

CACS 201: Computer Fundamentals and Applications

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- Introduction to Computer
- Characteristics of Computer
- Applications of Computer
- Classifications of Computer
- Anatomy of digital Computer
- Computer Architecture
- Input and output devices
- Memory and its classification
- Mobile Computing
- Interfaces

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Introduction to Computer System

The word computer comes from the word “compute”, which means, “to calculate”
Thereby, a computer is an electronic device that can perform arithmetic and logic operations at high speed , instructions and result.

A computer is an electronic device that is used to accept the data, process the data and give the desired information so that people can understand. Thus, the main tasks that are carried out by computer are:

- Accept the data
- Process or manipulate the data
- Output result in the form suitable for human understanding
- Stores the data.

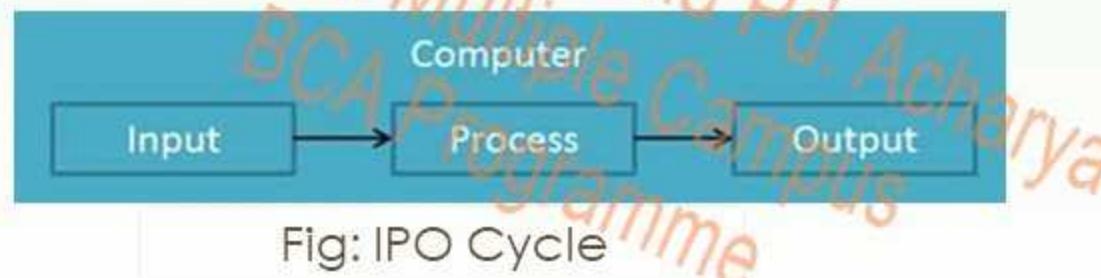


Fig: IPO Cycle

Computer is an advanced electronic device that takes raw data as input from the user and processes it under the control of set of instructions (called program), gives the result (output), and saves it for the future use.

Computer components

- Hardware - physical parts of the computer example, CPU, printer, keyboard, hard disk
- Software - instructions to the computer or collection of programs. Word, PowerPoint
- Data - raw facts the computer can manipulate and convert it into information.
- People - also known as users, who operate the computer.

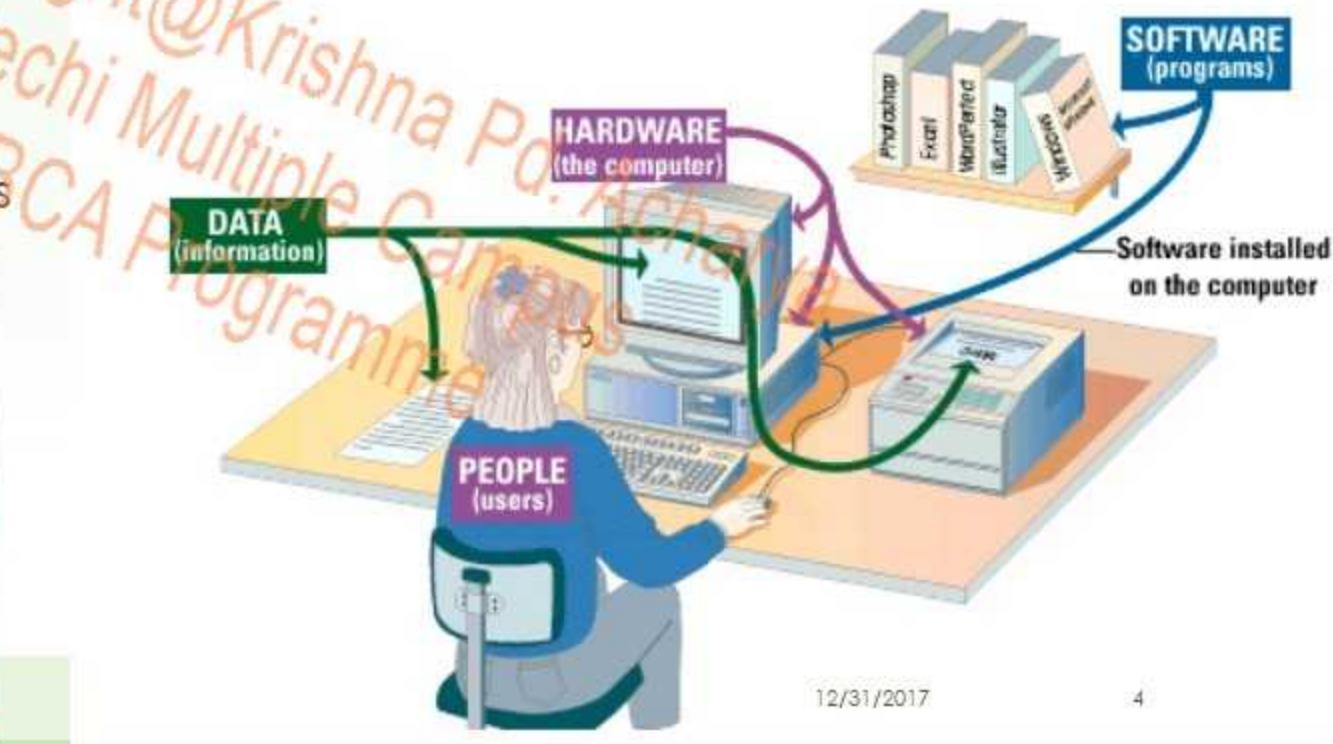
Data: the plural form of datum. It is raw fact and figure in the form text, picture, audio, video etc. which does not have any especial meaning.

Information: processed data which gives meaning full information

2 Medium Sodas	\$1.49 each
1 Small Turkey Sub	\$3.49 each
1 Caesar Salad	\$4.49 each
1 Bag of Chips	\$0.99 each
3 Cookies	\$0.39 each
Amount Received	\$20.00

Arrow Deli 10 Park Street Maple River, DE 20393 (734) 555-2939		
QTY	ITEM	TOTAL
2	Medium Sodas	2.98
1	Small Turkey Sub	3.49
1	Caesar Salad	4.49
1	Bag of Chips	0.99
3	Cookies	1.17
Total Due		13.12
Amount Received		20.00
Change		6.88

Thank You!



Characteristics of Computer

Automatic: Given a job, computer can work on it automatically without human interventions.

Speed: Computer can perform data processing jobs very fast, usually measured in milliseconds(10^{-3}), microseconds(10^{-6}), nanoseconds(10^{-9}) and picoseconds(10^{-12}). It is capable of performing billion(10^9) and trillion(10^{12}) simple arithmetic operation in a second. MIPS,BIPS

Accuracy: Accuracy of a computer is consistently high and the degree of its accuracy depends upon its design. Computer errors caused due to incorrect input data referred to as Garbage-In-Garbage-Out (GIGO).

Diligence: Computer is free from monotony, tiredness, and lack of concentration. It can continuously work for hours without creating any error and without grumbling

Versatility: Computer is capable of performing almost any task, if the task can be reduced to a finite series of logical steps.

Power of remembering: Computer can store and recall any amount of information because of its secondary storage capability. It forgets or loses certain information only when it is asked to do so.

No I.Q. A computer does only what it is programmed to do. It cannot take its own decision in this regard

No Feelings: Computers are devoid of emotions. Their judgment is based on the instructions given to them in the form of programs that are written by us (human beings)

Advantage and Disadvantage of using computer

Advantage

- Speed
- Reliability
- Consistency
- Storage
- Communications

Disadvantage

- Violation of Privacy
- Public Safety
- Impact on Labor Force
- Health Risks
- Impact on Environment

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Applications of Computer

1. Business
 - Payroll calculations
 - Budgeting
 - Sales analysis
 - Financial forecasting
 - Managing employee database
 - Maintenance of stocks, etc.
 2. Banking
 - Online accounting facility
 - Checking current balance
 - Making deposits and overdrafts
 - Checking interest charges
 - Issue of shares.
 - Employee recording and payroll
 - ATM machines.
 3. Insurance
 - Procedure to continue with policies
 - Starting date of the policies
 - Next due installment of a policy
 - Maturity date
 - Interests due
 - Survival benefits
 - Bonus
 4. Education
 - CBE involves control, delivery, and evaluation of learning.
 - Use of Graph, chart, image, audio, video
 - To generate the result, calendar, questions, presentation,..
 - To analysis the various types of reports
 5. Marketing
 - Advertising
 - create art and graphics, write and revise copy, and print and disseminate ads with the goal of selling more products.
 - Home Shopping
 - use of computerized catalogues that provide access to product information.
 - Permit direct entry of orders to be filled by the customers.
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Applications of Computer

5. Healthcare

- It used in scanning and diagnosing different diseases.
- Test like ECG, EEG, ultrasounds and CT scans, etc. perform by computer
- Diagnostic System
- Lab-diagnostic System
- Patient Monitoring System
- Pharma Information System
- Surgery

6. Engineering Design

- With use of CAD/CAM (Computer Aided Design) that provides creation and modification of images or structure
- Architectural Engineering
- Industrial Engineering
- Structural Engineering

7. Defense

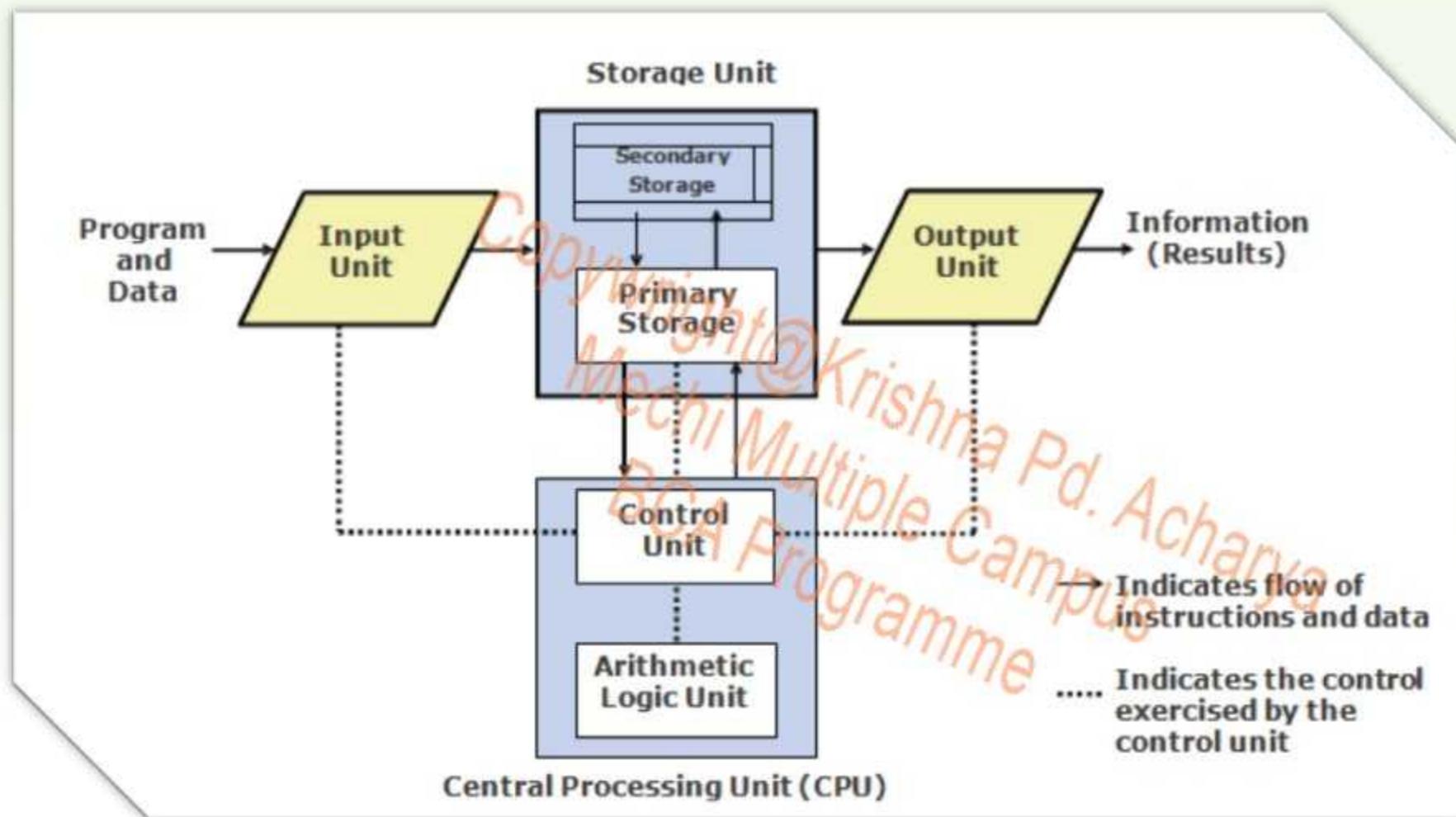
- Computers are largely used in defense modern tanks, missiles, weapons, etc. Military also employs computerized control systems. Some military areas where a computer has been used are –
- Missile Control
- Military Communication
- Military Operation and Planning
- Smart Weapons

8. Communication

- Communication is a way 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. Some main areas in this category are –E-mail, IM, FTP, www, Video-conferencing, VoIP call, IPTV

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Architecture/Organization/Anatomy of Computer



Architecture/Organization of Computer

Input unit:

1. It accepts (or reads) instructions and data from outside world.
2. It converts these instructions and data in computer acceptable form.
3. It supplies the converted instructions and data to the Computer system for further processing.

