

ICT (i.e. Information and Communication Technology) refers to the convergence of tools of Information and Communication. Here, information refers to the processed data or output that is generated by computing devices and communication refers to the transfer of knowledge and information. ICT has enabled with a vast array of new communication capabilities. The resources of telecommunication includes broadcast media, transmission, network based control, telephone lines and wireless signals whereas the resources of information technology includes data, information, software, audio & video processing, etc.



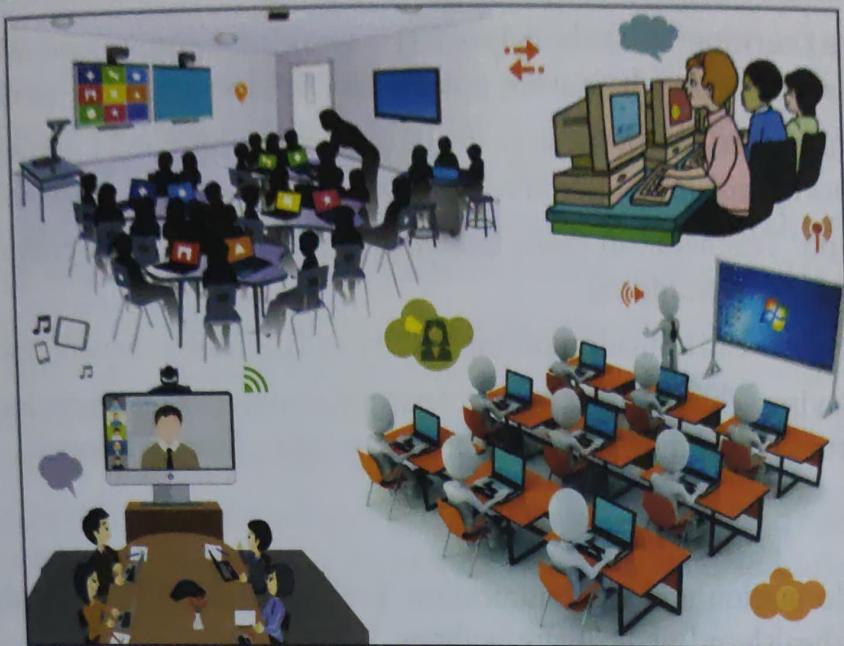
ROLE AND IMPORTANCE OF ICT

ICT deals with digital data and the way to create, store, retrieve and transmit data. The resources of ICT is being applied in all sectors of human activity, leading to a life of more facilities. The convergence of different technologies in ICT is being applied in academic, health, business, government communities to widen the use of their resources.

In Education

Imparting education & training is the most important aspect of human society. ICT has made it possible that the knowledge reaches everywhere in the best possible way.

It is helpful to make teaching and learning process an active and continuous process that can be connected to social life of all citizens as it has the potential for reaching remote places & increasing access.



It is providing variety of opportunities to scattered and rural populations, especially to traditionally excluded people from education due to cultural or social reasons such as ethnic minorities, girls, persons with disabilities and the elderly ones. It is helping people who are abstained to educate due to cost or because of time constraints. Education by ICT is reaching to many with quality deliverance in many ways like:

Virtual Class

ICT is in process of making the class rooms digital. In classrooms digital boards are being installed along with LCD projectors that are connected to servers of contents over network/internet. The teachers take help of such content to demonstrate of various topics that help the students to understand with broader perspective. Such arrangements also help the teachers to store the contents for further usage than that are written on the board while teaching in class. By virtual classes, live demo of any activity or concept can be given. It establishes realistic approach for training.

Video Conferencing

ICT helps to organize video conferences that telecast lectures, discussions about problems & providing instant solutions, clarifying doubts, etc. Such class-room teaching are being supported by e-learning concept in which projectors and internet features are used for online communication by renowned and well experienced faculties and there is deliverance of contents to demonstrate on important topics as well.

Online Examination

With increase in resources of ICT different types of examinations and competitions are held on

computers that are connected to a centralized server of organizers through the internet. Such kind of online exams give immediate results and saves a lot of time, effort and resources.

Advantages of using ICT tools in Education:

Access to Remote Learning: With the help of ICT, a wealth of learning materials on almost every topic can be accessed from anywhere at any point of time & by an unlimited number of people.

Use of Media: Images and pictures can easily be used in teaching and improving the retentive memory of students by recognizing, relating and composing the things with real life objects.

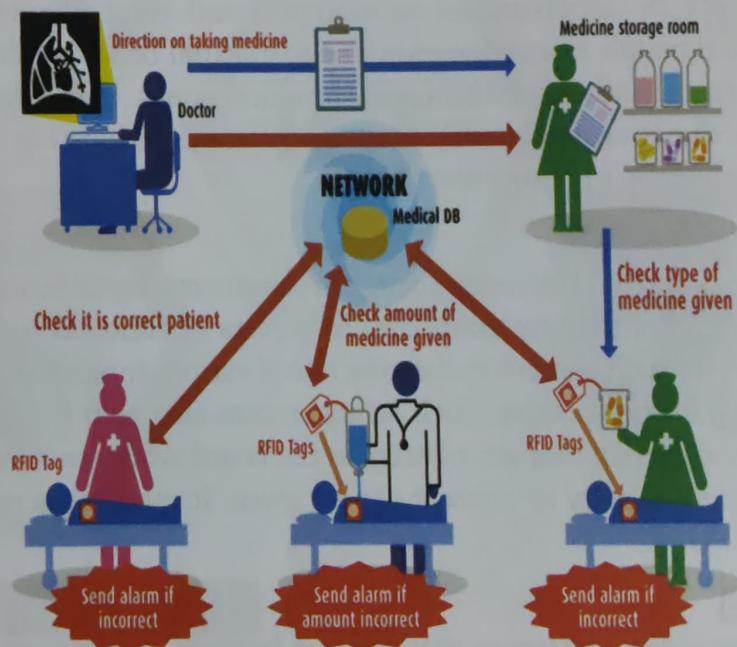
Easier Explanation: Teachers can easily demonstrate to explain about complex instructions and ensure student's understanding.

Interaction: The classes can be made more interactive and the lessons become more enjoyable.

Environmental Saving: This is a great saving of natural resources as learners don't need to travel long distance to attend coaching or classes. It also saves time, effort and money.

In Healthcare

The impact of Information and Communication Technologies (ICT) on health systems has revolutionized the health and medical care facilities.



It has revolutionized the services, advices and delivery of health care. With the use of this technology, patients can communicate with doctors for immediate advice or consultancy. They can even show the status of their disease via medical reports over communicating media, doctors can talk with patients by visiting a telemedicine room or can consult with patients from a laptop supported by an internet connection. A detailed 'clinical examination' and review of all diagnosis is also possible in a seamless manner with the option of recording the entire interaction or test or an operation.

In some cases the junior doctors operate the patients under the supervision of their senior doctors who may be connected with them by communication tools during operation but are residing at far away location.

They diagnose and record them too. Eventually, sometimes there can be some new findings through diagnosis. Diagnosis can be innumerable and recording of such diagnosis can be transferred into other language, textual matter or other readable form by operators (that can be useful for others or for future reference) with the help of ICT tools.

Now-a-days, many hospitals like Apollo in association with CISCO Health Presence Extended Reach technology are effectively delivering health care services remotely 24x7.

For example: Medical staff world-wide have many opportunities to update their skills through internet-based advice and training initiatives, resulting into early diagnosis of symptoms that can save a person's life. Rural health kiosks can transmit information of the symptoms of a sick person to the centrally located hospital and provide cure, etc.

ICT provides an excellent tool for enhancing the healthcare delivery and optimal utilization of the skills and infrastructure that may be located at remote rural and urban areas in a cost effective manner.

In Governance

The advancement of communication technologies, especially the internet, has enabled governments all over the world to improve the living standards of its citizens. Use of Information Technology tools in different government departments has led to better management and administrative control.



In India, NIC (National Informatics Centre), under the Department of Information Technology actively promotes to implement the Information and Communication Technology solutions in the government departments.



e-Governance relates to governance of various departments by exchanging information and direction between government and citizens (G2C), government and employees (G2E) and also between government and government's departments (G2G).

