Introduction to Computers
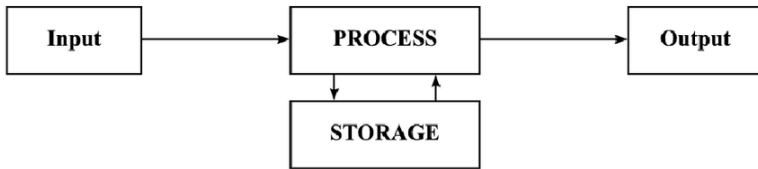## Unit- 1

Q1) Define a computer.

Computer is an advanced electronic device that takes raw data as input from the user and processes these data under the control of set of instructions and gives the result and saves output for the future use. Mainly computer works on IPOS formula.

accepts data	Input
processes data	Processing
produces output	Output
stores results	Storage

Q2) Give the characteristics and limitations of a computer?

Ans: Characteristics of a Computer:
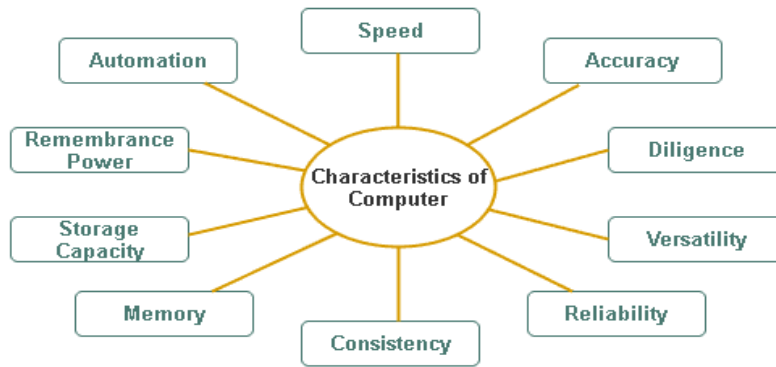
Characteristics of Computer

Speed:

A computer works with much higher speed and accuracy compared to humans while performing mathematical calculations. Computers can process millions (1,000,000) of instructions per second. The time taken by computers for their operations is microseconds and nanoseconds.

Accuracy :

Computers perform calculations with 100% accuracy. Computer always gives accurate results. The accuracy of Computer does not go down when they are used continuously for hours together. Errors may occur due to data inconsistency or inaccuracy.

Diligence:

A computer is free from tiredness, lack of concentration, 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.

Versatility:

Versatility refers to the capability of a computer to perform different kinds of works at the same time and with the same accuracy and efficiency.

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Reliability:
A computer is reliable as it gives consistent result for similar set of data i.e., if we give same set of input any number of times, we will get the same result.

Consistency:
The computer is so consistent that it can perform trillions of processes without errors for several hours. This means that we can use a computer 24 hours a day or 365 days a year continuously.

Memory & 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.

Remembrance:
Power of remembering is also very special Characteristics of the computer. You can store many types of information and data on your computer in very large quantities. Whenever you need this data in future, you can get that data in a few seconds

Automation:
Computer performs all the tasks automatically i.e. it performs tasks without manual intervention. Computers are quite capable of functioning automatically, once the process is given to the computer. They do not require any instruction from the operator at any stage of the process.

NO IQ :
Computer is a dumb machine and it cannot do any work without instruction from the user.

NO FEELING :
Computer does not have emotions, knowledge, experience, feeling.

Limitations of a Computer System:
Computers can't think:
Computers cannot think and they can't do any job unless they are first programmed with specific instructions for same. They work as per stored instructions. Algorithms are designed by humans to make a computer perform a special task. This is also called artificial intelligence.

Computers can't decide:
Computers are incapable of decision making as they do not possess the essential elements necessary to take a decision i.e. knowledge, information, wisdom, intelligence and the ability to judge.

Computers can't express their Ideas:
In any type of research ideas plays a vital role. In this context, computers can't express their ideas.

Computers can't implement:
Though computers are helpful in storage of data and can contain the contents of encyclopedias even, but only humans can decide and implement the policies.

Q3. Explain the generations of Computers?
Generation in computer terminology is a change in technology a computer was being used. There are totally five computer generations known till date. Each generation has been discussed in detail along with their time period and characteristics. Following are the main five generations of computers:

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First Generation (1946-1959): The period of first generation was 1946-1959.
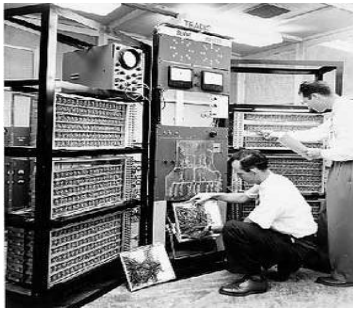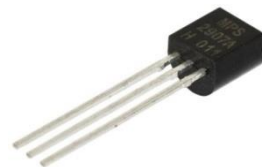

Advantages:
- 1 It made use of <u>vacuum tubes</u> which are the only electronic component available during first generation.
- 2. These computers could calculate in milliseconds.