Output Unit:

1. It accepts the results produced by the CPU, which are in coded form and hence, it cannot be easily understood by us
2. It converts these coded results to human acceptable (readable) form
3. It supplies the converted results to outside

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Architecture/Organization of Computer

Arithmetic Logic Unit:

Arithmetic Logic Unit of a computer system is the place where the actual executions of instructions takes place during processing operation. Like +,-,/,* , AND,OR,NOT.

Control Unit:

Control Unit of a computer system manages and coordinates the operations of all other components of the computer system

Primary storage(RAM) (Storage Unit):

1. Used to hold running program instructions
2. Used to hold data, intermediate results, and results of ongoing processing of job(s)
3. Fast in operation
4. Small Capacity
5. Expensive
6. Volatile (loses data on power lost)

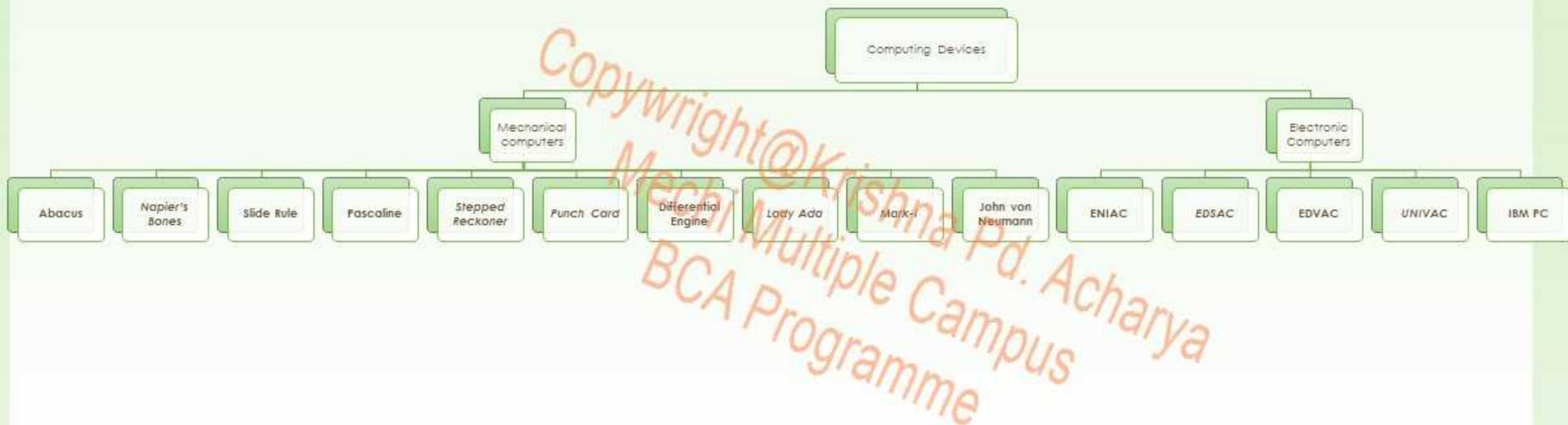
Architecture/Organization of Computer

Secondary storage(Hard Disk)

1. Used to hold stored program instructions
2. Used to hold data and information of stored jobs
3. Slower than primary storage
4. Large Capacity
5. Lot cheaper than primary storage
6. Retains data even without power

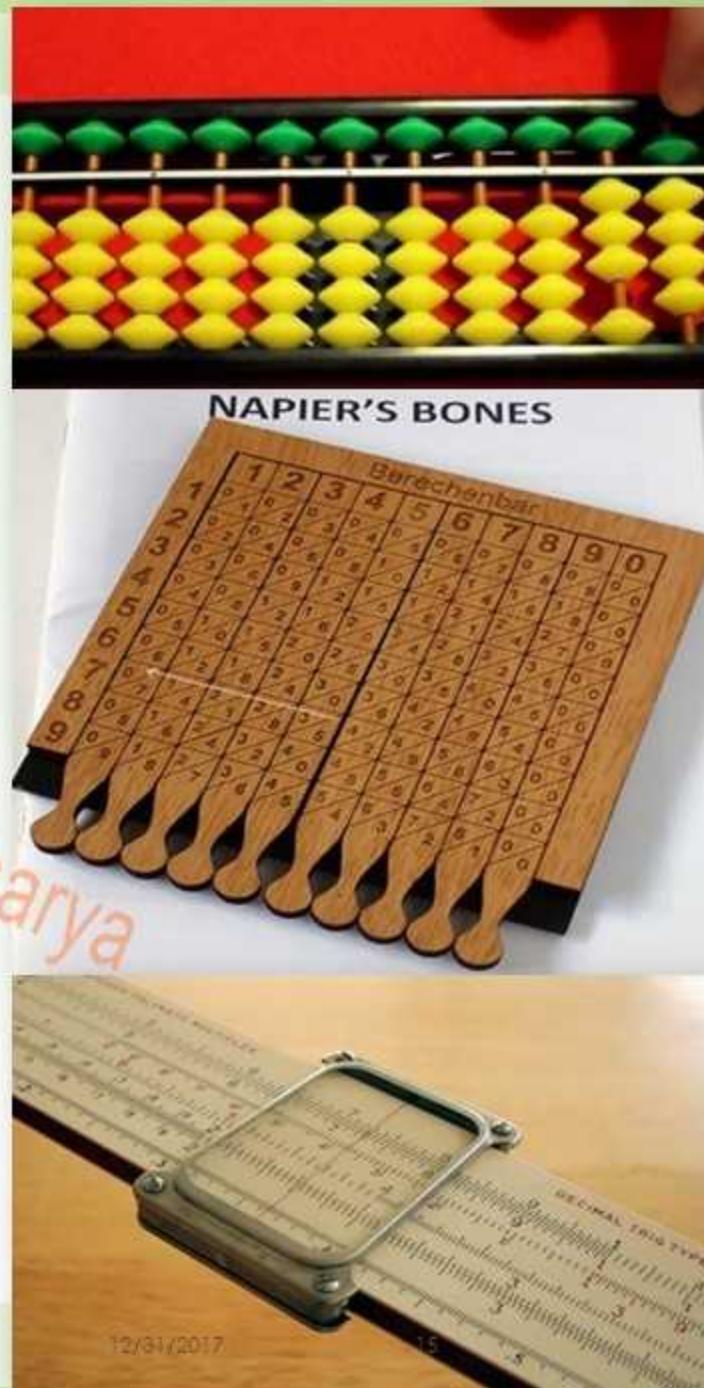
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History of Computer



History of Computer

- **Abacus:** It was the earliest counting device. It had a wooden frame and two sections called heaven and earth. Its section separated by a mid bar and each section having strings (rods). It could perform only add and subtract. It is believed to be discovered in China near 2000 BC first time and also found in Russia or Egypt.
- **Napier's Bones or Rods:** Scottish mathematician John Napier invented a principle of calculation called logarithm in 1614 AD and based on the same principle he invented some bone rods. It could perform multiplication very fast.
- **Slide Rule:** English mathematician William Augterd discovered a device in 1620 AD with two rulers and a slider on it for calculation. It was based on Napier's Bone. It could perform multiplication and division and it was the first analog device.



History of Computer

- **Pascaline:** French mathematician Blaise Pascal had developed a calculating machine called Pascaline. It was developed in 1642 AD and it is called Pascal's calculator. It had cogs and gears rotating in complement to each other and it had a simple monitor to see the result. It could perform operations add, subtract, multiply up to 8 digits, division.
- **Stepped Reckoner:** German mathematician Baron Gottfried Wilhelm Von Leibniz (In Short: G.V. Leibniz) had modified Pascaline and invented 'Stepped Reckoner' in 1671 AD and used till 1960s before Electronic or Electromechanical devices came into existence. It could perform Add, Sub, Multiply, Division and Square root first time
- **Jacquard's Loom and Punch Card:** One of the Textile Manufacturer Joseph Marie Jacquard had developed a Mechanism for automatic weaving of clothes in 1802 AD. It was based on some present or absence of some holes, in which principle punch cards were developed afterward. So Jacquard is known as a father of Punch Card.



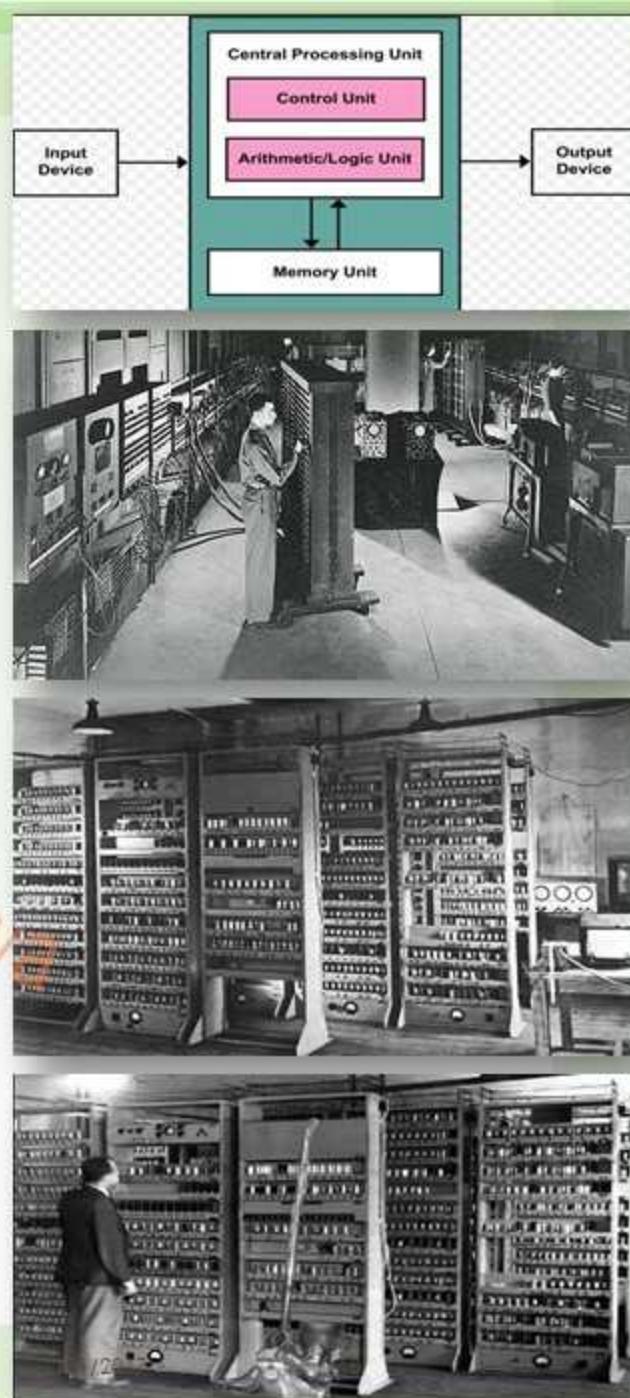
History of Computer

- **Charles Babbage:** One of the Great Mathematician of Cambridge University Charles Babbage Developed a First Engine in 1822 AD, called Difference Engine. It was not completed due to the lack of finance and after 10 years later he had invented another Engine in 1833 AD, called Analytical Engine. It was a great achievement of Charles Babbage due to the availability of finance as well as advancement of technology. Analytical Engine could perform the task same as Modern Computers, so he is known as father of Computer Science.
- **Lady Augusta Ada Lovelace:** She was a great follower of Charles Babbage. She had suggested to Babbage Use Binary Numbers System for his machine. She had developed a first program for Babbage's machine and it was first program in computer field and that was used by the Defence Department of USA, so she is known as first Programmer of the Computer Field.
- **Mark-I:** In 1937 prof. Howard Aiken developed an electromechanical computer (the first computer) called Mark-I. It was also Automatic Sequence Controlled Calculator (ASCC). It was based on Charles Babbage's principle after 100 years of his death. It was a very large computer and was used vacuum tubes (valves) as main memory. In 1944 AD, He modified it and invented Mark-II



History of Computer

- **John von Neumann Architecture** : Hungarian mathematician John von Neumann develops this concept in 1945s. It included three components used by most computers today: a CPU, memory (RAM), I/O and Control unit. Today "von Neumann architecture" often refers to the sequential nature of computers based on this model.
- **ENIAC (Electronic Numerical Integrator And Calculator)**: It was developed by John W. Mauchly and J. Presper Eckert. It was completed in 1946 and was used vacuum tube as main memory.
- **EDSAC (Electronic Delay Storage Automatic Computer)**: It was invented by Maurice Wilkes in 1949. It also used vacuum tubes. It was the first computer to use stored program.
- **EDVAC (Electronic Discrete Variable Automatic Computer)**: It was developed by J.P. Eckert and J. Mauchly in 1952. It was started before EDSAC but completed after it. So, some people say it was a computer to use stored program. It is also used vacuum tube as memory.