ICT has facilitated electronic access for different services to the citizens. It is enabling to provide in hand information of various government departments to the citizens at their door steps.

ICT TOOLS

ICT encompasses both the internet-enabled sphere as well as the mobile, powered by wireless networks. The list of ICT components is exhaustive, and it continues to grow. It includes antiquated technologies such as landline telephones, radio and television broadcast all of which are still widely used today alongside cutting-edge ICT pieces such as Computers, Smartphones, Artificial Intelligence, Robotics, etc.

Mobile Phone

A mobile phone is a wireless handheld device used for mobile telecommunication over a cellular network. Mobile phone is commonly known as a cell phone or cellular phone. It is primarily designed for 'Voice' communication and to send & receive text messages. In addition to the standard voice function, new generation mobile phones i.e., Smartphones support many additional services, and accessories, such as MMS, e-Mail, web browsing, gaming, photography and even navigation. A mobile phone with numerous features is called a Smartphone, while a regular mobile phone is known as a Feature Phone. Some of the popular operating systems for Smartphones are Android OS, Apple iOS, Windows Mobile, etc.

Tablet

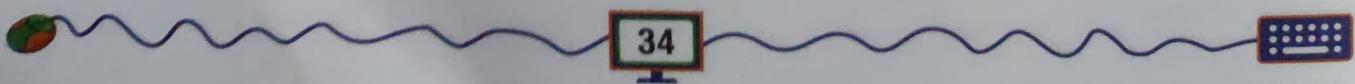
A tablet computer or Tab, is a mobile device, designed to be a handheld computer. It is small enough to fit in the hand but large enough to display a lot of text at a decent size. Tablets, being computers, do what other personal computers do, but are usually less powerful than 'regular' PCs. The tablet is ideal for browsing the web, its size and shape make it easy to read and hold. Most of the tablets include e-reader software that allows you to download books and other written material from the internet and read it on the machine.

Difference between Smartphone and Tablet

Smartphone	Tablet
Screen Size is smaller.	Bigger screen than Smart phones.
Reading, watching movie is difficult in small screen.	Best suited for reading, to watch movies.
Less storage capacity.	Usually have higher storage capacity.

Radio

Radio is one of the most popular ICT tool. Radio is used to broadcast audio. It is widely used in



modern technology, for radio communication, listening to songs, commentary, news, radar operation, radio navigation etc.

Television

Television popularly known as TV, was invented by a Scottish scientist named John Logie Baird. Television is a system for transmitting visual images and sound that are reproduced on screens. It is chiefly used to show programs for entertainment, information, advertisement and education.

E-Mail

Electronic mail is a mailing service provided on the internet by which one can send messages to any person around the world through a computer. It has become the fastest, easiest and the cheapest means of communication for business, governance, administration, education, tourism, etc.

WHAT IS MOBILE APP?

A mobile application, most commonly referred to as an App, is a type of application software developed to run on a mobile device, such as a smartphone or tablet computer. Apps are generally small, individual software units with limited function but they turn mobile devices into miniature powerhouses of function and fun. The use of app software was originally popularized by Apple Inc. and its App Store, which offers thousands of applications for the iPhone, iPad, etc. As in the year 2019, the three major players in the mobile apps space are:

Google Play: For Android devices

Apple's App Store: For iPads and iPhones

Amazon AppStore: For Amazon Fire devices

Some Common Mobile App

 **Phone:** This app is used to make calls. And most importantly it is used to store the contact details.

 **Message:** This app is used for sending and receiving SMS. It also stores draft, typed, sent and received messages.

 **Email:** An email app is used to send and receive email messages by configuring an email account (Gmail, Outlook etc.). It works similar to the web based email account.

 **Calendar:** This app is used to display Calendar in different views such as Yearly and Monthly. It is also used to schedule reminder, appointment, etc.

 **Clock:** It is used to display time in digital and analog format. It is also used to set an alarm, timer and stopwatch.

 **Photos:** This app helps to view images & videos and also used to arrange photos in the form of an album.

 **Maps:** This app is used for navigational purpose. It is enabled by GPS (Global Positioning System) technology.



Web Browser: This app is used to search the web to get desired information through the internet.



Music: It is used to play and listen to music and songs.



Camera: It is used to capture & store photos and videos in the phone.

INTERNET & ITS APPLICATION

The 'Internet' is a global system of interconnected computer networks that use the standard Internet Protocol Suite (TCP/IP) to serve billions of users worldwide. It is a network of networks that consists of millions of private, public, academic, business, and government networks, of local to global scope, that are linked by a broad array of networking technologies. The 'Internet' carries a vast range of information resources and services, such as the inter-linked hypertext documents of the World Wide Web (WWW) and the infrastructure to support electronic mail. Some of the popular applications of Internet are:

Search Engine: It can be used to search anything on the web. Most popular search engines are Google and Yahoo.

Hobbies: Those who are having certain hobbies can try to improve on it by reading upon many aspects of their hobbies.

Research: Research papers are present online which helps the researcher about literature review.

Education: Now, right from kinder garden, an enormous amount of educational material is available on the web. Online education has become the latest trend in today's education system.

Communication: Internet helps people to communicate, either with the use of social networking websites or through e-Mails. Computer users around the world extensively use email service on internet to communicate with each other.

Job Search: Now-a-days, many people search jobs online as it is quicker to approach and there is a large variety of job vacancies present. People can publish their resume online for prospective job. Some of the websites providing this service are naukri.com, monster.com, summerjob.com, recruitmentindia.com, etc.

Shopping: Shopping has become easier with the advent of Internet. It has also facilitated an introduction of a new market concept consisting of virtual shops. Using the internet services customers can submit specific product queries and request specific sales quotes. For example: amazon.com is a WWW based on the internet where information on all types of products can be found and online store can be ordered online.

Travel: One can use internet to gather information about various tourist places. It can be used for booking Holiday tours, hotels, train, bus, flights and cabs. Some of the web sites providing this service are goibibo.com, makemytrip.com, olacabs.com.



Video Conferencing: It enables live face-to-face communication across networks via web cameras, microphones, and other communication tools. Video conferencing can enable individuals at distant locations to participate in meetings on short notice, with time and money savings. When Video Conferencing is used in education, it is easier to have interactive communications between teacher to teacher, teacher to classroom, or classroom to classroom with students at different places.

e-Commerce: e-Commerce (Electronic Commerce) is the buying and selling of goods and services, or transmitting funds or data, over an electronic network, primarily the Internet. These business transactions occur either in business-to-business, business-to-consumer, consumer-to-consumer or consumer-to-business areas. Popular e-Commerce companies in India are Flipkart, Snapdeal, Amazon India, Paytm.

Social Networking: Social Networking is the use of internet-based social connections with friends, family, classmates, customers and clients. Social Networking can be established for social purposes, business purposes or both. These programs show the associations between individuals and facilitate the acquisition of new contacts. Examples of social networking are Facebook, LinkedIn, WhatsApp, etc.

SOCIAL MEDIA

Society is a community of people who are linked to each other on some common platform. Being social with hundreds of people over internet is social networking. In computer, social networking refers to a network of hundreds of people around the world on the internet. It is the network of different people who form communities among themselves to share sentiments, relationships, topics, ideas, etc. or topics of common interest. These people may be linked to each other because of some type of common platform (like: School, College, etc.) among them that may have been in the past or in present or may be in future.



In social networking site a user creates his own profile by uploading information about himself. In social network, it may be possible that the two persons in network may not know each other.



personally, they may know each other only on the basis of their profile which has been uploaded by themselves.

Twitter

Twitter is an online news and social networking platform where people post and interact in the form of short messages called 'tweets'. Tweets were originally restricted to 140 characters, but later, this limit was doubled to 280 except in few languages. Tweeting is posting short messages for anyone who follows you on Twitter, with the hope that your messages are useful and interesting to some of your followers. Some people use Twitter to discover celebrity, companies etc. to follow their tweets.



Twitter was created in March 2006 by Jack Dorsey, Noah Glass, Biz Stone, and Evan Williams and launched in July of that year. The head-quarter of Twitter is in San Francisco, California.

Facebook

Facebook is a social networking platform that is quite easy for us to connect online with family and friends. Facebook allows to share photos, text messages, videos, status & stories posts and feelings online.