Disadvantages:
- These were very big in size, weight was about 30 tones.
- These computers were based on vacuum tubes.
- These computers were very costly.
- Very less work efficiency.
- Large amount of energy consumption.
- It could store only a small amount of information due to the presence of magnetic drums.
- vacuum tubes require a large cooling system.
- Limited programming capabilities and punch cards were used to take inputs.
- Not reliable and constant maintenance is required.

Few Examples are: 1. ENIAC   2. EDVAC   3. UNIVAC   4. IBM-701   5. IBM-650

SECOND GENERATION: [1959-1965] is the period of second-generation computer.

Second generation computers were based on **Transistor** instead of vacuum tubes.

Advantages:
- The size of computer is reduced because Transistor is used instead of vacuum tubes.
- Less energy and not produce as much heat as the first generation.
- Low cost than first generation computers.
- Better speed, calculate data in microseconds.
- Better portability as compared to first generation

Disadvantages:
- A cooling system was required.
- Constant maintenance was required.
- Only used for specific purposes.

Few Examples are:
1 Honeywell 400   2. IBM 7094   3. CDC 1604   4. CDC 3600   5. UNIVAC 1108

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THIRD GENERATION: 1965-1971 is the period of third generation computer.These computers were based on **Integrated circuits(IC).**
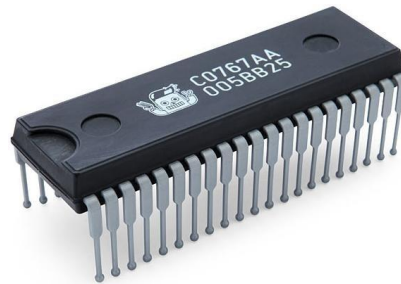
Advantages:
- These computers were cheaper as compared to second-generation computers.
- They were fast and reliable.
- Use of IC in the computer provides the small size of the computer.
- IC not only reduce the size of the computer but it also improves the performance of the computer as compared to previous computers.
- This generation of computers has big storage capacity.
- Instead of punch cards, mouse and keyboard are used for input.
- These computers reduce the computational time from microseconds to nanoseconds.

Disadvantages:
- IC chips are difficult to maintain.
- The highly sophisticated technology required for the manufacturing of IC chips.
- Air conditioning is required.

Few Examples are: 1. PDP-8   2. PDP-11   3. ICL 2900   IBM 360

FOURTH GENERATION:

The period of fourth generation was from 1971-1980. Computers of fourth generation used Very Large Scale Integrated (VLSI) circuits.This technology is based on Microprocessor.

A microprocessor is used in a computer for any logical and arithmetic function to be performed in any program.

Advantages:
- Fastest in computation and size get reduced as compared to the previous generation of computer.
- Heat generated is negligible.
- Small in size as compared to previous generation computers.
- Less maintenance is required.
- All types of high-level language can be used in this type of computers.

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Disadvantages:
- ➢ The Microprocessor design and fabrication are very complex.
- ➢ Air conditioning is required in many cases due to the presence of ICs.
- ➢ Advance technology is required to make the ICs.

Few Examples are: 1. IBM 4341   2. DEC 10   3. STAR 1000   4.PUP 11

FIFTH GENERATION: The period of the fifth generation in 1980-onwards.This generation is based on artificial intelligence.This generation is based on ULSI(Ultra Large Scale Integration) technology resulting in the production of microprocessor chips having ten million electronic component.

Advantages*:*
- ✓ It is more reliable and works faster.
- ✓ It is available in different sizes and unique features.
- ✓ It provides computers with more user-friendly interfaces with multimedia features.

Disadvantages:
1. They need very low-level languages.
2. They may make the human brains dull and doomed.

Few Examples are: 1. Desktop   2. Laptop   3. NoteBook 4. UltraBook 5. Chromebook

Q4 Explain the types or Classification of computers?

Computers are classified according to their functionality and size.

Based on Functionality:

According to functionality computer can be divided in to three types: Analog, Digital, Hybrid

Analog Computer:

An analog computer is a computer which is used to process analog data. Analog computers store data in a continuous form of physical quantities and perform calculations with the help of measures. Analog computers are excellent for situations which require data to be measured directly without converting into numerals.

Examples: Thermometer, analog clock, speedometer, air crafts etc.

Digital Computer

Digital computer is a machine or a device that helps to process any kind of information.These are the devices through which we provide some input and get the output within a fraction of seconds.The operations that are conducted internally in the device happens using the binary number system since the computer understands only digits i.e 0's and 1's.

Examples are: IBM PC, Calculators, Digital watches, etc.

Hybrid computer:

The hybrid computer is different type of computer that has both features of digital and analog computer. Main objective of designing of this computer is to perform very complicated calculations. Hybrid computers can be used in the large scale organizations to solve logical and technical calculations as well as offer great processing of differential equations.

Examples are: Hybrid computer is the computer used in hospitals to measure the heartbeat of the patient, Devices used in petrol pump.