History of Computer

- **UNIVAC (Universal Automatic Computer)**: It was the first computer manufactured for commercial use and general purpose digital computer. Before this, all the computers were used either for defence or census. It was also developed by J.P. Eckert and J. Mauchly in 1961
- **IBM**: It stands for International Business Machine and designed in 1981. it was popularly called IBM-PC. It was occupying a small place on study table and had keyboard and monitor attached to it. We can input the data from the keyboard and see the output on screen. Its size is drastically reduced and increase the execution speed and power consumption is very low. We can store data and instruction in the secondary devices such as floppy disk.



Generation of Computer

The advancement in Hardware technology with the span of time is termed as Computer generation. Or the development of the computer took place a stage and each stage is called the generation of computer. There are Five Generations:

First Generation (1951 -1959)

Electronic Circuit	Vacuum Tubes
Input	Punched Cards
Output	Paper
Storage	Magnetic Tape

Example, UNIVAC -1 IBM-650, 702, 705, BURROUGHS - 220, EDVAC, EDSAC, Mark -II, UNIVAC-II etc.

Second Generation (1959 - 1965)

Electronic Circuitry	Transistors
Input	Punched Card
Output	Paper
Storage	Magnetic Core Storage

Example, IBM-1400, IBM-7000, Control Data -3600, General Electric-635, Honeywell-200, SS-80 NCR-300 CDC 1604 etc.

Generation of Computer

Third Generation

1965-1971

Electronic circuitry	Integrated Circuits (IC), LSI
Input	Punched Cards, Keyboard
Output	Paper, Monitor
Storage	Magnetic Disks, Magnetic Tapes
Examples,	IBM System/360, UNIVAC 1108, UNIVAC 9000 series

Fourth Generation

1971-1980

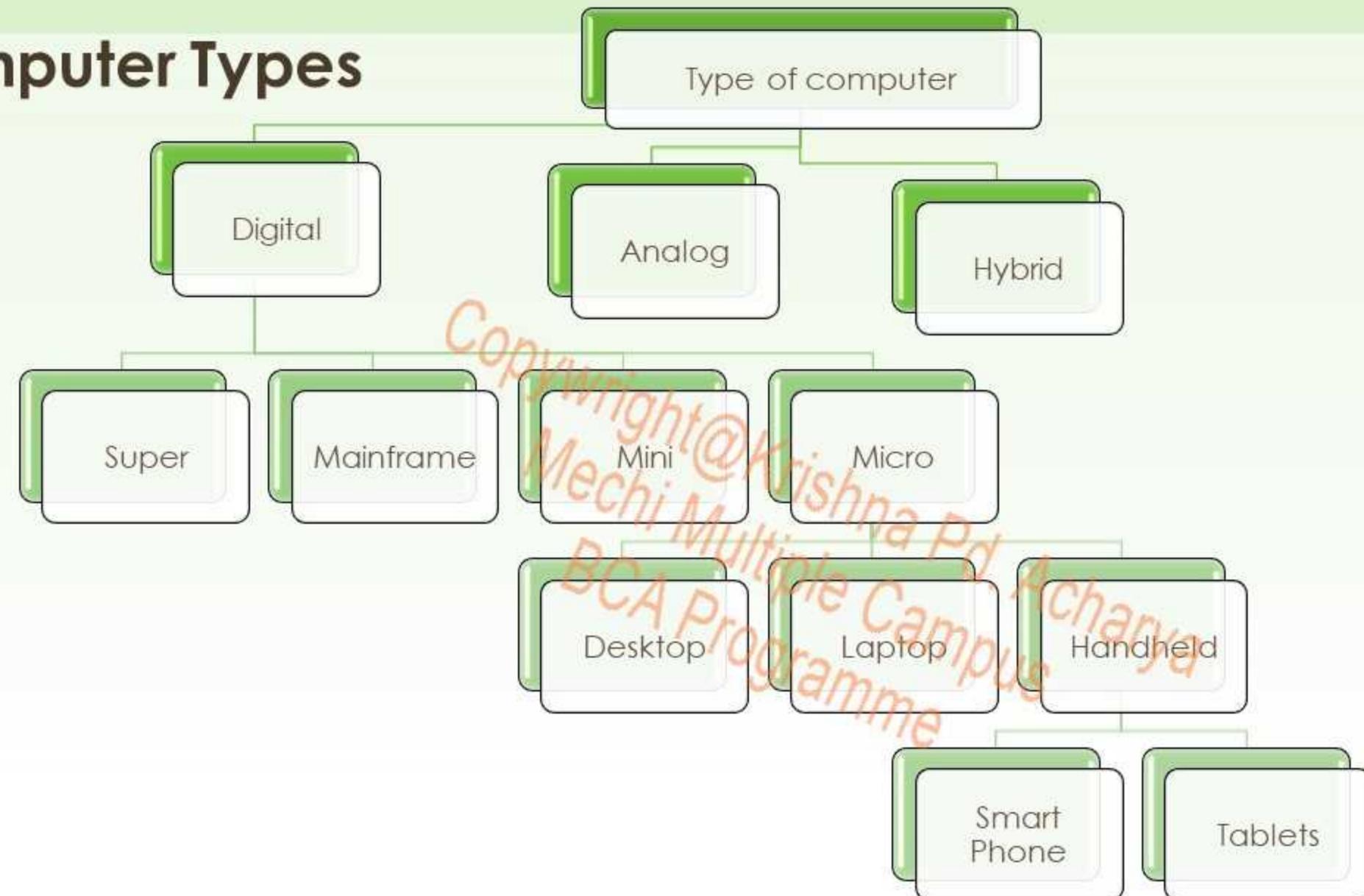
Electronic circuitry	VLSIC (Very Large scale Integrated Circuits)
Input	Keyboard, Mouse, Scanner, digitizers,
Output	Paper, monitor, Plotter, printer
Storage	Magnetic disk, Optical disk, DVD etc.
Example,	IBM System/370, HP-3000, AMD Athlon, Pentium etc.

Fifth Generation (Future)

1980-onwards

Electronic Circuitry	BIO Chips (Organic Chips)/Microprocessor
Technology capacity, Multi-point input and output etc.	AI, Expert Systems, high Speed, large storage

Computer Types

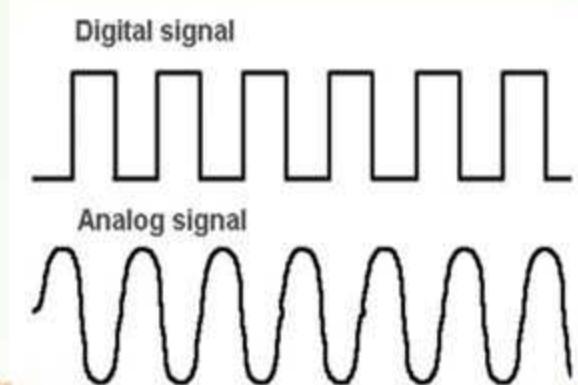


Types of Computer(On the Basis of Working Principle)

Analog Computer:

- It can process analog quantities (continuous data) like voltage, temperature, pressure.
- It is special purpose computer mainly used in scientific works.
- Less storage capacity and accuracy is not precious than digital.
- It is design to compute physical values such as temperature, pressure.
- Output is continuous.
- Examples speedometer, thermometer, petrol pump machine, electrical meter.

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Digital Computer

- It can process in the form of binary digit that is 0 or 1.
- It is general purpose computer mainly used in business.
- Fast processing, more accurate and has large memory then analog.
- Higher cost comparing with analog computer.
- Examples Personal computer, handheld devices.

Types of Computer(On the Basis of Size and Power)

Hybrid Computer:

- It is combination of qualities of analog as well as digital computer.
- It can process both continuous and discrete data
- It has capability to convert one type of data into another.
- It is the special purpose machine.
- It is mostly used in aircraft, hospital, weather forecasting.
- It usually has high cost compared to analog and digital computer.

(On the Basis of Size and Power)

Super Computer:

- It is used for scientific and engineering application which work with very huge amount of computation and used in the area like weather forecasting, military application, earthquake predication etc.
- It is an extremely fast computer that can perform one trillion of instruction per second.
- It is made up multiple computers that perform parallel operation.
- It is faster, costlier, and most powerful computers available today.
- It is special purpose so it executes few programs at very high speed.
- Examples Cray-2, PARAM, CDAC.



Types of Computer(On the Basis of Size and Power)

Mainframe Computer:

- Relatively slower, less powerful, less expensive than super computer.
- It mainly used in industries for commercial application which include large-scale computations.
- It support very large volume of data and large number of user(computer) (almost 1000) simultaneously.
- Business organization such as Insurance, Bank ,Government office need with more powerful in term of data storage and speed.
- It is general purpose and dedicate to execute many program simultaneously.
- For example IBM 3030,UNIVAL 1100, OS/390



Mini Computer:

- It has capabilities between mainframe and micro computer.
- It is general purpose and used in small and mid-size business organization.
- It is multi-user and capable of supporting 100 users simultaneously.
- It can process very large input and output compared with micro computer.
- Users can access the central minicomputer through PC.
- Examples IBM AS/400/800



Types of Computer(On the Basis of Size and Power)

Micro Computer:

- Smallest and least expensive of all computers.
- It has single processor and also known as PC(Personal Computer) and single user system.
- Relatively fewer peripherals can be attached, less processing power and have smallest memory.
- Portable and ease of use.
- Low power consumption compared with other.
- Desktop, laptop and handheld device are the major example of micro computer.

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Desktop Computer (Types of Micro Computer)

- It is small enough to sit on top of a desk or table in an office or home is called desktop computer.
- It is most affordable hence are frequently used business , home, school and other organization.
- It has various unit like processor, CD-ROM, Hard disk, Monitor, Keyboard, mouse.
- Powerful, maintenance, very cheap and general purpose are the advantage of it.
- Required more space and less portability are the disadvantage of it.

Types of Micro Computer

Notebook/Laptop Computer:

- It is a small mobile personal computer weighting 1 to 3 kg.
- User normally it is used by keeping on lap and work hence it is known as laptop.
- It has flat screen display, keyboard, DVD and pointing devices such as mouse and touchpad etc. in single unit.
- It is portable so that it can be easily carried to anywhere.
- It is designed to run using its own batteries.
- Examples IBM, Apple, Compaq, HP, Dell and Toshiba.
- Portability, integrated unit, less space, power are the advantages of using it.
- Costlier, high maintenance charge, easy to stolen, less keys in keyboard and difficult to upgrade to high version are disadvantages of using it.



Types of Micro Computer

Tablet Computer:

- It is like a standard slate. The display system can be rotated by 180°
- It has the feature of laptop and allow the user to write on screen using digital pen which is called *stylus*.
- This pen also used to tap on the icon so as to select item.

Advantage

- Handwriting style can be converted into standard text.
- Paper work can be eliminated.
- Smaller and portable compared with laptop.
- who can not type but hold stylus can able to input.