Originally, it was designed for college students, Facebook was created in 2004 by Mark Zuckerberg while he was enrolled at Harvard University. Today, Facebook is the world's largest social network, with more than 1 billion users worldwide.

Key Features of Facebook

Here are few features that make Facebook so popular:

- ◆ Facebook allows us to maintain a friends list.
- ◆ Facebook enables to choose privacy settings to tailor who can see contents of our profile.
- ◆ Facebook allows us to maintain photo albums that can be shared with friends.



- Facebook supports interactive online chat and the ability to comment on the friend's profile pages.
- Facebook supports group pages, fan pages, and business pages.
- We can stream video live using Facebook Live.

YouTube

YouTube is a social platform meant for sharing videos. It enables the users to watch, like, share, and comment on uploaded videos. YouTube services can be accessed on PCs, laptops, tablets and via mobile phones.



Main Functions of YouTube

- Users can search for and watch videos.
- Create a personal YouTube channel.
- Upload videos to channel.
- Like/Comment/share uploaded YouTube videos.
- Users can subscribe/follow YouTube channels and users.
- Create playlists to organize videos and group videos together.

WhatsApp

WhatsApp Messenger is a freeware instant messaging platform owned by Facebook. It allows smartphone users to share text, image, document, location, contact, video and audio. In addition to basic messaging, WhatsApp provides group chat, voice call and video conferencing.



WhatsApp can be downloaded from Apple store, the Google Play store or from the WhatsApp website. WhatsApp is available in web based and app based mode both.

WhatsApp Inc. was founded in 2009 by Brian Acton and Jan Koum.

COMPUTER

'A computer is an electronic device which performs numerical calculations (+, -, *, /) and logical operations (AND, OR, NOT) at high speed and produces information that are expressible in numerical as well as in logical form'.



A computer performs actions and accomplishes its tasks in three basic stages namely: Input, Process and Output. It works according to a set of pre-defined programs. A program is a set of sequentially arranged instructions which directs the computer to process the input, in order to produce the required output or result.



Input is the data that is fed to the computer by the user. Some examples of input are numbers for calculation, marks of students of a class, etc.

Processing refers to the series of action by which the computer converts raw data into information. Processing of data is done by the CPU.

Output is the result which is termed as information. Some examples of output are graphs, mark sheets, reports, animated movies, etc.

Data is the raw facts and figures which are fed into the computer in the form of Input. Process is the series of actions performed on the data to convert it into meaningful information as per the given instructions. Information is the result produced by the computer in the form of output.

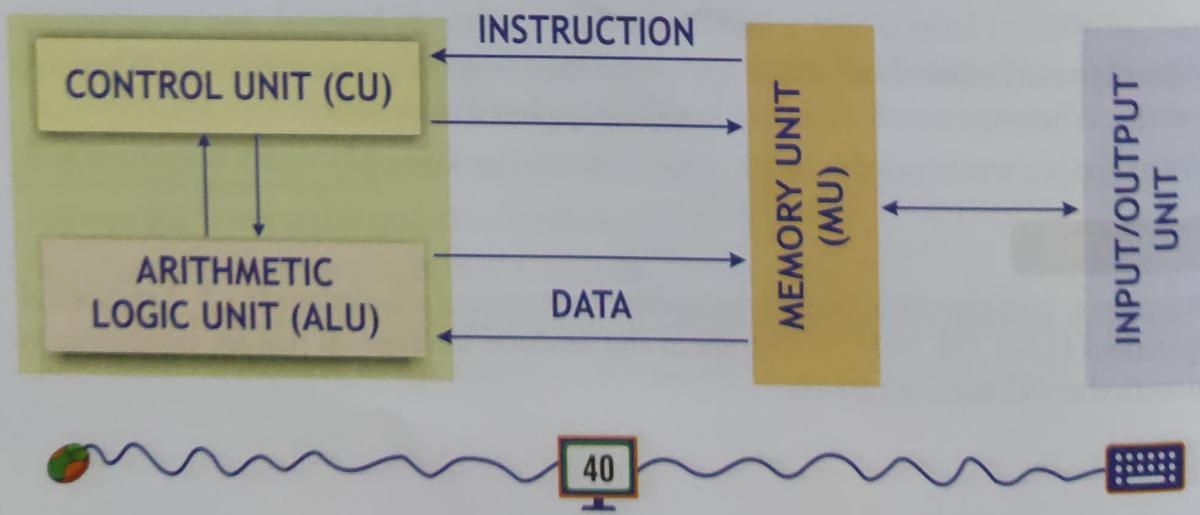
CENTRAL PROCESSING UNIT

CPU (Central Processing Unit) is also known as the 'Brain of a Computer'. As it appears, it is a hardware component and also an important functional component of a computer system. It takes information from the input unit or memory and processes it as per the given instructions. Processing includes calculations, comparisons, decision making, etc.

Functional Elements of a CPU

The functional elements of a CPU can be divided into three parts:

- Arithmetic Logic Unit (ALU)
- Control Unit (CU)
- Memory Unit (MU)



Arithmetic Logic Unit (ALU)

ALU performs mathematical calculations (addition, subtraction, division, multiplication, etc.) and does logical comparisons (greater than(>), less than(<), equal to (=), not equal to(!=) etc.). 'Logical Operation' refers to comparison, as it sets the sequence of operations. It differentiates between 'TRUE' and 'FALSE'. It receives the coded data and manipulates them to produce information in machine code and then sends to the Control Unit.

Control Unit (CU)

Control Unit co-ordinates and directs the operation of the hardware devices. It also co-ordinates the flow and execution of the data and instructions, that are fed into the computer's memory. CU functions in a F-D-E-S (Fetch-Decode-Execute-Store) cycle. It fetches the instruction and data from the memory unit & decodes them and passes to the ALU for further processing. It also directs the ALU to execute the instruction and perform the required operations on the data.

Memory Unit (MU)

Memory Unit or main storage stores the data, instructions, intermediate results and final results that are ready for the output. All instructions or data are stored in the memory unit before being used by the ALU or the CU.

The main storage is divided into a number of storage locations that can be accessed by a unique number or address, known as **memory address**. Within the CPU there are high speed, special purpose memory units called **registers**.

The Control Unit and the internal storage are linked together by sets of parallel electrical conducting lines called **Buses**. The buses that carry data are called 'Data Buses'. To retrieve data from the memory, it is necessary to identify the address of data in the main memory. The address is identified by 'Address Buses'. The buses that carry control signals, are called 'Control Buses'.

COMPONENTS OF A COMPUTER SYSTEM

A computer system functions with the help of 'Hardware' and 'Software'. The physical components of a computer system are known as 'Hardware'. The virtual component is known as 'Software'. It is abstract, i.e., it has no physical identity.

Hardware is the electro-mechanical part of a computer that is capable of computing and manipulating information, whereas software is a collection of instructions or programs which directs and co-ordinates the functions of computing and manipulating.

A computer is an instruction driven device that accepts data, processes it and produces the desired results in the form of information. Data are fed into the computer through the 'Input' devices which are then 'Processed' inside a CPU and then results are displayed through the 'Output' devices. Thus, a computer system constitutes an input device, output device and processing device.



There are various types of input devices. Some of the common input devices are Keyboard, Mouse, Joystick, Scanner, OMR, OCR, MICR, Light Pen, Microphone, Bar Code Readers, Web Camera, Digital Camera, etc.

Keyboard

Keyboard is a standard input device. It is mainly used to type text and to send the instructions to a computer with the help of keys. Keyboard keys are the buttons that represent alphabets, numerics, alphanumerics and special characters. The keys can be used individually or in combination with other keys. The keyboard normally contains 101 to 108 keys.



Depending on the position or placement of the keys, the layout of a keyboard comes in various styles such as QWERTY, QWERTZ, AZERTY and DVORAK. QWERTY keyboard is the most commonly used keyboard. It is based on the English Language. Its name is derived from the sequence in which six alphabetical keys are positioned on the upper line of the keyboard. AZERTY type keyboard is mostly used in France ('A' and 'Z' characters replace 'Q' and 'W' on such keyboards). QWERTZ type keyboard is widely used in Germany and Central Europe.