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Based on Size:
Super Computer:
Supercomputers are one of the fastest computers currently available. Supercomputers are very expensive and are employed for specialized applications that require extremely large amount of mathematical calculations. For example, weather forecasting, scientific simulations, graphics, nuclear energy research, electronic design, and analysis of geological data.

Main frame Computer:
Mainframe is very large in size and is an expensive computer capable of supporting hundreds or even thousands of users simultaneously. Mainframe executes many programs concurrently and supports much simultaneous execution of programs.

Mini computer:
A minicomputer is a type of computer that possesses most of the features and capabilities of a large **computer** but is smaller in physical size. A minicomputer fills the space between the mainframe and microcomputer,

Micrro Computer:
Microcomputer is known as personal computer like as small computer. Microcomputers are designed with <u>microprocessor</u> as well as it consists single chip that is CPU (Central Processing Unit), data memory (RAM, ROM), and I/O buses; these are connected on the motherboard.

Q5) What are the Applications or uses of Computers?
Computers are used in so many fields in our daily life. From Engineers to Doctors, Students, Teachers, and Government Organization they all use computers to perform specific tasks, for entertainment or just to finish office work. Computers have made our life easier.

Business: A computer has high speed of calculation, diligence, accuracy, reliability, or versatility which made it an integrated part in all business organisations. Computer is used in business organizations for:

- Budgeting
- Sales analysis
- Managing employees database

Banking: Today banking is almost totally dependent on computer. Banks provide following facilities:

- Banks provide online accounting facility, which includes current balances, deposits, overdrafts, interest charges, shares, and trustee records.
- ATM machines are making it even easier for customers to deal with banks

Insurance:
Insurance companies are keeping all records up-to-date with the help of computers. The insurance companies, finance houses and stock broking firms are widely using computers for their concerns. Insurance companies are maintaining a database of all clients with information showing

- procedure to continue with policies
- next due installment of a policy
- maturity date

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Education: The computer has provided a lot of facilities in the education system.
- The computer provides a tool in the education system known as CBE (Computer Based Education) which involves control, delivery, and evaluation of learning.
- The computer education is rapidly increasing the graph of number of computer students.

Marketing: In marketing, uses of computer are following:
- **Advertising -** With computers, advertising professionals create art and graphics, write and revise copy, and print and disseminate ads with the goal of selling more products.
- **At Home Shopping -** Home shopping has been made possible through use of computerized catalogues that provide access to product information and permit direct entry of orders to be filled by the customers.

Health Care: Computers have become important part in hospitals, labs, and dispensaries. The computers are being used in hospitals to keep the record of patients and medicines. It is also used in scanning and diagnosing different diseases. ECG, EEG, Ultrasounds and CT Scans etc., are also done by computerised machines. Some major fields of health care in which computers are used are:
- **Diagnostic System -** Computers are used to collect data and identify cause of illness.
- **Patient Monitoring System -** These are used to check patient's signs for abnormality such as in Cardiac Arrest, ECG etc.

Engineering Design: Computers are widely used in engineering purpose. One of major areas is CAD (Computer aided design). That provides creation and modification of images. Some fields are:
- **Structural Engineering -** Requires stress and strain analysis for design of Ships, Buildings, Budgets, and Airplanes etc.
- **Architectural Engineering -** Computers help in planning towns, designing buildings, determining a range of buildings on a site using both 2D and 3D drawings.

Military: Computers are largely used in defence. Modern tanks, missiles, weapons etc. Military also employs computerised control systems. Some military areas where a computer has been used are:
- Missile Control
- Military Communication

Communication: Communication means to convey a message, an idea, a picture or speech that is received and understood clearly and correctly by the person for whom it is meant for. Some main areas in this category are:
- E-mail
- Chatting
- Video-conferencing

Government: Computers play an important role in government. Some major fields in this category are:
- Budgets
- Male/Female ratio
- Computerization of voters lists

Q6) Draw the Block diagram or Architecture of a Computer? Explain its parts in detail

Computer Block Diagram System:

　　　Mainly computer system consists of three parts, that are Input Devices, Central processing unit (CPU) and Output Devices. The Central Processing Unit (CPU) is divided into two parts again: arithmetic logic unit (ALU) and the control unit (CU). The set of instruction is in the form of raw data. A large amount of data is stored in the computer memory with the help of primary and secondary storage devices. The CPU is like the heart/brain of the computer. The Central processing unit (CPU) is responsible for the processing of all the instructions which are given by the user to the computer system.