Disadvantage:

- Costlier and has higher maintenance cost, difficult to upgrade.



Types of Micro Computer

Handheld PC(PDA Personal Digital Assistant)

- It small enough to fit in one hand while we operate it with the other hand.
- It can placed on top of the palm so it also called as palmtop computer.
- The stylus used for input and select the option.
- It has calendar, appointment book, address book, calculator and note pad and so on.
- Information can be transfer to and from other PC.
- It is used by salesperson, doctors, lawyer, student etc



Types of Micro Computer

Smart Phone

- It is electronic hand held device and has functionality of mobile phone and PDA.
- Various software and app can be install and remove.
- It has Wi-Fi, Bluetooth to access internet and web sites.
- It can be used to listen music, radio and play game, take photo, record audio/video and many more.



Types of Micro Computer(on the basis of Brand)

1. IBM(International business machine)

1. It is developed by IBM company itself.
2. It is called branded or original PC.
3. It is reliable, durable and have good quality compared with IBM compatible.
4. It is generally expensive.
5. It has its own principle.

2. IBM Compatible

1. It is developed by other company than IBM.
2. It is generally called as assembled or duplicate PC.
3. It is less reliable, durable and have good low quality compared with IBM.
4. It is generally cheaper than IBM.
5. It is based on the principle developed by IBM.

3. Apple/Macintosh Computer

1. also known as Mac PC.
2. developed by Apple Corporation.
3. architecture different than IBM PC.
4. has its own Operating System called Mac OS X.
5. High quality of output(used in animation and design)
6. reliable, durable and have better quality.

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Interface

In general sense, **interface** is a boundary across which two independent systems meet and act on or communicate with each other. In computer science, an **interface** is the point of interaction with software, or **computer** hardware, or with **peripheral** devices such as monitor, keyboard, mouse, touch pad, pen drive etc. Some **computer** interfaces such as a touch screen can send and receive data, while others such as a mouse or microphone, can only send data.

Interface

- A point where two objects meet.
- A point where the human can tell the computer what to do.
- A point where the computer displays the requested information.

Interface

SMPS.

Switch Mode Power Supply uses electronics circuitry that converts the AC input voltage to different values of regulated DC supply which is fed into various color-coded wires fixed to connectors.

SMPS FAN

The fan is fixed inside the SMPS and is used to radiate the internal heat of SMPS to outside.

Power In Socket. This socket is used to input 220V AC to the PC from mains supply when the computer switch on the front side is pressed.

PS-2 Port. You can see two different colored 6-pin round shaped connectors. These connectors are used to connect input devices, keyboard and mouse. Color Coding defines the connector type. The purple connector is dedicated to connect Keyboard and Green color is used for Mouse.

USB Port. The full form is Universal Serial Bus and is used to connect various input and output devices like Mouse, Keyboard, Printers, Webcams etc. USB 3.0 is the latest version which offers high data transfer speed.



Interface

DVI Port. Digital Video Interface is a high-speed serial link for connecting output display Devices.

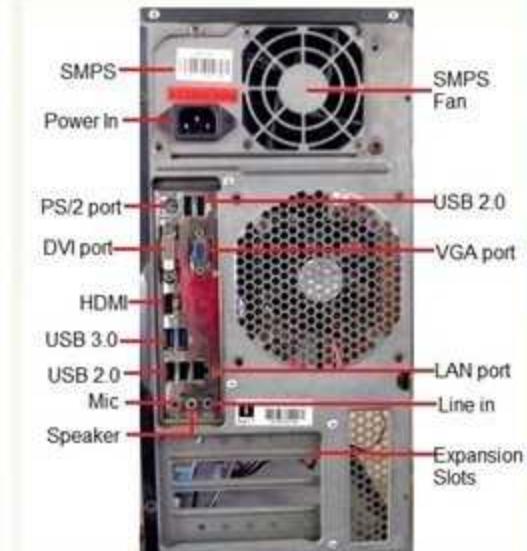
HDMI Port HDMI stands for high definition multimedia interface. This is a latest interface that helps to get high definition video and multi channel sound. You can connect HDMI enabled blue ray devices, LED's etc.

15-pin VGA Port. This is used to connect display devices like Monitor / LCD / LED Display.

LAN Port. The LAN or network port is used to connect to other devices and computers in a network.

Audio Ports. Generally there are 3 number of audio ports on the back side of a PC. These parts are either aligned vertically or in horizontal position. Green color port is dedicated for headphones or speakers, a blue colored port is marked as Line-in and Mic can be inserted in a pink port.

Expansion Slots: These expansion slots are used to connect add-on cards to increase the capabilities of the motherboard.



Mobile Computing

Mobile Computing is a technology that allows transmission of data, voice and video via a computer or any other wireless enabled device without having to be connected to a fixed physical link. The main concept involves –

- Mobile communication:

It refers to the infrastructure put in place to ensure that seamless and reliable communication carry on which would include devices such as protocols, services, bandwidth, and portals necessary to facilitate and support services.

- Mobile hardware:

Mobile hardware includes mobile devices or device components that receive or access the service of mobility. They would range from portable laptops, smartphones, tablet PCs, Personal Digital Assistants.

- Mobile software

Mobile software is the actual program that runs on the mobile hardware. They are small enough to fit in a small portable devices.

Assignment

1. What is a computer? How does it work.
2. Explain a few of the different ways in which computers can be categorized.
3. Differentiate between super computer and micro computer.
4. Describe the two usage of desktop computers.
5. Explain the major features that used in fifth generation?
6. List Three types of computers that are designed for use by organizations, and are commonly used by multiple people at the same time.
7. Why are mainframe systems usually limited in the number of tasks they perform?
8. What is the most popular use for home computers?
9. How are computer technologies used by the Education?
10. Explain IPO Cycle of computer?
11. Differentiate between data and information
13. Explain components of computer.
14. What is interface? Explain mobile computing
15. Differentiate between IBM and IBM compatible PC.

Real Time Assignment

Pay a visit to any business or government office in your town, and observe the people working there. Are they using computers? Simply by watching, can you tell what kinds of computers they are using and what types of work they are performing? In a power point, list your findings and explain the reasoning behind them. Be prepared a quotation to share your findings with the class.

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Input Devices:

- A component or peripheral devices that feeds data or instruction into a computer for display, processing, storage, or output refers as input devices
- Input devices convert the user's actions and analog data (sound, pictures) into digital electronic signals that can be processed by a computer.
- Digital data (such as from barcode readers, modems, scanners, etc.) does not require any conversion and is input direct into a computer.

Types of Input devices

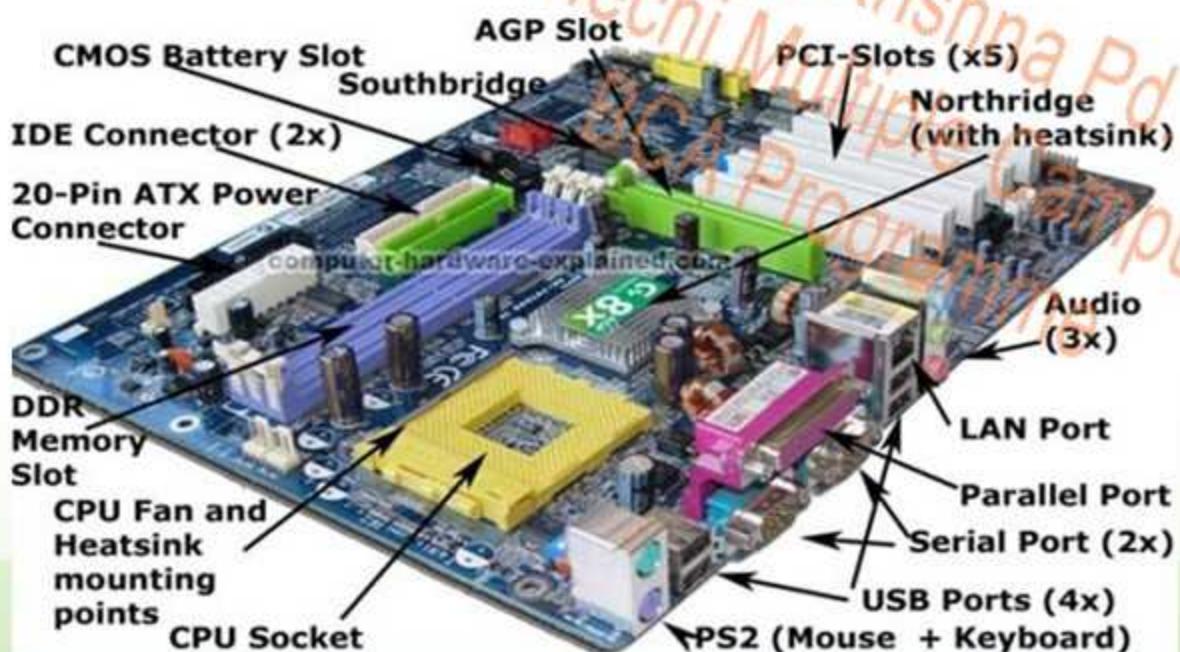
- Keyboard
- Mouse
- Microphone
- Scanner
- Touch Panel
- MICR (Magnetic Ink Character Recognition)
- OBR (Optical Bar Code Reader)
- OMR (Optical Mark Recognition)

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Central Processing Unit

CPU(Central processing unit)

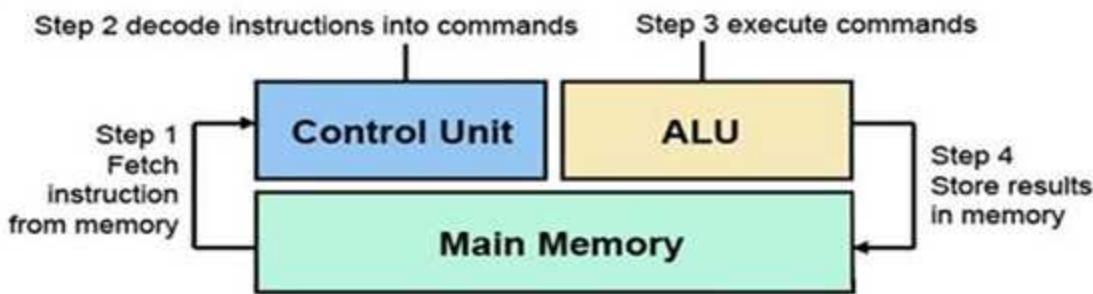
- Sometimes CPU referred to simply as the central processor or processor, the CPU is the brains of the computer where most calculations take place. Two typical components of a CPU are the following:
- The *arithmetic logic unit (ALU)*, which performs arithmetic and logical operations.
- The *control unit (CU)*, which extracts instructions from memory and decodes and executes them, calling on the ALU when necessary.



Central Processing Unit

- ALU(Arithmetic Logic Unit, ALU) is one of the many components within a computer processor. The ALU performs mathematical, logical, and decision operations in a computer and is the final processing performed by the processor. After the information has been processed by the ALU, it is sent to the computer memory.
- In computer processors, the ALU is divided into an AU and LU. The AU performs the arithmetic operations and the LU performs the logical operations.

Machine Cycle / CPU Fetched Cycle



Functions of CPU

Central Processing Unit

Functions of ALU

- To perform arithmetic calculation such as addition, subtraction, multiplication and division.
- Logical Operations: These include AND, OR, NOT, XOR, NOR, NAND, etc.
- Bit-Shifting Operations: This refers to shifting the positions of the bits by a certain number of places to the right or left.

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Central Processing Unit

Register:

- It is high-speed storage areas within the CPU but have least storage capacity.
- It is manipulated directly by CPU during instruction execution.
- It stores data, instruction, address and intermediate results of processing.
- The data and instructions that require processing must be brought in the registers of CPU before they can be accessed. For Example, if two numbers are to be added, both number are brought in the register, added and the result is also placed in a register.

Types of register:

- Accumulator(ACC): stores the result of arithmetic and logical operation.
- Instruction Register(IR): contains the current instruction most recently fetched.
- Program Counter(PC): contains the address of next instruction to be processed.
- Memory Address Register(MAR): contains the address of next location in the memory to be processed.
- Memory Buffer Register(MBR): temporarily store data from memory or the data to be sent to memory.
- Data Register(DR): stores the operands and any other data.