In Laptop, Notebook and Tabs, keyboard is referred as 'Keypad'. Christopher Latham Sholes is the inventor of keyboard.



Mouse

Mouse is a hand-held pointing device which is used on a flat surface and is represented by a pointer on the screen. The pointer on the screen moves when the mouse is moved by the user. A mouse generally consists of two buttons and a scroll wheel on its top.



By pressing (clicking) the buttons of a mouse, the user gives instructions to the computer. The mouse was invented by Douglas Engelbart.

Joystick

Joystick is a pointing device whose function is similar to a mouse, except that a mouse pointer stops moving on the screen as soon as the user stops moving it, while in the joystick pointer continues to move in the direction towards which the joystick has been pointed.



To stop the pointer, the user has to bring the joystick to its upright position. It is generally used to play video games.

Scanner

A scanner is a device that scans a document by sensing the reflection that is received when the scanner emits rays on the contents. It takes the image of contents and converts it into a digital file.



The scanned image or photo can be stored in a computer and easily transferred to a secondary storage device. Scanners can be categorized as 'Handheld scanner' and 'Flatbed scanner'.

Optical Mark Reader (OMR)

OMR is an input device which can detect the marks on a paper. It is used to evaluate answer sheets in which selected answers are marked in dark circles.



It is used to read the given or marked answers by sensing the marks made on the answer sheet.

Magnetic Ink Character Reader (MICR)

MICR is a device which is used by banks to process cheques by interpreting information stored in MICR code.



On the cheques, the code of name of the bank, branch code and cheque number are printed with a special kind of ink containing magnetic particles or iron oxide which is scanned & read with the help of MICR and accordingly processed by the computer. A MICR code consists of nine (9) digits.



On the back of Credit/Debit Cards, there is a thin black stripe (known as Magnetic stripe). Such stripes contain coded information in the form of magnetic marks and are read when the card is inserted in the ATM.

Light Pen

A 'Light Pen' is a pen like device which uses a light sensitive detector to select or draw objects on the display screen.



It is similar to a mouse, except that with a light pen one can move the pointer on the screen by touching it on the objects on the screen. When the pen is moved across the screen, its position is sensed because of the light it emits.

A Tablet PC is slate shaped notebook computer. Its technology allows the user to operate the computer with stylus, digital pen or fingertip, instead of using a keyboard or mouse.



Bar Code Reader

Bar Code Reader is a popular scanning device which reads the bar codes. Bar codes comprises of adjacent vertical black bars of different width.





Bars are codes that represent different numbers. One can see the bar code on the back cover of this book as well. A bar code reader emits a beam of light (Laser Beam), which reflects the bar code image. A light sensitive detector is present in the bar code reader which identifies and reads the bar code image. The bar pattern is changed into numeric code inside the CPU.

Microphone

Microphone is a voice based input device. With the help of this device, sound or voice is recognized/recorded in the computer and is converted into digital form which is then played or processed by the computer.



Digital Camera

Digital Camera captures image or picture momentarily and converts the image directly into digital form and stores in memory. It can then be viewed on the computer or compatible devices.



It is available in various models with different specifications that include pixels, sizes and memory. The quality of image captured by digital camera is measured in pixels.





Digital photo frame is a thin coloured screen in the form of a picture frame. It can store photographs/images in its memory in the digital format and can be used for slide show presentation.

Web Camera

A web camera or webcam is a type of video camera that saves images or visuals in real-time into a computer via USB, ethernet or Wi-Fi.



Web camera is used to create video links and helps us to set up authentic video-conference stations. Some built-in webcams can be remotely activated from far off locations. Webcams can also be used for security & surveillance purposes by monitoring the captured visuals.

Biometric Sensor is a device which captures unique information from human body. The unique information can be fingerprints, iris pattern, etc. It stores and compares to match the information with the available database.



COMPONENTS OF CPU

The function of a CPU is performed by various hardware components present inside it. The hardware components of a CPU can be broadly divided into 'Memory' & 'Storage Devices', 'Main Circuit'(Motherboard), 'Processor', 'Power Controller'(SMPS), 'Ports', 'Cards', etc.

MEMORY & STORAGE DEVICES

Memory, in context to a computer system, refers to the location of storage of information. The CPU stores the data in the memory/storage device that can be used or retrieved whenever required.

'Memory' receives instructions and data from the input devices and stores them till they are needed by other parts of the computer. Once the instructions are executed, the results are transferred to a permanent location which are then stored in a storage device.

Memory can be classified into two types:

Primary Memory

Secondary Memory

Primary Memory

Primary Memory is also known as 'Main Memory'. It is that part of the CPU which stores the



data and instructions that are meant for current processing or for the internal management of the computer. It has a limited capacity for storage of data.

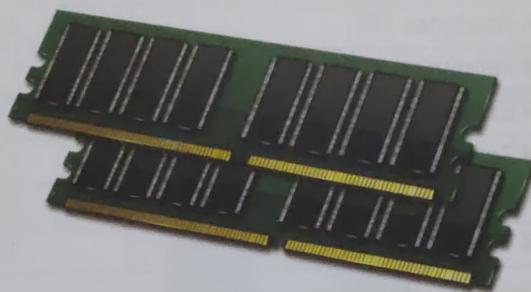
Primary Memory can be classified into two groups:

RAM (Random Access Memory)

ROM (Read Only Memory)

RAM: It holds the information temporarily, during the ongoing operation of a computer. When a computer is under operation, the data or instructions are stored into its memory for instant access. During the course of the execution of instructions, some intermediate results may be produced which are stored in the RAM.

RAM is a volatile memory i.e., when a computer is switched 'OFF' or the power supply is interrupted, all the stored information in it disappears. RAM chip is made of Metal Oxide Semiconductor (MOS). RAM is available in the form of chip of different capacities, Eg.: 4 GB, 8 GB, 16 GB, 32 GB, 64 GB, etc. You can upgrade the capacity of existing RAM in a computer by installing extra RAM chips in addition to the existing ones. There are different types of RAM like SRAM, DRAM, SDRAM, EDRAM, ECRAM, etc.



ROM: It stores a set of pre-defined instructions for the internal operations of a computer. It is also referred to as 'non-volatile' memory or 'firmware'.

Once the user switches 'ON' the computer, the computer automatically does a series of sequential tasks like POST (Power On Self Test), RAM Test, etc. before the user starts its operation. The instructions for such predefined set of tasks are stored in the ROM. Such information on this memory can only be read. There are different types of ROM like PROM, EPROM, EEPROM, Flash ROM, etc.



BIOS pronounced as 'Bye-ose', is stored in ROM and it operates when the computer is switched 'ON'. It contains a set of essential software that test the setup of hardware devices during startup. It helps to start the operating system and supports the transfer of data among the hardware devices.

Cache Memory

Besides RAM and ROM, there are some other primary memories like the Cache or Buffer memory. Cache Memory is a part of CPU and is used when there is swapping of information

between the primary memory and the ALU.

Units of Storage

A computer understands its own language. All the data and information that are fed into a computer are converted into its own (machine) language. Its language consists of two digits i.e. 0 and 1 which are called 'Binary Digits'. Each digit i.e., 0 or 1 is known as a 'Bit'.