Block diagram of Computer
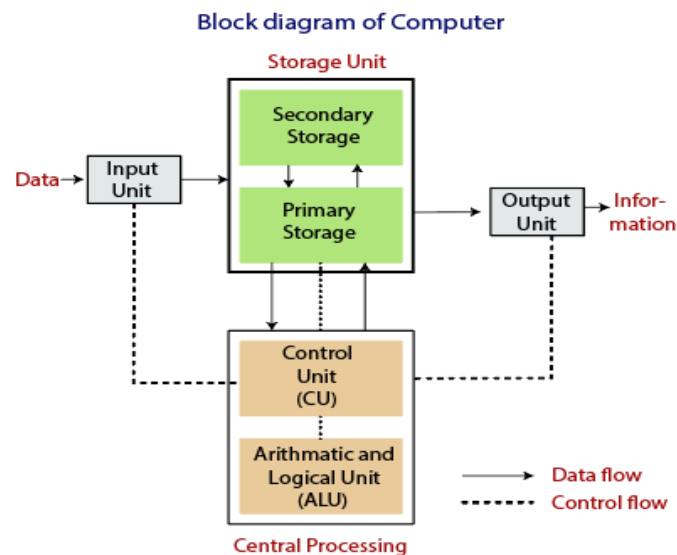
Input unit:

　　　A computer takes input as a raw data (Binary data) and performs necessary processing giving out processed data. The Input unit consists of input devices such as a mouse, key board , scanner, joy stick, etc. These devices are used to input information. All the input devices perform the following functions.

• Accept the data and instructions from the outside world.

• Convert it to a form that the computer can understand(Binary data).

• Supply the converted data to the computer system for further processing

Storage Unit: The storage unit of the computer holds data and instructions that are entered through the input unit, before they are processed. It preserves the intermediate and final results before these are sent to the output devices. It also saves the data for the later use. The various storage devices of a computer system are divided into two categories they are Primary memory and secondary memory. Primary memory is temporary memory and main memory of the computer, primary memory includes RAM and ROM. The secondary memory is permanent memory it includes Hard disk, floppy disk, etc.

Central Processing Unit: The Control Unit (CU) and Arithmetic Logic Unit (ALU) of the computer are together known as the Central Processing Unit (CPU). The CPU is like brain performs the following functions:

• It performs all calculations.

• It takes all decisions.

•It controls all units of the computer.

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Arithmetic Logical Unit:

All calculations are performed in the Arithmetic Logic Unit (ALU) of the computer. It also does comparison and takes decision. The ALU can perform basic operations such as addition, subtraction, multiplication, division, etc and does logic operations viz, >,<,= etc Whenever calculations are required, the control unit transfers the data from storage unit to ALU once the computations are done, the results are transferred to the storage unit by the control unit and then it is send to the output unit for displaying results.

Control Unit:

It controls all other units in the computer. The control unit instructs the input unit, where to store the data after receiving it from the user. It controls the flow of data and instructions from the storage unit to ALU. It also controls the flow of results from the ALU to the storage unit.

Output Unit:

The output unit of a computer provides the information and results of a computation to outside world. Printers, Visual Display Unit (VDU) are the commonly used output devices. Other commonly used output devices are Speaker, Headphone, Projector etc.

The output unit performs the following major functions

• The output unit accepts the data or information in binary form from main memory of the computer system.

• The output unit converts the binary data into a human readable from for better understanding.

Q 7)What is Primary Memory? Explain its types?

Primary memory or main memory or internal memory is the only type of memory that is directly accessed by the CU. The CPU continuously reeds instructions stored in the primary memory and execute them. Any data that has to be operated by the CPU is also stored there. Primary memory is divided into two memories they are – Read only memory (ROM), Random Access memory (RAM).

Random Access Memory (RAM): RAM is a <u>volatile memory</u> within the computer that is typically used to store data temporarily. RAM is considered random access because any memory cell can be directly accessed if its address is known when the RAM gets full; the computer system operates at a slow speed.

In the year 2000, a personal computer had only 128MB of RAM, but today PCs have 1-2 GB of RAM. There are two types of RAM – static RAM and dynamic RAM.

Static RAM – this type of RAM that holds data without an external refresh as long as it is powered. SRAM is occupies more space ad most expensive and is faster, more reliable.

Dynamic RAM – This is the most common type of memory used in personal computers, workstations and servers today. A DRAM chip contains millions of tiny memory cells. Each cell is made up of transistor and capacitor and can contain one bit of information. To store a bit of

information in a DRAM chip, a tiny amount of power is put into a cell to charge the capacitor.

Read only Memory (ROM): ROM refers to computer memory chips containing permanent data. Unlike ROM is non- volatile; that is the data is retained in it even after the computer is turned off

Most computers contain a small amount of ROM that stores critical programs such as the basic input/output system (BIOS), which is used to boot up the computer when it is turned on.

Q 8) What is secondary memory? Explain its types?

Secondary memory is also known as external memory or auxiliary memory in that it is not directly accessible by the CPU. The secondary storage devices hold data even when the computer is switched off. An example of such devices is hard disk, floppy disk, magnetic tape, CD, DVD, pen drives, memory cards, etc.

Magnetic tape: Magnetic tapes are storage devices capable of backing up and retaining large volumes of data. A magnetic tape is a thin strip of plastic coated with magnetic recording material.

Magnetic tapes are available in the form of cassettes, reels and cartridges.

A magnetic tape drive is used to read and write data on magnetic tape. A magnetic tape is compact in size, light in weight and can be used to transfer data from one computer to another.