Central Processing Unit

Control Unit

- This unit controls the operations of all parts of computer but does not carry out any actual data processing operations.
- It acts as a supervisor and control and coordinates the activity of the other units.
- It works by gathering input through a series of commands it receives from memory in a running programs and then outputs those commands into control signals that the computer and other hardware attached to the computer carry out.
- CU tell when to fetch the data and instruction, what to do , where to store the results, the sequencing of events during processing.

Functions of this unit are:

- It is responsible for controlling the transfer of data and instructions among other units of a computer.
- It manages and coordinates all the units of the computer.
- It obtains the instructions from the memory, interprets them, and directs the operation of the computer.
- It communicates with Input/Output devices for transfer of data or results from storage.
- It does not process or store data.

Central Processing Unit

Factors that affect a CPU performance

- The amount of RAM memory
- The speed and generation of your CPU (the system clock)
- The size of the Register on your CPU
- The Bus type and speed
- The amount of Cache memory

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Central Processing Unit

Factors that affect a CPU performance

1. CPU Clock Speed

The operating frequency of the CPU known as the *clock speed* which determines how fast it can process instruction.

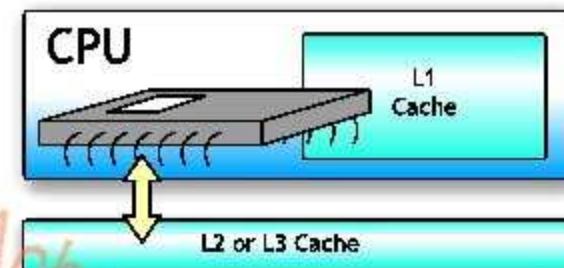
- o How many times per second the processor has the opportunity to perform the task.
- o The speed is measured in terms of Hertz, and it is usually lies in the megaHertz (MHz) or gigaHertz (GHz) range.
- o A megaHertz means that the CPU can process one million instruction per second whereas a gigahertz CPU has the capability to process one billion instructions per second.
- o In today technology, all CPUs run in the gigahertz range and you seldom see CPU with speed in the MHz range anymore..
- o In general, the higher the frequency of a CPU, the faster the speed of the computer.

Central Processing Unit

Factors that affect a CPU performance

2. Cache

- The purpose of a cache is to ensure this smooth and fast transition of data transfer from the hard disk to the CPU.
- a cache, which was effectively a small and extremely fast memory, was added to the processor to store immediate instruction from the RAM. Since the cache runs at the same speed of the CPU, it can rapidly provide information to the CPU at the shortest time without any lag.

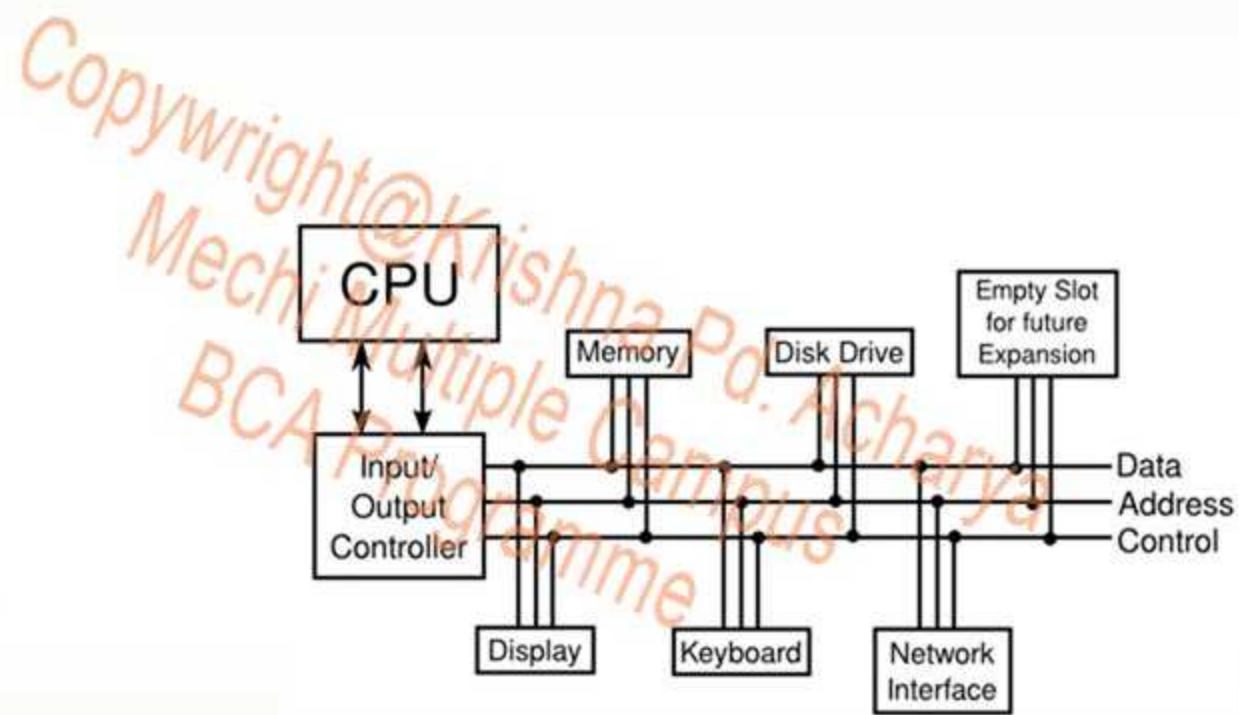
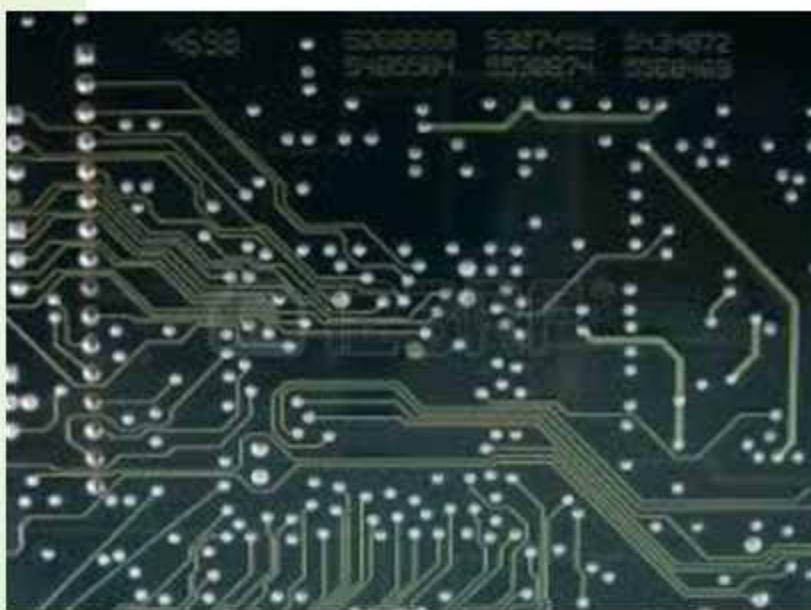


- Here, bigger is better. Core i3 chips have 3- or 4MB, while i5s have 6MB and the Core i7s have 8MB

Central Processing Unit

Introduction to Bus

A group of wires connected between various sub-unit of a computer to transfer the data/information is called a *PC bus* or *bus*. As the bus is used to transfer people one place to another place the PC bus is used to transfer the data/instructions from one unit to other unit.



Types of Bus

- **Data Bus:** A group of wires exclusively used to transfer the data is called data bus. Using this bus, the data is transferred between the processor, memory and I/O devices. The data can be transferred into CPU from external devices or the data can be transferred from CPU to external devices so the data bus is bidirectional.
- **Address Bus:** A group of wires exclusively used to transfer the address is called address bus. The information on address bus is nothing but the address of data/instruction in memory or address of the input/output device. During communication, the CPU place the address of the device on to the address bus.
- **Control bus:** A group of wires exclusively used to transfer the control signals is called control bus. The control bus responsible for making CPU, memory, input and output devices work together as a functional system, carrying various signals

Questions

- Why CPU is considered as brain of computer?
- Write down the function of ALU?
- Explain the fetch cycle of CPU.
- Write down the functions of CU.
- Explain the functions of ALU.
- What is data bus? Explain different types of buses used in computer system.
- What is register? Explain different types of register used in computer system.
- What do you mean by clock speed of cpu?
- What do you understand if your cpu has clock speed of 2.5 ghz.
- List down different types of CPU available in Market with respect to cache, clock speed and price

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Real Time Assessment

Suppose that you are marketing representative of Intel corporation, and your task is to make sale of intel processor by comparing with other processor in the market in term of number of registers, word size, system bus speed, L1 cache, L2 cache and price. You can take references like internet, books, magazines and newspaper articles.

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Types of Input Devices

Keyboard:

- It is the most common and very popular input device.
- It has various sizes 84 keys or 101/102 keys or 108 keys.(101 Standard)
- It has additional keys provided for performing additional functions.
- When user press any key, it first goes to keyboard controller which is processor and has ROM, controller identifies which key is pressed and send to appropriate signal to computer.

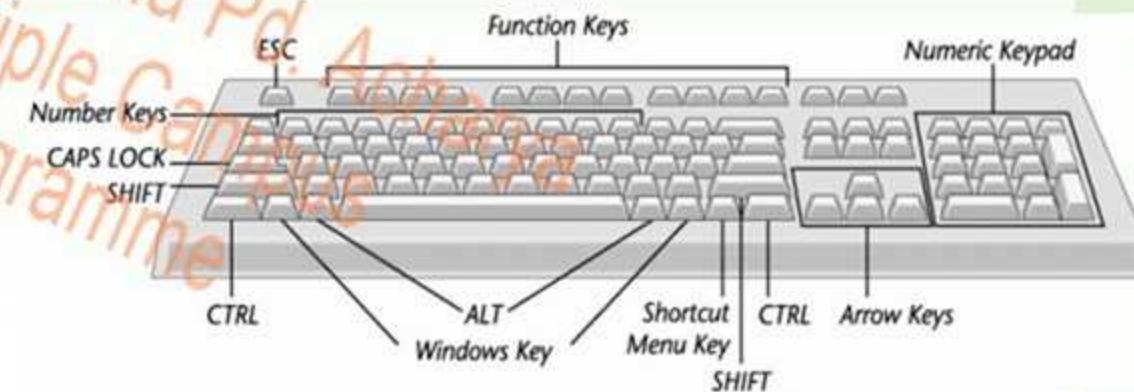


Fig: Layout of key in keyboard

Types of Input Devices

Types of keys in keyBoard

Sr.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. Generally, it consists of a set of 17 keys that are laid out in the same configuration used by most adding machines and calculators.
3	Function Keys	The twelve function keys are present on the keyboard which are arranged in a row at the top of the keyboard. Each function key has 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.

Input Devices:

Microphone:

- Microphone is an input device to input sound that is then converted into digital form and stored at memory.
- The microphone is used for various applications like adding sound to a multimedia presentation , for mixing music, telephone calls using PC, record our own voice and distribute.



- To use microphone PC should have **a sound card**. It is a hardware it tasked to translates analog signals obtained from microphone into a digital form so computer stored in memory.

Input Devices:

Scanner:

- It is an input device that can electronically capture the text or images such as photographs, drawings, artwork, map etc.
- it takes the input in graphical form and converted into 0's and 1'(digital form) then it can be stored in the computer.

○ Scanner has following parts:

1. **Glass Screen**: this is used to place the object like drawing or paper.
2. **Lid**: used to cover the document placed on the glass screen.
3. **Light source**: It is a moving part that illuminates the document.
4. How does scanner works?

When user put image or drawing on surface of glass screen and closed the lid then light source below the glass plate produce laser ray towards the image or drawing objects. The amount of light reflected by the image is picked up by the sensor and is converted in to digital form then sent to memory of computer.



Input Devices:

Touch Panel:

- It is a stationary pointing device such as mouse.
- Touch sensitive surface may be just 1.5 to 2.5 inches rectangular or square in shape.
- It consists of a soft surface which is sensitive to finger movement or pressure

Touch Panel: how it works:

- The movement of a finger on the touch panel, is sensed by the sensors and these signals are transferred to CPU. These movements are interpreted and displayed on the screen in the form of an arrow so that we can move cursor around the screen, it has two buttons perform the same function as that the mouse.



Input Devices:

Mouse:

- It is a handheld pointing device.
- It is used to control the movement of the pointer on the screen.
- It is also used to make selection from the screen by pointing to the item.
- It is connected to the computer using the cables.