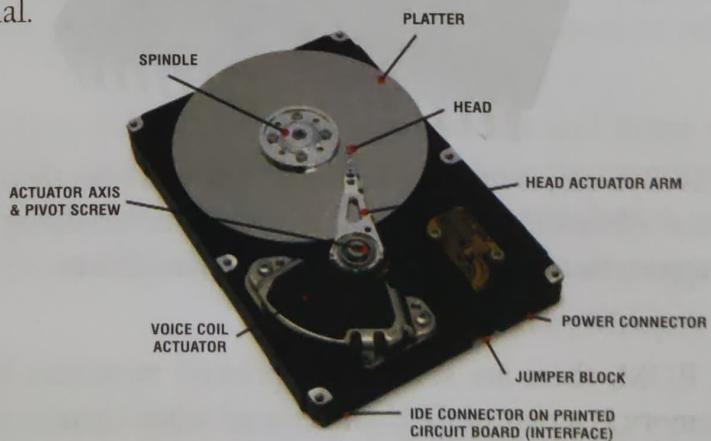
A group of four (4) bits is called a 'Nibble'. A group of eight (8) bits is called a 'Byte'. Conventionally, byte is also known as the word length of computer. Storage of data is measured in multiples of bytes. Different units of storage of data are:

No. of bits/bytes	Said as
8 Bits	1 Byte
1024 Bytes	1 Kilobyte
1024 Kilobytes (KB)	1 Megabyte
1024 Megabytes (MB)	1 Gigabyte
1024 Gigabytes (GB)	1 Terabyte
1024 Terabytes (TB)	1 Petabyte
1024 Petabytes (PB)	1 Exabyte
1024 Exabytes (EB)	1 Zettabyte
1024 Zettabytes (ZB)	1 Yottabyte
1024 Yottabytes (YB)	1 Brontobyte
1024 Brontobytes (BB)	1 Geopbyte

Secondary Memory / Auxiliary Memory

Secondary memory refers to the permanent storage of data. During the operation of a computer, the currently used data lies in the temporary memory. It may be lost, if the computer is suddenly switched OFF. For this purpose, secondary memory is required, as it provides necessary backup and storage of instruction or data that are permanent & can be retrieved back as and when required. It is also known as backup memory. It has higher storage capacity than the primary storage/memory. There are various types of secondary storage devices. Some of them are:

Magnetic Disks: Magnetic Disks are storage devices that are made up of several disks coated with magnetic material.



The surface of each disk is marked with invisible circular tracks. The data is stored in the form of magnetic spots on disk.

- ⑤ Hard Disk: It is the most widely used internal storage magnetic disk. It is made up of spindles of smooth metallic plates coated with thin layer of magnetic material. Each plate of a hard disk is called a platter. Each platter has two (read/write) heads, one on each side. Over the years hard disks have been available in various storage capacities. eg. 20 MB in earlier days to 160 GB, 320 GB, 500 GB, 1 TB, 5 TB, 6 TB, 12 TB, 16 TB and more in recent times.

Hard Disk is also known as Winchester Disk.



Optical Disc: Optical Disc is commonly used as an external storage device in which a laser beam helps to read data from the flat surface of the optical disc.

- ⑥ CD: CD or Compact Disc is a common optical disc. It is made up of light weight plastic material with a chemical coating on one side where data is stored.



It is inserted into a CD/DVD drive or CD/DVD writer of a CPU. CD ROM (Compact Disc Read Only Memory) reads the data whereas in CD writer, data can be read and written as well. The capacity of 120 mm standard CD is 700 MB.

- ⑦ DVD: DVD or Digital Versatile/Video Disc is an optical disc which looks like a CD but has a capacity to store data up to 17.1 GB. DVD is the merging of video and audio in a common format.



To read information stored in a DVD, it has to be inserted into a DVD ROM or DVD Writer or DVD player (to copy information on a DVD, one has to use a DVD writer).



- ④ **Blu-ray Disc:** Blu-ray Disc can store data of upto 128 GB. It has been developed by the Blu-ray Disc Association (BDA).

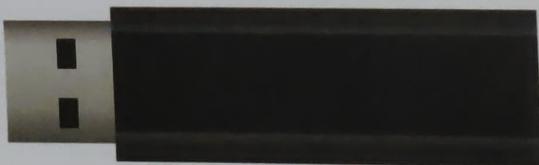


It is much advanced than CDs or DVDs. Blue-violet laser is used to read or write data in the Blu-ray disc.

- Diameter of a CD, DVD or Blu-ray disc is 120 mm. DVD can also be of 80 mm diameter that can hold data upto 1.5 GB.
- CDs can be used or played in a DVD-ROM or a DVD player but DVD cannot be operated in a CD player.



- ⑤ **Flash Memory:** Flash Memory is a small sized external storage device that is commonly used in digital cameras, mobile phones, MP3 players, etc. It can be plugged through USB or Fire wire port of a computer to fetch or transfer data to computer.
- ⑥ **Pen/Flash Drive:** It is small in size, handy and is a detachable device from which data can be read, copied or transferred from one system to another. It is re-writable and weighs less than 25 gm.



Now-a-days, pen drives are the most commonly used external storage and data transferring device. It has an attachment slot which can be easily inserted or attached into the computer's USB (Universal Serial Bus) port.

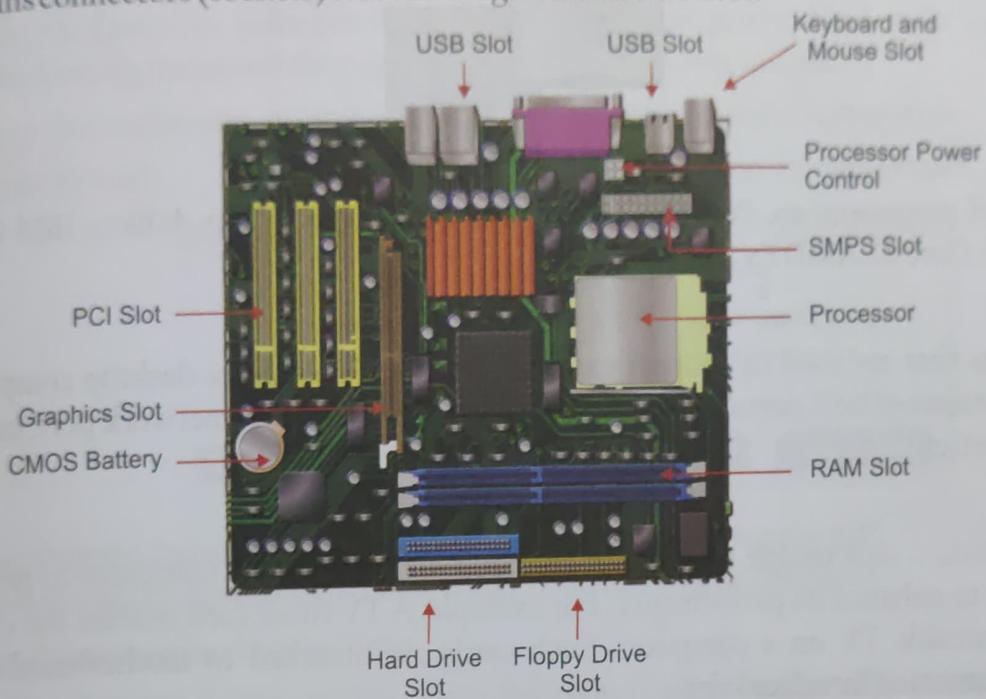
- ⑦ **Memory Stick:** Memory Stick is a detachable flash memory card device that was launched by Sony in 1998. The data stored in memory card can be read or written with a memory stick (typically a small box that connects via USB or some other serial connection).



Memory Stick supports memory card of different storage capacities and helps in faster data transfer speeds.

Motherboard

Motherboard is the main circuit board of a computer that lies inside the CPU, to which all the hardware devices are connected. It is in the form of a large multilayered printed circuit which contains connectors (sockets) for attaching additional devices.



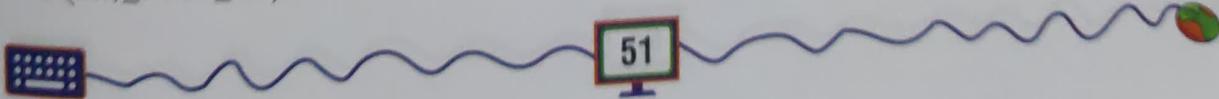
Typically, motherboard contains slots for the processor, BIOS, ROM chip, CMOS setup, mass storage interfaces, serial and parallel ports, expansion slots and all the controllers required for standard peripheral devices like monitor, keyboard, disc drives etc. The chips that are attached on the motherboard are known as the 'Motherboard Chipset'.

SMPS (Switch Mode Power Supply)

SMPS is an electric regulator component that receives electricity from the main power supply and then supplies appropriate power to the other components of the computer. It takes the required amount of electricity from mains or UPS and converts the AC current into DC current with required voltage.



It also regulates the voltage to eliminate spikes and surges inside the computer. It supplies power (i.e., $\pm 3V$ to $\pm 5V$) to different devices inside the computer.