Floppy disk: Floppy disks are data storage devices that consist of a thin magnetic storage medium encased in a square plastic shell. The storage capacity of the floppy disk is very limited, and its cost is cheap, they are much slower than other data storage devices.

Floppy disks were widely used from the mid 1970s till 2000s to distribute software, transfer of data, however today their use has become limited.

The mechanism of floppy disk involves two motors, while one motor in the drive rotates the disk at a speed, the second motor moves the magnetic R/W head to read or write the data on the magnetic plate. The memory capacity of the 3.5 inch floppy disk is 1.44 MB

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Hard disk: The hard disk is a part of the computer that stores all the programs and files, so if the drive is damaged for some reason, all the data stored on the computer is lost.A hard disk is basically a set of disks, stacked together, that has data recorded electromagnetically on tracks. Hard disks are also called as magnetic disks; at present 1 Terra byte hard disks are available.

Magnetic disks enable random access of data; can be used as a shared device in a multi-user environment. The cost of the magnetic disk is very low, and its data transfer rate is much higher than magnetic tapes.

Optical Disk:

Optical storage refers to storing data on an optical readable medium that can be read using a beam of laser light focused on a spinning disk. The most popular optical storage devices

are CD, DVD, etc.

CD-ROM:- Compact disk read only memory, is a type of optical disk that uses laser technology to read and write data onto the disk. Once the information is stored on the disk is permanent and **cannot be altered.**

CD-R:- Compact disk recordable is a blank disk that can be used to store information. The user can write the data onto the disk until the maximum disk capacity is fill after that we cannot write data.

CD-RW:- Compact disk rewritable is a new generation of erasable optical disk. The user can write and overwrite data on the CD-RW disk multiple times.

DVD-ROM:- Digital video disk or digital versatile disk is an extremely high capacity optical disk with storage capacity ranging from 4.7 GB to 17 GB. DVDs are widely used to store large data bases, movies, music, softwares, etc.

USB flash drives:

USB flash drives are removable and rewritable and are physically much smaller drives, weighting less than 30g. A flash drive consists of a small printed circuit board carrying the circuit elements and a USB connector that can be carried in a pocket or on a key chain.They can be easily used to transfer data from one computer to another. Flash drives have higher data capacity than any other removable media. In 2010, the storage capacity of the USB flash drives was as large as 256 GB.

Q9) Explain the types of input devices?

An input device is any hardware device that sends data to a computer, allowing you to interact with and control the computer. The most commonly used input devices on a

computer are the keyboard and mouse. However, there are dozens of other devices that can also be used to input data into the computer. Below is a list of computer input devices that can be used with a computer or a computing device.

- 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

Keyboard: Keyboard is the most common and very popular input device which helps in inputting 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. 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 (0-9) which generally give same layout as that of typewriters.
2	Numeric Keypad	It is used to enter numeric data or cursor movement.
3	Function Keys	The twelve function keys are present on the keyboard which is arranged in a row at the top of the keyboard. Each function key has 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.

Pointing Device:

Mouse: Mouse is 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 mouse and sends

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

Light Pen: Light pen is a pointing device which is 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

pen button is pressed, its ph otocell sensing element detects the screen location and sends the corresponding signal to the CPU.

Track Ball: A trackball is a pointing device that is used to control the position of the cursor on the screen. It is usually used in notebook computers.

Touchpad: A touchpad is a small, flat, rectangular stationary pointing device with a sensitive surface of square inches. The user has to slide his or her fingertips across the surface of the pad to point to a specific object on the screen. The surface translates the motion and position of the user's fingers to a relative position on the screen. Touch pads are widely used in laptops, and are in built on the laptop keyboards.

Handheld input devices:

Joystick: Joystick is also a pointing device which is used to move 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 joystick is

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

Touch Screen: A touch screen is a display screen that can identify the occurrence and position of a touch inside the display region. The user can touch the screen either by using a finger or a stylus. The touch screen facilitates the users to interact with what is displayed on the screen in a

straightforward manner, rather than in an indirect way by using a mouse or a touchpad. Such touch screen displays are available on computers, laptops, PDAs, and mobile phones.

Optical Input Devices: Optical devices, also known as data-scanning devices, use light as a source of input for detecting or recognizing different objects such as characters, marks, codes, and images. The optical device converts these objects into digital data and sends it to the computer for further processing. Some optical devices that are discussed in this section include barcode readers, image scanners, optical character recognition (OCR) devices, optical mark readers (OMR), and magnetic ink character recognition (MICR) devices.

Barcode Scanner: A barcode reader is a handheld input device that is used to capture and read information stored in a bar code. It consists of a scanner, a decoder, and a cable used to connect the reader to a computer. The function of the barcode reader is to capture and translate the bar code into numerals and/or alphabets. It is connected to a computer for further processing of the captured information.

Image Scanner: A scanner is a device that captures images, printed text, and handwriting, from different sources such as photographic prints, posters, and magazines and converts them into digital images for editing and display on computers. Scanners come in handheld, feed-in, and flat bed types, and for scanning either colour images, black-and-white images, or both.