Action performed by Mouse.

- **Pointing:** point means placing the mouse pointer over a word or object on the screen by moving the mouse on the desk.
- **Click:** the action of pressing down a mouse button and releasing it is called click.
- **Double click :** point to the desired position, press and release the button twice in rapid succession.
- **Drag:** point to desired position , by pressing the mouse button down move the mouse without releasing it.
- **Scroll:** the scroll wheel is situated in between left and right button is used to scroll through long documents up and down.

Input Devices:

- How does the optical mouse work?

An **optical mouse** uses a light source, typically a light-emitting diode(LED) that produce the red light, and a light detector, such as image sensor that detect movement relative to a surface and sent respective signal to CPU as result mouse cursor move on your screen.

- How does the mechanical mouse work?

When a mouse moved, the ball which is situated at the bottom of the mouse rolls. This movement is converted into electrical signals and is transferred to CPU, these movements are interpreted and displayed on the screen in the form of arrow.



Input Devices:

- OBR:

- It stands for Optical Bar Code Reader.
- It consists of a series of parallel adjacent vertical bars known as barcode.
- It can capture the information of a product which is in the form of barcode.
- *How it works?*

Working the barcode reader uses a laser beam scanning technology. A barcode reader works by passing a beam of light across the bar code and measures the amount of light that is reflected back that have the product name, product number and product price which are sent to the computer for further processing.



Input Devices:

OMR :

- The process of capturing human marked data from various paper documents such as test, exams and various surveys using optical device is called **optical mark recognition**.

How it works?

OMR work has dedicated scanner device which shines a beam of light into the paper. it measures the reflectivity of light from predetermined positions on paper and send the signal to OMR software maintain the record.

Applications:

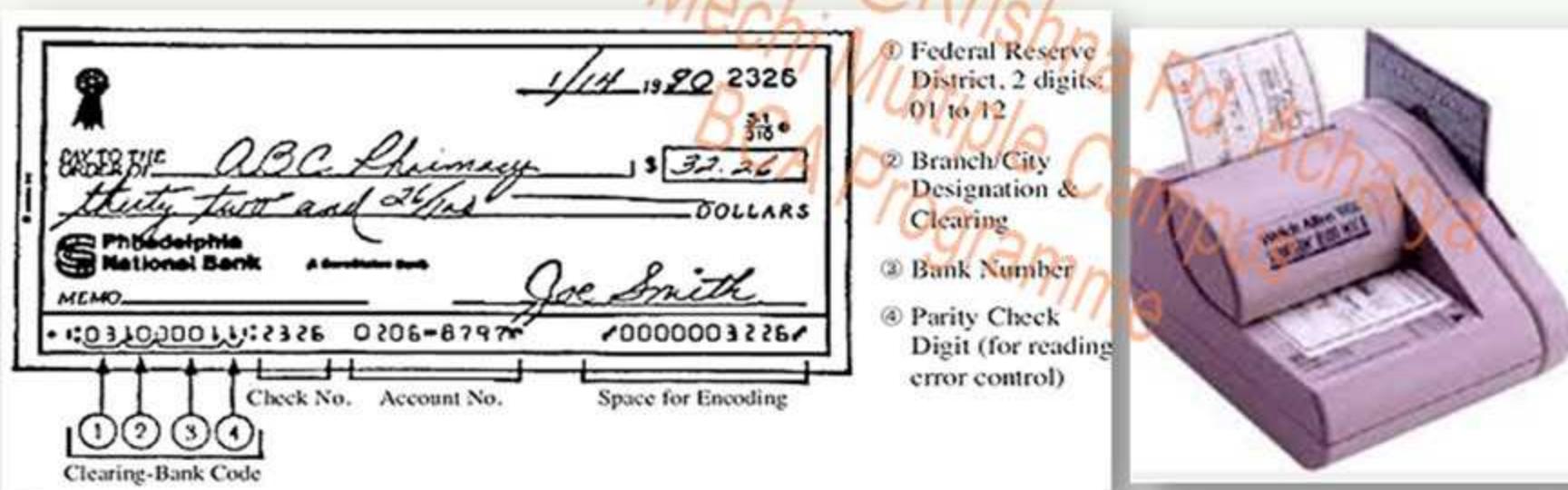
Exam, surveys,
Lotteries, Voting,
Test assessment, Evaluation,
feedback



Input Devices:

MICR:

- It stands for **Magnetic Ink Character Recognition**.
- MICR uses magnetically chargeable ink to print the numbers and special characters on the bottom of the cheque or other financial transaction documents.
- It provides a secure, high-speed method of scanning and processing information.
- The main advantages of MICR is that it is fast and less error prone.



Real Time Assignment

Suppose that you are responsible for computerizing a City Hospital what types input devices do you think would best for Medical and Account department and also prepare budget. Explain the reasoning behind choosing them(current trends in terms of feature, Quality and price). Be prepared to share your findings with the class.

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Assignments

1. Define peripheral device?
2. What are the major functions of input device?
3. How does the keyboard work?
4. Explain types of keys in keyboard.
5. Explain the use of sound card in computer system.
6. How does the scanner works.
7. Give three applications of scanner in business organization.
8. Explain the working mechanism of touch pad.
9. What are the various action performed by mouse.
10. Explain working mechanism of mouse(mechanical/optical).
11. Explain working mechanism and application of OBR,OMR and MICR.

Output Devices

Output devices accept the data from computer(CPU) and convert the data into a form that can be understood by the people. In other words, the devices that are used to convert machine readable information(0s and 1s) into human-readable information .

Types of Output devices

o Monitors

- o CRT
- o LCD
- o LED
- o Plasma

o Printer

- o Impact
- o Non impact printer

Softcopy and hardcopy output:

❖ Softcopy

The electronic version of an output such as a document or a file which is stored on a computer disk such as pen drive, DVD or hard disk are referred as softcopy.

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Output device

- Hardcopy output:

- The physical form of output is called hardcopy.
- It is tangible and no skill is required to see the output.
- Searching the content is difficult on it.
- It is permanent in nature and it is more stable form of output.
- The devices which are used to create the hardcopy out are called hardcopy output devices.
- Difficult to duplicate and distribute.
- Examples Printer and plotters.

Can you differentiate between Hardcopy and Softcopy?

Output Devices

Monitors

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

Emissive vs Non-Emissive

Emissive display: is device that convert electrical energy into light.

example of emissive display are plasma panels, light emitting diodes(LED)

Non-Emissive(Transmissive) display: it use optical effects to convertsunlight or light from some other source into graphics pattern.

example of non-emissive display is Liquid Crystal Display(LCD).

Output Devices

- Characteristics of a monitor:

- a) Size:

Screen sizes are measured in diagonal inches, the distance from one corner to another opposite corner diagonally.

- b) Resolution:

The resolution of a monitor indicates how much density of the pixels are packed. A pixel is a single point in a graphic image. The quality of a display monitor largely depends on its resolution.

Monitor size	Recommended resolution (in pixels)
Monitor size 15-inch CRT monitor	Recommended resolution (in pixels) 1024×768
Monitor size 17- to 19-inch CRT monitor	Recommended resolution (in pixels) 1280×1024

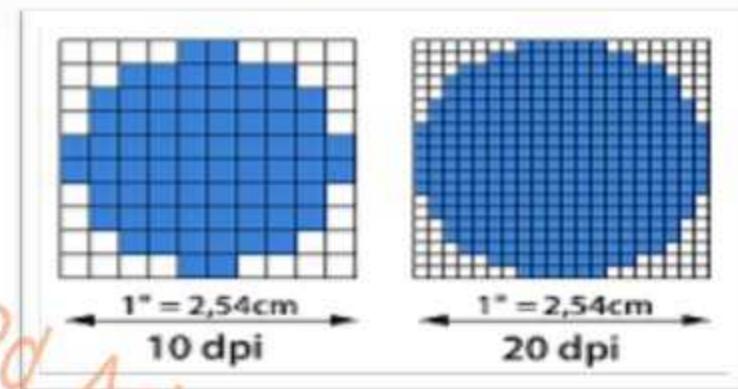


Output Devices

- Characteristics of a monitor:

- d) Dot Pitch:

A measurement that indicates the vertical distance between each pixel on a display screen. It is measured in millimeter. The dot pitch is one of the principle characteristics that determine the quality of display monitors.



- c) Refresh Rate:

Display monitors must be refresh many times per second. The refresh rate determines how many times per seconds the screen is to be redrawn. It is measured in Hertz. The faster the refresh, the less the monitor flickers.



Output Devices

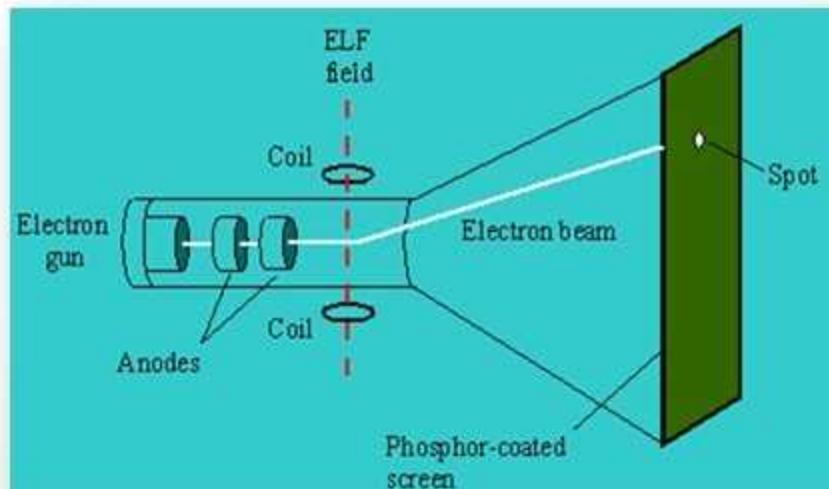
CRT Monitor

CRT stands for Cathode Ray Tube and is a TV like display attached to the computer on which the output is displayed.

The CRT monitors were normally used in desktop computer

How it works:

A **cathode ray tube (CRT)** is a special type of a vacuum tube in which images are produced when an electron beam strikes a phosphorescent surface that create a visible spot and from the collection of those spot form a image.



Output Devices

Advantage:

- They produce more colors.
- The Cathode Ray Tube monitors have lower price rate than the LCD display or Plasma display.

Disadvantage:

- Bulky in size.
- CRT emit electromagnetic and x-ray band radiation filed which make negative impact on human cell.
- Constant refreshing of CRT monitors can result in headache.
- It take high voltage around 150 Watt.

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Output Devices

- A plasma display is thin-panel in which each pixel on the screen is illuminated by a tiny bit of plasma or charged gas.
- It is slim and flat rather than curved as CRT.
- It is free of distortion on the edges of the screen.
- The plasma display units has a clearer image, brighter viewing angle, better colour quality and higher contrast ratio than the CRT and LCD display units



Output Devices

LCD

- It stands for **Liquid-Crystal Display**.
- An LCD monitor is a thin, light computer monitor that displays images through the use of a liquid crystal display.
- The flat display technology used in laptops, cell phones, calculators, digital cameras, and flat screen displays.
- LCD monitors are much thinner, use less energy, and provide a greater graphics quality.
- LCD monitors have completely obsolete CRT monitors due to their higher quality, smaller size decreasing price.
- LCD panel does not produce the light of their own, it require external light to produce a visible image. this light is provided at the back of the glass ,which is called the backlight, generally CCFL(cold cathode fluorescent lamps).



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Output Devices

LED



- LED: (Light Emitting Diode) is a special diode that emits light when an electric voltage is applied to it.
- An LED is a small light bulb that easily fits into an electrical circuit. These light bulbs do not get hot and they are illuminated by the constant movements of the electrons which produce electric voltage.
- It is common electronic component that is being used in devices like TV, computer, etc. They are available in various colors like red, yellow, green etc.
- The actual difference between this and a typical LCD monitor is the backlighting. The first LCD monitors used CCFL(cold cathode fluorescent lamps) instead of LEDs to illuminate the screen.