Processor

It is the most important component of a computer system. It does all calculations and comparisons rapidly. Its speed is measured in higher units of hertz (hz) i.e. 9 MHz. Processor is often referred as the CPU.



Some versions of processors are Pentium series, Dual Core, Core 2 Duo, Athlon, IBM Cyrix, Core-i3, Core-i5, Core-i7, AMD Ex Series, etc.

Ports

Ports are sockets that are used to connect external devices. Generally, a desktop computer's motherboard consists of USB ports, serial port, parallel port, audio port, network port, modem port, monitor port, etc.

Cards

Cards are the devices that enable the user to configure or customize a computer to perform specific tasks or to enhance its performance. For example: A TV tuner card enables the user to watch television/cable TV on a computer. Such cards are attached to motherboard's PCI (Peripherals Connecting Interface) slots.

OUTPUT DEVICES

Output is the information obtained after the processing of data. The user receives the result through output devices. Output can be in the form of soft copy or hard copy. Soft copy refers to the digital copy which lies in the storage device whereas hard copy refers to the printed contents on a paper or film. Some common output devices are:

 Printer

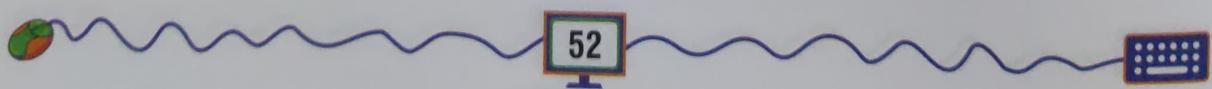
 Plotter

 Monitor

 Speaker

Printer

Printer is a common output device which is used for the purpose of printing documents. Printer generates a hard copy of data or information.



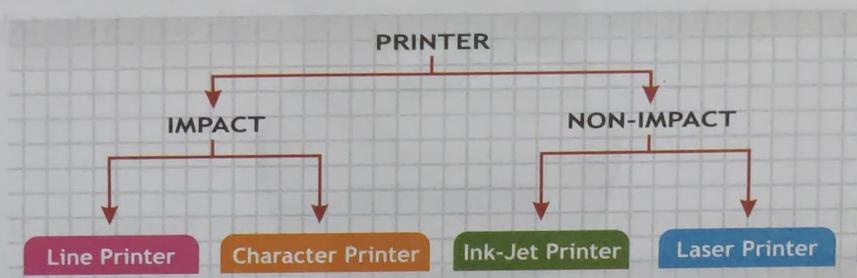
Printers are of different types depending upon:

- ④ **Quality of Printing:** The quality of output produced by the printer can be measured in units of dpi (dots per inch) which is also termed as resolution.
- ④ **Speed:** The speed of different types of printer varies widely. The speed of a printer is measured in cps (characters per second), ppm (pages per minutes) or lpm (lines per minute).
- ④ **Printing Mechanism:** There are different types of mechanism that are applied in different types of printers. Some printers print by striking the printer head on the paper, some print by forming images on the paper, some print by spraying ink, etc.

Based on the mechanism, printer can be broadly classified into two categories:

Impact Printer

Non-Impact Printer



Impact Printer: Impact printer prints the contents by striking the printer head or needle, on an ink ribbon which rolls through the cartridge to make mark on the paper.

Impact Printer can be classified into:

- ④ **Line Printer:** A line printer prints the contents line by line. The printing speed of line printers varies from 300 to 3000 lines per minute. Generally, line printer is used because of its greater printing capacity and higher speed than serial printers. It can be further divided into two types i.e. Drum Printer and Chain Printer.
- ④ **Character Printer:** A character printer is also known as serial printer. It prints the contents character by character, i.e., it prints a character at a time in serial order. It can be further divided into Daisy Wheel Printer, Dot Matrix Printer, etc.

Dot Matrix Printer: It is the most commonly used printer. It is also known as the 'Wire Matrix' printer. In dot matrix printer the printer head contains a matrix of pins. The characters are printed by the dots which are formed by striking the pins on the ribbon, with the help of small 'printer head' which moves to and fro across the page, it stops momentarily at each character position to strike the print ribbon.



A print head of a Dot matrix printer contains, 9 or 24 pins. Dot matrix printer is cheaper and has low printing cost than other printers. The width of a dot matrix printer can be 80 or 132 or 136 columns. Dot matrix printer can print upto 100 to 300 characters in a second. The resolution of the printing ranges from 150 to 300 dots per inch (dpi).

Non-Impact Printer: Non-Impact printer prints the output without touching or striking the ribbon on paper or on the film. This kind of printer prints by using thermal, chemical, electrostatic, laser beam or inkjet technology. Usually non-impact printer has greater resolution and is faster as compared to impact printer. Non-impact printer can print colorful content also. This printer can be classified into:

- ❖ **Inkjet Printer:** An inkjet printer produces high quality print outputs by spraying drops of ink (which is stored in coloured and black cartridges). This printer has a print head which contains the cartridge that has several tiny holes through which the ink is sprayed on the paper.



An inkjet printer can print upto 2 to 10 pages per minute. Its printing is costlier than that of dot matrix printer but its quality is much better than that and it prints at a medium pace. Inkjet printer prints photo quality image with resolution of 400 to 4000 dpi (dots per inch).

- ❖ **Laser Printer:** Laser printer prints the contents by laser technology. It is fast in operation as it operates in similar mechanism same as photocopy machines. The laser beam makes shadow of the images with the help of toner and transfers them on paper.



It is also known as 'Page Printer' because it actually stores the content of the page in memory before printing it. It can print up to 5-300 pages in a minute and the resolution output ranges from 600 dpi to 2400 dpi.

Plotter

Plotter is an output device that helps in printing high quality poster, flex, visuals, charts, graphs, tables and diagrams, etc. It can draw continuous lines and can produce output on paper, polyester film or coloured transparencies. In plotter, the figures are drawn by an electronic pen which is driven by a motor. It uses inkjet cartridges (single or multi-coloured) to spray colours for drawing and sketching.



Plotter is mostly used in CAD (Computer Aided Design), CAM (Computer Aided Manufacturing) and for printing Banner and DTP Flexes. Plotter can be classified into four categories:

- Flatbed Plotter
- Micro-graphic Plotter

- Flatbed Plotter: It consists of a fixed horizontal flat surface on which paper or any other medium is fixed. The pen is mounted on a carriage that moves along the horizontal and vertical axis to print over the medium.



- Drum Plotter: It consists of one or more pen(s) which moves across the drum. The output medium is placed over the drum. The drum rotates either clockwise or anticlockwise under the control of plotting instructions sent by the computer. The pen is mounted on the carriage and moves along with the carriage either 'left to right' or 'right to left' from the paper to print.



- Micro-graphic Plotter: In this type of plotter, the paper or other medium is held on both sides at the edges by pinch wheels which gives back-and-forth movement to the paper while printing. It does not print over the drum.



- Inkjet Plotter: In this type of plotter, jets of ink is used in place of ink pens. The paper is placed on a drum and inkjet with different coloured inks are mounted on a carriage. Inkjet plotter can print multi-coloured large drawings.





Speaker

Speaker is an output device that converts the electrical signals into sound waves that we hear. In speakers, electric current of the music files is supplied to the magnet that pushes the diaphragm of the speaker back and forth. This creates pressure and vibration in the air and as a result sound is produced.



Monitor

Monitor is a standard output device. It is also known as VDU (Visual Display Unit) or Screen. Monitor is used for interactive processing i.e., the data being fed is displayed on the screen. It resembles a television.

The monitor is connected to the video adapter or video card of the motherboard inside the computer. Monitors can be either monochrome or coloured. In monochrome screen (though rarely used) there is only one colour (usually white, green, amber or black). The Monochrome monitor's display is only in Black and White. In colour screens there can be color combination of upto 2,56,000 colours on the monitor. The screen of the monitor is normally measured diagonally and is available in different sizes like 15", 17", 21", 34", etc. The screen of a VDU is divided into specific character positions.

In the graphics mode the pictures are displayed by a combination of dots. The screen is treated as an array of tiny dots called 'Pixels'. In the graphics mode there is a resolution of 640 dots across and 480 dots vertically on the screen. There are different types of adaptors that support display of graphics. The higher the resolution, i.e., more the number of pixels the better is the quality of picture that is displayed on the screen. *DPI (dots per inch) is the unit of measurement of resolution applied to printers, scanners, monitors, etc.* Many computer system and the portable devices like laptops, PDAs etc. have Liquid Crystal Display (LCD) or LED monitor.