MICR Scanner: Magnetic ink character reader (MICR) is used to verify the legitimacy of paper documents, especially bank checks. It consists of magnetic ink printed characters that can be

recognized by high-speed magnetic recognition devices. The printed characters provide important information for processing to the receiving party

OMR Scanner: Optical mark recognition (OMR) is the process of electronically extracting data from marked fields, such as checkboxes and fill-in fields, on printed forms. The optical mark reader, is fed with an OMR sheet that has pen or pencil marks in predefined positions to indicate each selected response (such as answers for multiple-choice questions in an entrance examination)


OCR Scanner: Optical character recognition (OCR) is the process of converting printed materials into text or word processing files that can be easily edited and stored. The steps involved in OCR include:

> ➤ Scanning the text character by character
> ➤ Analyzing the scanned image to translate the character images into character codes

Q 10)Explain the types of Output devices?

Any device that gives information from a computer can be called an output device. Monitors and speakers are two widely used output devices. For example, monitors display characters as they are typed. Similarly, speakers play a song instantly when the user selects one from a playlist. Other examples of output devices include printers, plotters, and projectors.
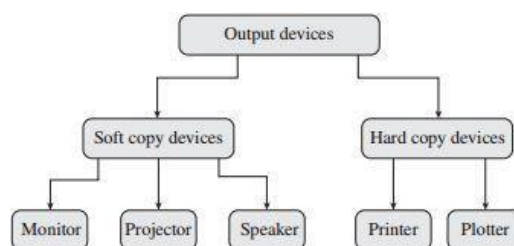
Soft copy output devices: Soft copy output devices produce an electronic version of an output, for example, a file that is stored on a hard disk, CD, or pen drive and is displayed on the computer screen. Features of a soft copy output include the following:

• The output can be viewed only when the computer is on.
• The user can easily edit soft copy output.
• Soft copy cannot be used by people who do not have a computer.
• Searching for data in a soft copy is easy and fast.

Monitors: The monitor is a soft copy output device used to display video and graphics information generated by the computer through the video card. Computer monitors are similar to television screens but they display information at a much higher quality. Monitors come in three variants—cathode ray tube (CRT), liquid crystal display (LCD), and plasma

CRT Monitors: CRT (Cathode Ray Tube) monitors work by firing charged electrons at a phosphorus film. When electrons hit the phosphor-coated screen, they glow, thereby enabling the

user to see the output. The size of CRT monitors is big and high power consumption.

LCD Monitors: An LCD (Liquid Crystal Display) monitor is a thin, flat, electronic visual display unit that uses the light modulating properties of liquid crystals, which do not emit light directly. LCD screens are used in a wide range of applications ranging from computer monitors, televisions, instrument panels, aircraft cockpit displays, signage, etc.

Plasma Monitors: Plasma monitors are thin and flat monitors widely used in televisions and computers. The plasma display contains two glass plates that have hundreds of thousands of tiny cells filled with xenon and neon gases.

Projectors: A projector is a device that takes an image from a video source and projects it onto a screen or another surface. These days, projectors are used for a wide range of applications, varying from home theatre systems for projecting movies and television programmes onto a screen much larger than even the biggest available television.

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Speakers: By using speakers, the user can enjoy music, movie, or a game, and the voice will be spread through the entire room. With good quality speakers, the voice will also be audible even to people sitting in another room or even to neighbours

Hard copy output devices:

Hard copy output devices produce a physical form of output. For example, the content of a file printed on paper is a form of hard copy output.

Printers: A printer is a device that takes the text and graphics information obtained from a computer and prints it on to a paper. Printers are available in the market in various sizes, speeds, and costs. Usually, more expensive printers are used for higher-resolution colour printing. Printers can be broadly classified into two groups: *impact* and *non-impact* printers

Impact printers: These printers print characters by striking an inked ribbon against the paper. Examples of impact printers include dot matrix printers, daisy wheel printers, and most types of line printers.

Dot Matrix Printer: A dot matrix printer prints characters and images of all types as a pattern of dots (hence the name). This printer has a print head that consists of pins representing the character or image. The print head runs back and forth, or in an up-and-down motion on the page and prints by striking an ink-soaked cloth ribbon against the paper, much like the print mechanism of a typewriter. From 1970s to 1990s, dot matrix impact printers were the most common type of

printers used with PCs

Daisy Wheel Printer: A daisy wheel printer uses an impact printing technology to generate high-quality output comparable to typewriters, and is three times faster. However, today, daisy wheel technology is found only in some electronic typewriters. The print head of a daisy wheel printer is a circular wheel, about 3 inches in diameter with arms or spokes. The shape of the printer wheel resembles the petals of a daisy flower, and hence its name. The characters are embossed at the outer ends of the arms.

Line Printer: A line printer is a high-speed impact printer in which one typed line is printed at a time. The speed of a line printer usually varies from 600 to 1200 lines per minute, or approximately 10–20 pages per minute. Because of their high speed, line printers are widely used in data centres and in industrial environments. Band printer is a commonly used variant of line printers.