Output Devices

- **Printer:** Printer is an output device, which is used to print information on paper.
- There are two types of printers:
 - Impact Printers
 - Non-Impact Printers
- Impact Printers
 - The impact printers print the characters when it's head strike on the ribbon which is then pressed on the paper.
- Characteristics :
 - Inexpensive in cost.
 - Very noisy
 - Can use carbon copies to multiple copies print
 - Useful for bulk printing due to low cost
 - There is physical contact with the paper to produce an image
 - Quality of graphics will be very poor

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Output Devices

- Impact printers are of two types

- **Character printers:** Character printers are the printers which print one character at a time.
- **Line printers:** Line printers are the printers which print one line at a time.

Examples Dot Matrix Printer(DMP), Daisy Wheel

- Dot Matrix Printer

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



Output Devices

Daisy Wheel

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

Advantages

- More reliable than DMP
- Better quality
- The fonts of character can be easily changed

Disadvantages

- Slower than DMP
- Noisy
- More expensive than DMP

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TRS-80 Printers for Word Processing

New Daisy-Wheel II for Superb Quality

High-speed interchangeable character wheel and carbon ribbon give you the electric typewriter quality you need for your important word-processing print! A plastic-faced printer takes paper up to 9-1/2" wide and up to 8 inches/12 characters including underline plus reverse tab/line feed. Includes well-test, 17-L sheet, 28-150.

DW II Dual Cover 28-528

Accessories	QTY/PC.
Return Cartridge, Part # 2	28-1429
Carbon Ink Wheel, 10-line width	28-1421
Printer Ink Wheel, 12-line width	28-1422
Mounting Instruction Sheet	28-1423
Service Manual, Serial Number	28-1424
Return Used Ink Print Plates	28-1425



Output Devices

Non-impact Printer

- It uses ink sprayed against the paper in the form of a character.
- In some machines heat and pressure are used to enable the toner powder in the shape of character.
- It is faster and quieter than impact printer.
- It produces high quality of output.
- Capable of printing both text and graph.
- Supports many fonts and different character size.

Laser Printers

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

Advantages

- Very high speed.
- Very high quality output.
- Give good graphics quality.
- Supports many fonts and different character size.

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Output Devices

Disadvantages

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

Inkjet Printers

- Inkjet printers are non-impact character printers based on a relatively new technology.
- They print characters by spraying small drops of ink onto paper.
- Inkjet printers produce high quality output with presentable features.
- They make less noise because no hammering is done and these have many styles of printing modes available.
- Color printing is also possible.



Output Devices

Advantages

- High quality printing
- More reliable

Disadvantages

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

Questions:

1. Define output device? Explain any two output devices?
2. What is soft copy? What are softcopy output devices.
3. What is hard copy? What are hardcopy output devices.
4. Differentiate between hard copy and softcopy .
5. Write down the quality factors while purchasing the monitor.
6. How does a CRT displays image or text on the screen?
7. What are difference between impact and non impact printer?
8. what are emissive and non- emissive devices.

Evaluation factors of printers

1. **Image Quality**(600 dpi dot per inch)
2. **Speed** (paper per minute PPM >50)
3. **Initial cost**
4. **Cost of operation**(cost of ink ,tonner and maintenance)

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Real Time Assessment

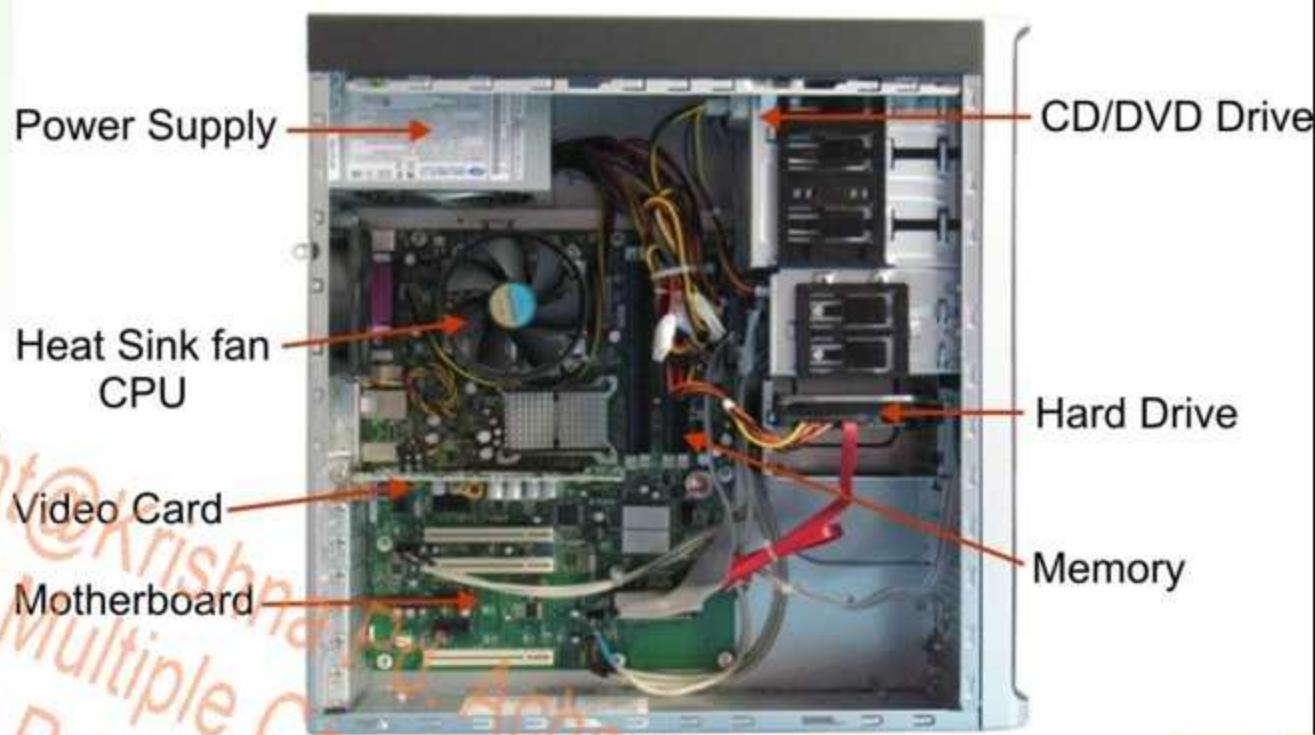
Suppose that you are responsible for computerizing campus what types output devices do you think would best for Exam, library and Account department and also prepare budget. Explain the reasoning behind choosing them(Trends in size, feature and price). Be prepared to share your findings with the class.

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Storage Devices

- Primary Storage Device
 - RAM and its type
 - ROM and its type
 - Cache Memory
- Secondary Storage Devices
 - Hard Disk,
 - Optical Disk
 - Flash Drive
 - Memory/SD card
- Uses of storage devices and Memory Hierarchy.

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Storage Devices

Storage unit or memory is defined as the place or location where the data or instructions are stored. Memory is required for the following purposes:

- Memory is required to store both the data and *instructions* given to the computer to achieve a specific task.
- Memory is also required to store the partial or complete results during or after processing.
- Memory can be broadly classified as Primary and Secondary. Primary memory consists of RAM, ROMS and Cache and Secondary memory includes Hard disk, CD ROM, Floppy Disk

Storage Devices

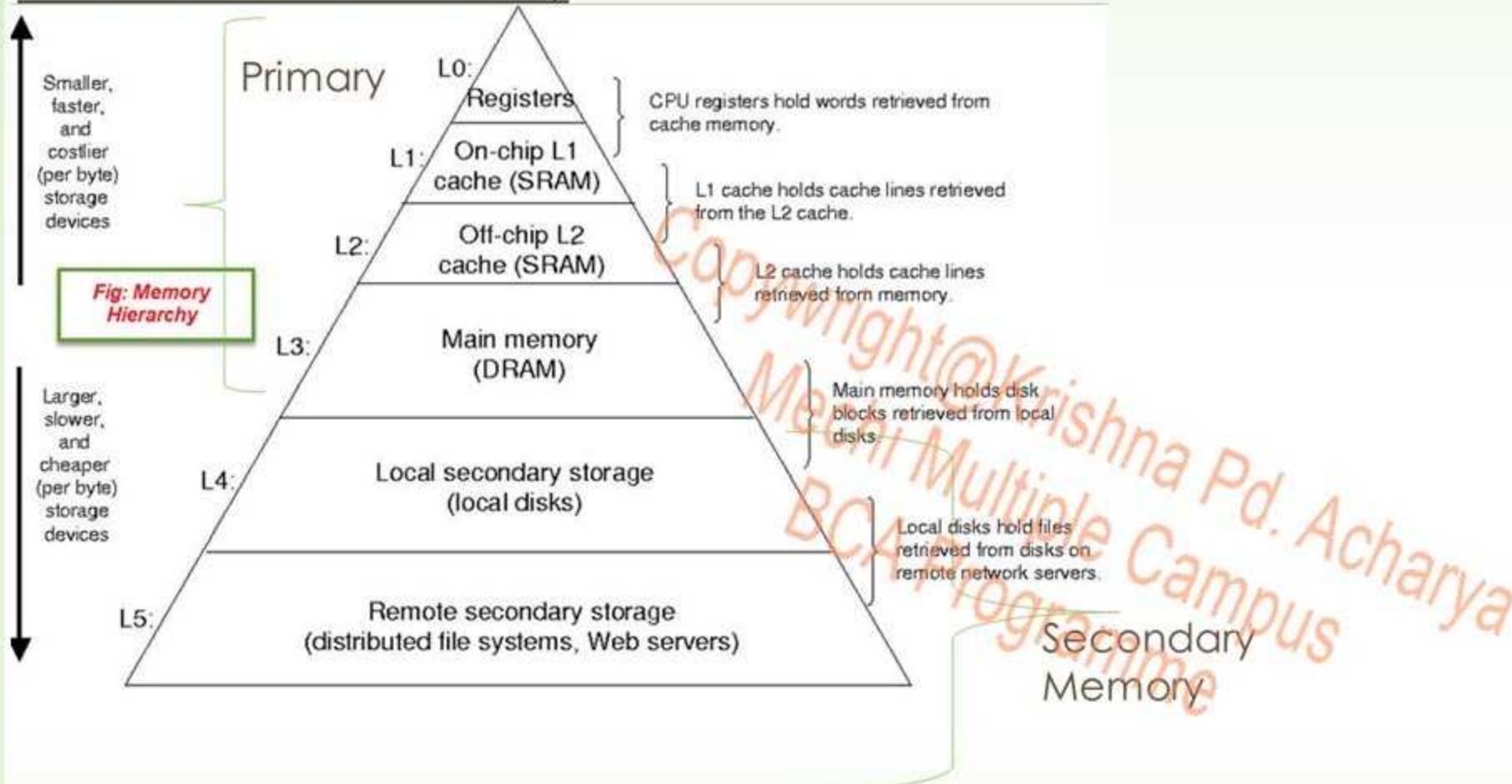
Measurement of memory

Unit	Description
Bit (Binary Digit)	A binary digit is logical 0 and 1 representing a passive or an active state in an electric circuit.
Nibble	A group of 4 bits is called nibble.
Byte	Group of 8 bits i.e. $1\text{Byte} = 8\text{Bits}$
Word	A computer word, like a byte, is a group of fixed number of bits processed as a unit which varies from computer to computer but is fixed for each computer
Kilobyte (KB)	$1\text{ KB} = 1024\text{ Bytes}$
Megabyte (MB)	$1\text{ MB} = 1024\text{ KB}$
Giga Byte (GB)	$1\text{ GB} = 1024\text{ MB}$
TeraByte (TB)	$1\text{ TB} = 1024\text{ GB}$
PetaByte (PB)	$1\text{ PB} = 1024\text{ T}$

Storage Terms		
Storage Term	Approximate Number of Bytes	Exact Number of Bytes
Kilobyte (KB)	1 thousand	2^{10} or 1,024
Megabyte (MB)	1 million	2^{20} or 1,048,576
Gigabyte (GB)	1 billion	2^{30} or 1,073,741,824
Terabyte (TB)	1 trillion	2^{40} or 1,099,511,627,776
Petabyte (PB)	1 quadrillion	2^{50} or 1,125,899,906,842,624
Exabyte (EB)	1 quintillion	2^{60} or 1,152,921,504,606,846,976
Zettabyte (ZB)	1 sextillion	2^{70} or 1,180,591,620,717,411,303,424
Yottabyte (YB)	1 septillion	2^{80} or 1,208,925,819,614,629,174,706,176

Storage Devices

Measurement of memory



Storage Devices

Primary Memory

- The memory that is accessible directly by the CPU of a computer is called primary memory. This memory is part of the main computer system which is plugged into motherboard along with CPU.
- It is also called internal memory or main memory. It allows the CPU to store and retrieve data quickly. It is very fast, small storage capacity, volatile, and expensive memory. It is semiconductor memory. Example RAM,ROM,PROM

Note: The term memory refers to primary memory.