Liquid Crystal Display Monitors

LCD monitor is the advanced form of CRT monitors. A cold cathode ray and the fluorescent panel are two major components of the LCD. The cold cathode ray technology is used in LCD



which emits electrons and light up the fluorescent coated monitor screen. The process is known as backlighting. The second component is a fluorescent panel, which is made up of liquid crystal. Liquid Crystal is current sensitive and determines the number of electrons to pass through the screen to make the shape and image of an object.



Light Emitting Diode Monitors

Light Emitting Diode (LED) is an improved version of LCD monitor and manufacturers have tried to eliminate the drawbacks of LCD monitors. Both the monitors are based on the same display technology and provide better resolution. However, the difference comes on backlighting as LCD monitors use Cold Cathode Fluorescent Light and LED monitors are based on light emitting diode. The backlighting impacts badly on the image and decreases its sharpness and brightness. WLED and RGB LED are the two types of LED monitors, depending on the way LED, placed in the panel.



Benefits of LED over CRT and LCD Monitors

LED monitors give a high-quality image with vibrant colors and viewing comfort. LCD monitors are unable to display black and white image while LED monitors are capable of producing true black hues. It consumes less electricity than CRT and LCD monitors as a cold cathode fluorescent lamp is embedded in the panel. The absence of mercury makes it eco-friendly while zero percent flickering removes the chances of strain on the eyes.

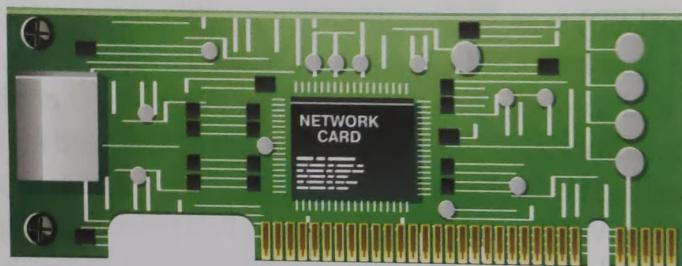
EXPANSION CARD

Expansion boards or cards are connected to the sockets of motherboard called expansion slots. The expansion slot is a socket circuit that allows us to attach devices such as modems, sound cards, graphics cards, network interface cards etc. to the computer in order to expand its working capability & performance. Expansion slots differ primarily in the speed in which they transfer information between the processor and the expansion board. There are three types of expansion slots that are found in modern computers:

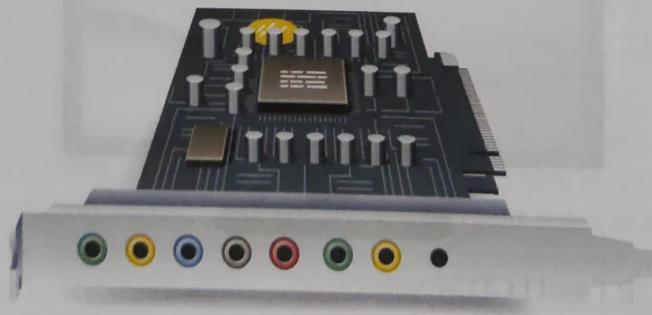
- ❖ PCI (Peripheral Component Interconnect)
- ❖ ISA (Industry Standard Architecture)
- ❖ AGP (Accelerated Graphics Port)

Kinds of Expansion Cards

Network Interface Card (NIC): A network interface card is an expansion board that enables the exchange of data between the computer and a network. NICs are designed to operate in a specific type of network, such as Ethernet or Token Ring. Modern NICs are manufactured to be integrated into PCI expansion slots.



Sound Card: A sound card is an expansion board that enables to produce sound as output that can be heard through speakers or headphones. It is also used to record sound as input from a microphone that is connected to the computer and to edit or mix sound stored on a disk. Most of the sound cards are manufactured to be integrated into PCI expansion slots.



Graphics Card (Display Adaptor): A graphics card is an expansion board that helps us to process & display videos. Modern display adaptors contain memory, therefore many times the RAM of computer is not used for storing the data. Availability of memory is a major factor in determining the screen resolution and colors that can be displayed on the monitor. Graphic cards are manufactured to be integrated into PCI expansion slots.



POR

Computer Port is an interface between the computer and peripheral devices like mouse, keyboard, monitor, printer, speaker, flash drive, pen drive, etc.

A computer port acts as a point of connection, where the cable or plug from the peripheral can be plugged to facilitate data flow from and to the device.

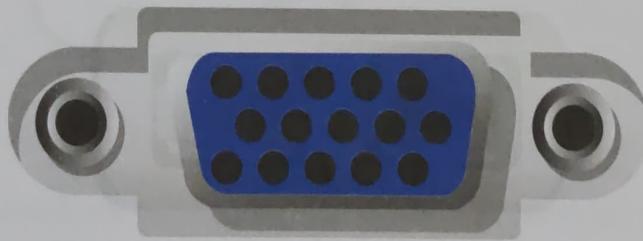
A computer port is also called a Communication Port as it facilitates communication between the computer and its peripheral device. Based on the type or protocol used for communication, ports can be categorized as Serial Ports and Parallel Ports.

A serial port is an interface through which peripherals can be connected using a serial protocol which involves the transmission of one (1) bit of data at a time over a single communication line.

A parallel port, on the other hand, is an interface through which the communication between a computer and its peripheral device takes place in a parallel manner i.e., data is transferred in or out parallelly or simultaneously using more than one communication line or wire. Printer port is an example of parallel port.

Video Ports

Video Graphics Array (VGA): It is found in computers, projectors, video cards and many TVs. The connector is called DE-15. It is a D shaped sub connector consisting of 15 pins in 3 rows.



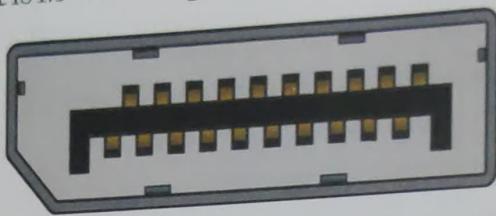
With the increase in use of digital video, VGA ports are gradually being replaced by HDMI and Display Ports. Some laptops have extra on-board VGA ports to connect to external monitors or projectors.

Digital Video Interface (DVI): It is a high speed digital interface between a computer (CPU) and a display device like a monitor. It was developed to replace the VGA technology. DVI-I, DVI-D and DVI-A are the common types of DVI connectors.

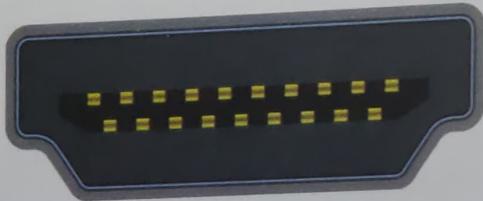




Display Port: It is a digital display interface with multiple channel for audio and other forms of data. It can replace VGA and DVI ports as the main interface between a CPU and monitor. The latest version of Display Port is 1.3 which supports resolution up to 7680 X 4320.



High Definition Media Interface (HDMI): It is a digital interface that helps us to connect High Definition (HD) and Ultra High Definition (UHD) devices like Computer monitors, HDTVs, Blu-Ray players, Gaming Consoles, High Definition Cameras etc.



Universal Serial Bus (USB)

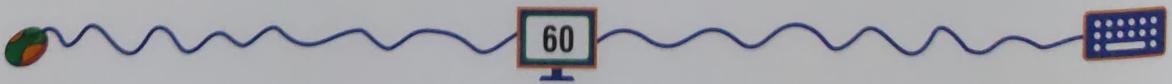
USB port is used to transfer data, act as an interface for peripherals and even act as power supplier for devices connected to it. USB replaced serial ports, parallel ports, game ports and power chargers for portable devices. There are three kinds of USB ports viz. Type A, Type B or mini USB and Micro USB.