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Non-Impact Printers: These are much quieter than impact printers, as their printing heads do not strike the paper. They offer better print quality, faster printing, and the ability to create prints that contain sophisticated graphics. Non-impact printers use either solid or liquid cartridge-based ink, which is sprayed, dripped, or electro-statically drawn onto the page. The main types of non-impact printers are inkjet, laser, and thermal printers

Inkjet Printer: Inkjet printers came in the market in the 1980s, but it was only in the 1990s that their prices reduced enough to bring the technology to the high street. Inkjet printers have made rapid technological advances in recent years. The colour inkjet printers have succeeded in making colour printing an affordable option even for home users.

Laser printer: A laser printer is a non-impact printer that works at very high speeds and produces high-quality text and graphics. It uses the technology used in photocopier machines.

Plotters: A plotter is a printing device that is usually used to print vector graphics with high print quality. They are widely used to draw maps, in scientific applications, and in CAD, CAM, and computer aided engineering (CAE).

Q11) Operating System and functions of Operating System

An Operating System (OS) is an interface between a computer user and computer hardware. An operating system is a software which performs all the basic tasks like file management, memory management, process management, handling input and output, and controlling peripheral devices such as disk drives and printers.

Some popular Operating Systems include Linux Operating System, Windows Operating System, VMS, OS/400, AIX, z/OS, etc.

Functions of an operating System.

- Memory Management
- Processor Management
- Device Management
- File Management
- Security
- Control over system performance
- Job accounting
- Error detecting aids
- Coordination between other software and users

Memory Management Memory management refers to management of Primary Memory or Main Memory. Main memory is a large array of words or bytes where each word or byte has its own address.Main memory provides a fast storage that can be accessed directly by the CPU. For a program to be executed, it must in the main memory.

An Operating System does the following activities for memory management −

- Keeps tracks of primary memory, i.e., what part of it are in use by whom, what part are not in use.
- In multiprogramming, the OS decides which process will get memory when and how much.
- Allocates the memory when a process requests it to do so.
- De-allocates the memory when a process no longer needs it or has been terminated.

Processor Management

In multiprogramming environment, the OS decides which process gets the processor when and for how much time. This function is called **process scheduling**. An Operating System does the following activities for processor management −

- Keeps tracks of processor and status of process. The program responsible for this task is known as **traffic controller**.
- Allocates the processor (CPU) to a process.
- De-allocates processor when a process is no longer required.

Device Management

An Operating System manages device communication via their respective drivers. It does the following activities for device management −

- Keeps tracks of all devices. Program responsible for this task is known as the **I/O controller**.
- Decides which process gets the device when and for how much time.
- Allocates the device in the efficient way.
- De-allocates devices.

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File Management

A file system is normally organized into directories for easy navigation and usage. These directories may contain files and other directions.

An Operating System does the following activities for file management −

- Keeps track of information, location, uses, status etc. The collective facilities are often known as **file system**.
- Decides who gets the resources.
- Allocates the resources.
- De-allocates the resources.

Other Important Activities

Following are some of the important activities that an Operating System performs −

- **Security** − By means of password and similar other techniques, it prevents unauthorized access to programs and data.
- **Control over system performance** − Recording delays between request for a service and response from the system.
- **Job accounting** − Keeping track of time and resources used by various jobs and users.
- **Error detecting aids** − Production of dumps, traces, error messages, and other debugging and error detecting aids.
- **Coordination between other softwares and users** − Coordination and assignment of compilers, interpreters, assemblers and other software to the various users of the computer systems.

Q12)Types of Operating Systems:

An Operating System performs all the basic tasks like managing files, processes, and memory. Thus operating system acts as the manager of all the resources, i.e. **resource manager**. Thus, the operating system becomes an interface between user and machine.

Types of Operating Systems: Some widely used operating systems are as follows-

1.Batch Operating system: This type of operating system does not interact with the computer directly. There is an operator which takes similar jobs having the same requirement and group them into batches. It is the responsibility of the operator to sort jobs with similar needs.
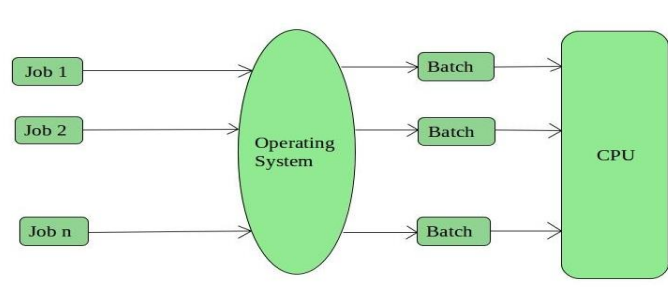
Advantages of Batch Operating System:

- It is very difficult to guess or know the time required for any job to complete. Processors of the batch systems know how long the job would be when it is in queue
- Multiple users can share the batch systems
- The idle time for the batch system is very less
- It is easy to manage large work repeatedly in batch systems

Disadvantages of Batch Operating System:

- The computer operators should be well known with batch systems
- Batch systems are hard to debug
- It is sometimes costly
- The other jobs will have to wait for an unknown time if any job fails

Examples of Batch based Operating System: Payroll System, Bank Statements, etc.