Characteristics of Main Memory

- These are semiconductor memories
- It is known as main memory.
- Usually volatile memory.
- Data is lost in case power is switched off.
- It is working memory of the computer.
- Faster than secondary memories.
- A computer cannot run without primary memory.

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Storage Devices

Secondary Memory

- The memory that can store all the data and instructions even when the computer is turned off is called secondary memory or auxiliary memory.
- It is used to store data and instruction permanently. The data and instructions is loaded from secondary memory to main memory so that the CPU process the data. Examples Hard disk, CD ROM.
- It is non-volatile, large storage capacity inexpensive, Magnetic Memory.

Characteristic of Secondary Memory

- These are magnetic and optical memories
- It is known as backup memory.
- It is non-volatile memory.
- Data is permanently stored even if power is switched off.
- It is used for storage of data in a computer.
- Computer may run without secondary memory.
- Slower than primary memories.

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Storage Devices

Primary Memory

RAM(Random Access Memory) and it's Types:

- RAM is a semiconductor memory. The data and the programs that are entered from the keyboard are stored temporarily in RAM during execution.
 - It is possible to read and write operation into RAM. The contents in RAM remains as long as power on and when power is off all the contents in Ram is lost so it is volatile memory.
- Types of RAM
1. SRAM(Static Random Access Memory): The word **static** indicates that the memory retains its contents as long as power is being supplied. However, data is lost when the power gets down. SRAM need not have to be refreshed on a regular basis.
- 
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Storage Devices

Primary Memory

o Characteristics of SRAM:

- It has long life
- There is no need to refresh
- Faster
- Used as cache memory
- Large size
- Expensive
- High power consumption

2. Dynamic RAM (DRAM)

DRAM, unlike SRAM, must be continually refreshed in order to maintain the data. This is done by placing the memory on a refresh circuit that rewrites the data several hundred times per second.

Characteristics of the DRAM

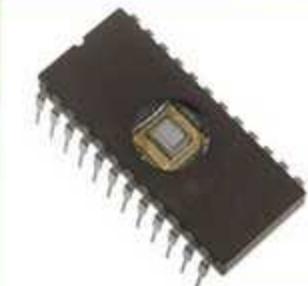
- It has short data lifetime
- Need to be refreshed continuously
- Slower as compared to SRAM
- Lesser in size
- Less expensive
- Less power consumption

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Storage Devices

Primary Memory

ROM (Read Only Memory):



ROM stands for Read Only Memory. The memory from which we can only read but cannot write on it. This type of memory is non-volatile. The information is stored permanently in such memories during manufacture. A ROM, stores such instructions that are required to start a computer. ROM chips are not only used in the computer but also in other electronic items like washing machine and microwave oven.

Characteristics of ROM

- Non-volatile in nature
- These cannot be accidentally changed
- Cheaper than RAMs
- More reliable than RAMs
- These are static and do not require refreshing
- Its contents are always known and can be verified

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Storage Devices

Primary Memory

Types of ROM

1. PROM(Programmable Read Only Memory):

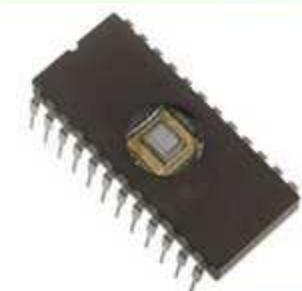
PROM is read-only memory that can be modified only once by a user. The user buys a blank PROM and enters the desired contents using a PROM program. It can be programmed only once and is not erasable.

2. EPROM(Erasable and Programmable Read Only Memory)

The EPROM can be erased by exposing it to ultra-violet light for a duration of up to 40 minutes.

3. EEPROM(Electrically Erasable and Programmable Read Only Memory)

The EEPROM is programmed and erased electrically. It can be erased and reprogrammed about ten thousand times. Both erasing and programming take about 4 to 10 ms (millisecond). In EEPROM, any location can be selectively erased and programmed. EEPROMs can be erased one byte at a time, rather than erasing the entire chip. Hence, the process of reprogramming is flexible but slow.



Storage Devices

Cache Memory

Cache memory is a very high speed semiconductor memory which can speed up CPU. It acts as a buffer between the CPU and main memory. It is used to hold those parts of data and program which are most frequently used by CPU. The parts of data and programs are transferred from disk to cache memory by operating system, from where CPU can access them.

Advantages

- Cache memory is faster than main memory.
- It consumes less access time as compared to main memory.
- It stores the program that can be executed within a short period of time.
- It stores data for temporary use.

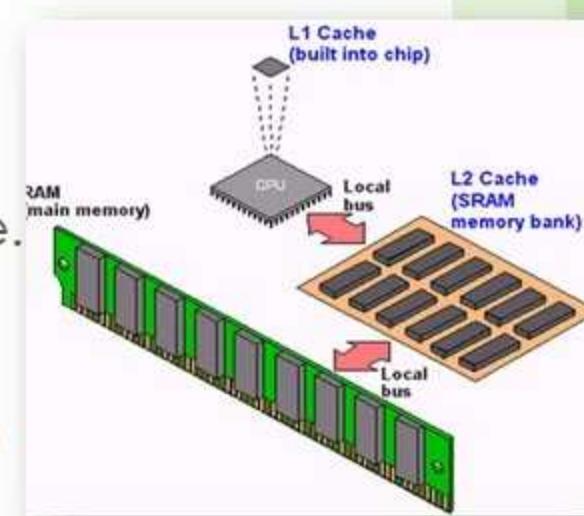
Disadvantages

- The disadvantages of cache memory are as follows:
- Cache memory has limited capacity.
- It is very expensive.

Register

A register is one of a small set of data holding places(memory) that are part of a computer processor . A register may hold a computer instruction , a storage address, or any kind of data. Registers are used to hold information on a temporary basis that can help the CPU to speed up their performance for calculation.

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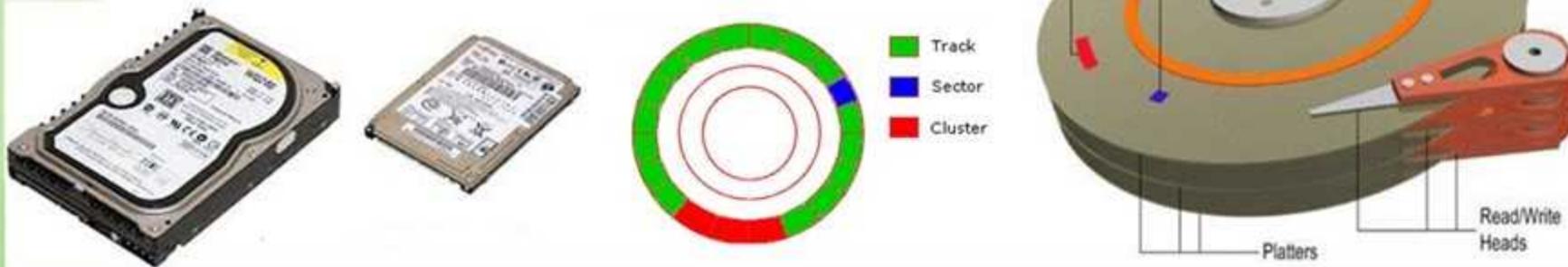
Storage Devices

Hard Disk

Hard disk is a magnetic disk that is used as secondary memory for mass storage of data permanently. It stores programs, data, operating system, compilers, application programs and database. It holds more data and is faster than other disk like floppy disk.

How it works

Hard disk usually consists of several platters. Each platter requires two read/write heads one for each side. All the read /write heads are attached to a single access arm so that they can move independently. Read/write head made up of aluminum and coated on both side with the special iron oxide to store data in the form of magnetized dots on the platters. Platters rotated at very high speed in between 3600 to 15000 rpm (revolutions per minute) or more.



Storage Devices

Optical Disk

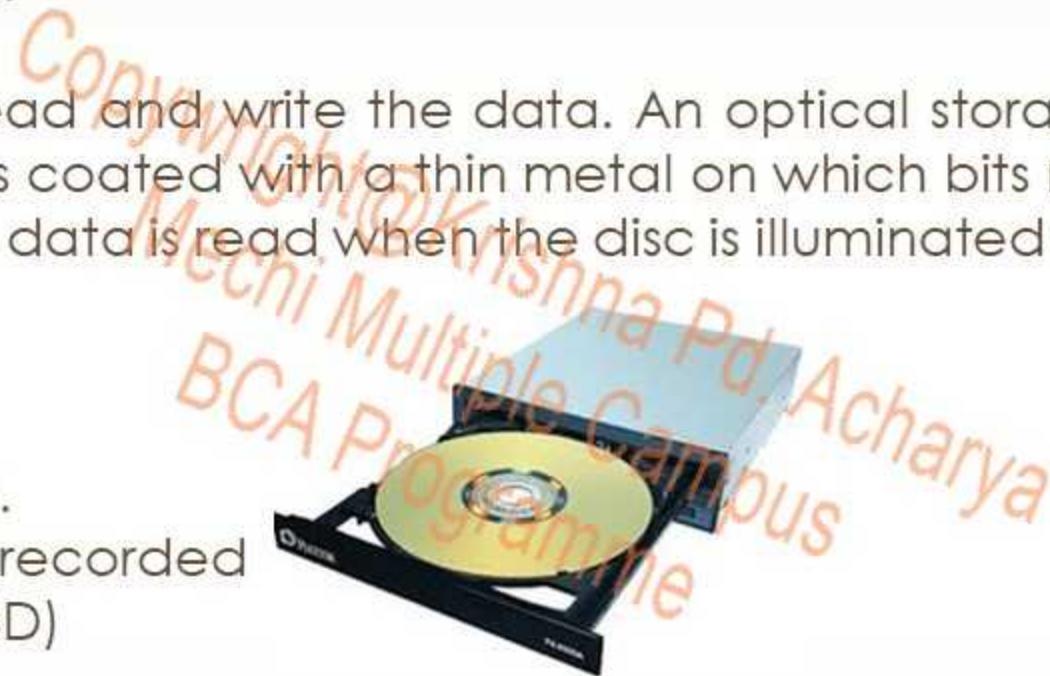
It removable disk on which data is written and read through the use of laser beams. A laser beam is concentrated narrow beam of light focused and directed on a particular location to read or write data. It is used as back up memory. Its advantage is that it has very high storage capacity and relatively cheaper.

How it works

It use the laser technology to read and write the data. An optical storage medium is a flat, circular storage medium which is coated with a thin metal on which bits may be stored in the form of highly reflexive area. The data is read when the disc is illuminated with laser beam.

Advantage

- High storage capacity .
- Less expensive
- Write once read more(WORM).
- High quality (HD) data can be recorded
- CD-RW,DVD-RW, Blu Ray Disk(BD)



Storage Devices

Flash Memory

It is special type of EEPROM It consist of circuitry on small-card-sized that can be inserted into slots connecting to the motherboard. It is nonvolatile. It is not only to simulate main memory but also supplement or replace hard disk drives for permanent storage.



Secure Digital (SD) memory:

Secure Digital memory cards are used in just about every type of portable device available, from digital still cameras, video cameras/camcorders, tablets, to cell phones and smart phones.

Secure Digital memory cards are significantly smaller than Flash cards, and are equipped with a nine-pin interface as compared to the 50-pin interface of the Flash.

Questions

- what is the purpose of memory?
- 1 TB =?MB and ? byte
- what is register?
- what are the purpose of cache memory?
- Explain RAM in computer
- Write down the characteristics of primary memory.
- Write down the characteristics of Secondary Memory
- what is volatile and non-volatile memory.
- Differentiate between SRAM and DRAM.
- why ROM is required in computer system
- write down the characteristics of ROM.
- Explain EPROM.
- what is disadvantages of cache memory.
- Explain the working mechanism of Hard disk.
- What is optical disk? explain how it works.
- write down two application of SD Memory

Real Time Assignment

Suppose that your class is actually one department within a medium-sized company. You need to adopt a backup system for the department's data. As a group, what factors should you consider in making this decision? What the backup technologies should you consider? What type of backup schedule should you follow?

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