2. Time-Sharing Operating Systems –

Each task is given some time to execute so that all the tasks work smoothly. Each user gets the time of CPU as they use a single system. These systems are also known as Multitasking Systems. The task can be from a single user or different users also. The time that each task gets to execute is called quantum. After this time interval is over OS switches over to the next task.
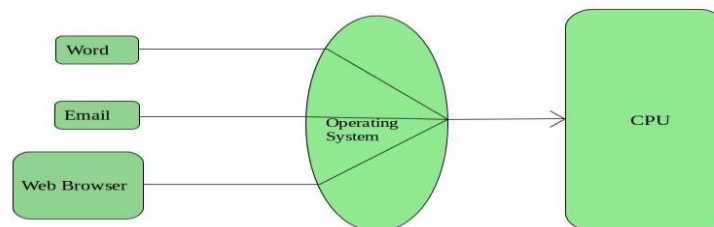
Advantages of Time-Sharing OS:

- Each task gets an equal opportunity
- Fewer chances of duplication of software
- CPU idle time can be reduced

Disadvantages of Time-Sharing OS:

- Reliability problem
- One must have to take care of the security and integrity of user programs and data
- Data communication problem

Examples of Time-Sharing OSs are: Multics, Unix, etc.

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3.Distributed Operating system:

A distributed operating system is system software over a collection of independent, networked, communicating, and physically separate computational nodes. They handle jobs which are serviced by multiple CPUs. Each individual node holds a specific software subset of the global aggregate operating system.
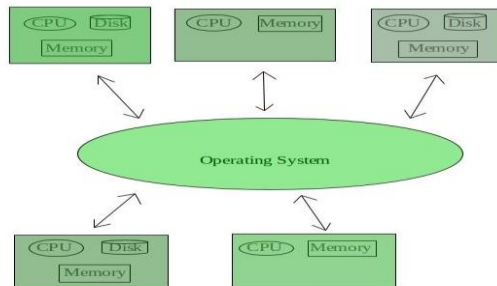
Advantages of Distributed Operating System:

- Failure of one will not affect the other network communication, as all systems are independent from each other
- Electronic mail increases the data exchange speed
- Since resources are being shared, computation is highly fast and durable
- Load on host computer reduces
- Delay in data processing reduces

Disadvantages of Distributed Operating System:

- Failure of the main network will stop the entire communication
- To establish distributed systems the language which is used are not well defined yet
- These types of systems are not readily available as they are very expensive. Not only that the underlying software is highly complex and not understood well yet

Examples of Distributed Operating System are- LOCUS, etc.

4. Network Operating System – **Network Operating System** is one of the important type of operating system.

Network Operating System runs on a server and gives the server the capability to manage data, users, groups, security, applications, and other networking functions. The basic purpose of the network operating system is to allow shared file and printer access among multiple computers in a network, typically a local area network (LAN), a private network or to other networks.
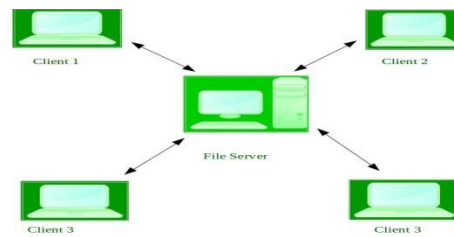
Advantages of Network Operating System:

- Highly stable centralized servers
- Security concerns are handled through servers
- New technologies and hardware up-gradation are easily integrated into the system
- Server access is possible remotely from different locations and types of systems

Disadvantages of Network Operating System:

- Servers are costly
- User has to depend on a central location for most operations
- Maintenance and updates are required regularly

Examples of Network Operating System are: Microsoft Windows Server 2003, Microsoft Windows Server 2008, UNIX, Linux, Mac OS X, Novell NetWare, and BSD, etc.

5. Real-Time Operating System –
It is defined as an operating system known to give maximum time for each of the critical operations that it performs, like OS calls and interrupt handling.

The Real-Time Operating system which guarantees the maximum time for critical operations and complete them on time are referred to as **Hard Real-Time Operating Systems.**

While the real-time operating systems that can only guarantee a maximum of the time, i.e. the critical task will get priority over other tasks, but no assurity of completeing it in a defined time. These systems are referred to as **Soft Real-Time Operating Systems**.
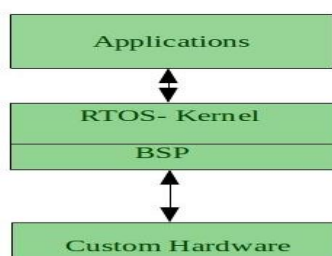
Examples of Real-Time Operating Systems are: Scientific experiments, medical imaging systems, industrial control systems, weapon systems, robots, air traffic control systems, etc.