Type-A is one of the most common USB port. There are different versions of Type A USB ports i.e. USB 1.1, USB 2.0 and USB 3.0. The USB 2.0 is Black colour coded and USB 3.0 is Blue colour coded. *USB 3.0 is the common standard and supports a data transfer rate of 400Mbps.*

RJ-45

Ethernet is a networking technology that is used to connect a computer to Internet and communicate with other computers or networking devices.



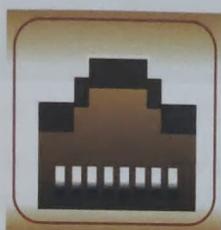
The interface that is used for computer networking (ethernet) and communications is known as Registered Jack (RJ) and RJ-45 port in particular is used for Ethernet over cable. RJ-45 connector is an eight (8) pin connector.

The latest Ethernet technology is called Gigabit Ethernet and supports a data transfer rate of over 10 Gigabits per second.

RJ-11

RJ-11 is another type of Registered Jack that is used as an interface for telephone, modem or ADSL connections. It is the main interface in all telecommunication networks.

RJ-45 and RJ-11 ports look alike but RJ-11 is a smaller port and uses a 6 pin connector.



RJ 45 port



RJ 11 port

FireWire

FireWire is used with digital audio/video camcorders, personal computers (PC) and offers sustained data transfer rates of over 3200 Mbits/s. *FireWire was developed by Apple, Inc. and integrated into Apple PCs as its main communication interface.* It is similar to a USB port that facilitates a high-speed connection between a computer and peripheral devices.



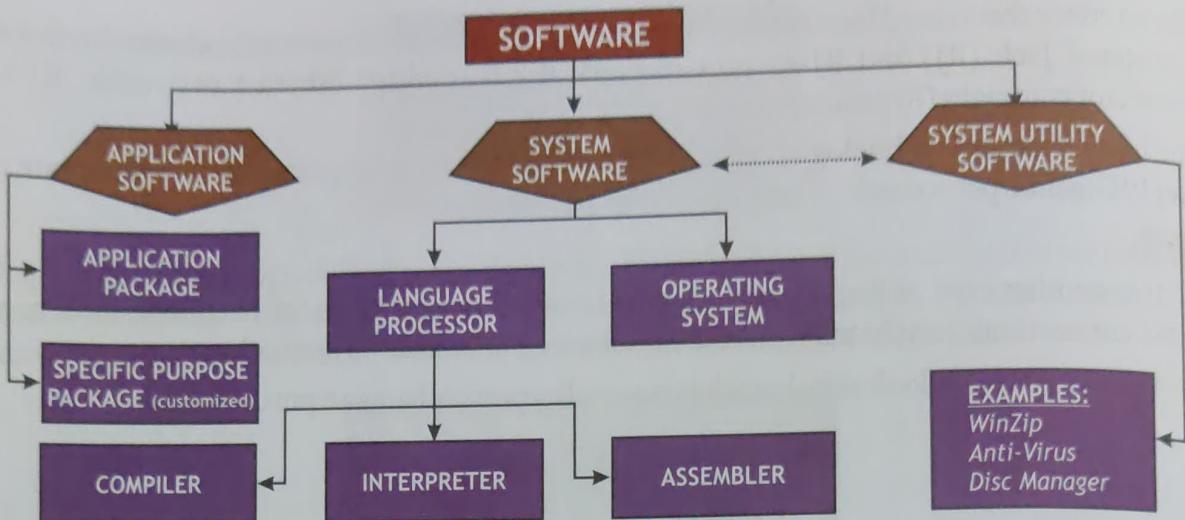
SOFTWARE

Computer can neither think nor work on its own. It has to be provided with a set of pre-defined instructions which are written in a computer language. Such sets of instructions are known as 'Programs'. A set of organized programs meant for specific purpose is known as 'Software'. Software is an intangible part of a computer.

Software can be broadly classified as:

- ❖ Application Software
- ❖ System Software
- ❖ System Utility Software





APPLICATION SOFTWARE

Application Software refers to programs which are designed to accomplish particular type of tasks to meet a user's specific needs. Application software can be classified into two categories:

❖ Application Package

❖ Customized Package

Application Package

Application packages are typically designed to accomplish some specific tasks which meet the needs of general user. Some examples of application packages are:

Word Processing Package: A word processing package enables the user to type and manipulate text to create documents. It also enables to create, edit, print and save documents. For example: MS-Word, Word Star, OpenOffice Writer, etc.

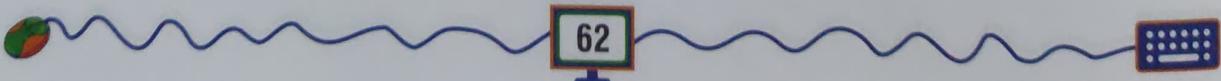
Spreadsheet Package: Spreadsheet package helps in representing data in tables and enables to do calculations and analysis by making graphs, tables, charts, etc. For example: MS-Excel, Lotus 1-2-3, OpenOffice Calc, etc.

Database Management Package: A database management package helps to store inter-related data or records together in an organized manner under controlled redundancy. It helps in generating different reports that are based on the records. For example: MS-Access, FoxPro, Sybase, Oracle, OpenOffice Base, etc.

DTP Package: DTP or (Desktop Publishing) package enables to design and make graphics and figures. It helps in designing brochures, news letters, books, posters, etc. For example: Page maker, Corel Draw, Ventura, etc.

CAD Package: CAD (Computer Aided Design) packages are used to create complex, two-or-three dimensional models of buildings, including architectural, civil engineering and mechanical designs.

CASE Package: 'Computer Aided Software Engineering' package is used to develop information systems. CASE automates the analysis, design, programming and documentation tasks.



Presentation Package: Presentation Package is used to display information, normally in the form of slides. It includes graphics, animation and use of multimedia. For example: MS-PowerPoint, OpenOffice Impress, Corel Presentations, KPresenter, etc.

Customised Package

Software which is designed especially for a specific purpose to fulfill the requirement of a particular individual or an organization is called a 'Customised Software'. It is also called 'Tailor Made software'. For example: Inventory Management System, Fee collection system, etc. It is developed according to the personal need of a user.

UTILITY SOFTWARE

Utility Software is a set of small programs that support the execution and operation of the Computer system by doing additional works like scanning the hard disk to check the faulty sectors, virus scanning to check the infected files, etc. Example : WinZip, NOD 32, etc.

Utilities are neither completely system software nor application software. It is difficult to make a definite list of utility software. But the most common types are disk and file management, Internet security and OS customization tools. Such software are also used as specific tools while developing programs etc.

SYSTEM SOFTWARE

System software helps the user to operate the computer system & utilize its different resources. It co-ordinates the operation and functioning of a computer along with the attached hardware components of the computer. System software acts as an interface or a bridge between the user and the computer. System software can be broadly classified into:

↳ Operating System

↳ Language Processor

Language Processor

Language processors is a type of system software that helps in converting programs in high level language to machine understandable language. Software or programs are set of instructions that are written in a programming language. Usually a programmer writes programs in High Level Languages (HLL).

HLL is a computer language in which codes or commands are represented in simple language like English as it is easier to understand. The internal parts of CPU understand machine language. A machine language is a computer language that consists of binary digits i.e. 0 and 1.



Assembler : An assembler is a utility program that helps to translate assembly language into the machine code.

Interpreter : An interpreter is a system software which translates high level language into machine code line by line.

Compiler : A compiler translates a program that is written in high level language into machine level language in one go.



Mobile Application

Mobile Application is commonly known as Mobile App. It was introduced by Apple for its mobile phones. Mobile application is specifically meant for use on handheld wireless computing devices such as smartphones and tablets. Mobile App is OS specific i.e., it works only with a particular mobile for which, it has been developed.

As per the areas of usage, mobile application can be broadly classified as:

Art & Design	Auto & Vehicle	Beauty	Books & References	Business
Comics	Communication	Chatting	Education	Entertainment
Events	Family	Food & Drink	Games	Google Cast
Health & Fitness	House & Home	Libraries & Demo	Lifestyle	Maps & Navigation
Medical	Music & Audio	News & Magazines	Parenting	Personalization
Photography	Productivity	Shopping	Social	Sports
Tools	Travel & Local	Video Players & Editors	Wear OS	Weather

(Above categories have been taken from Android Play Store.)

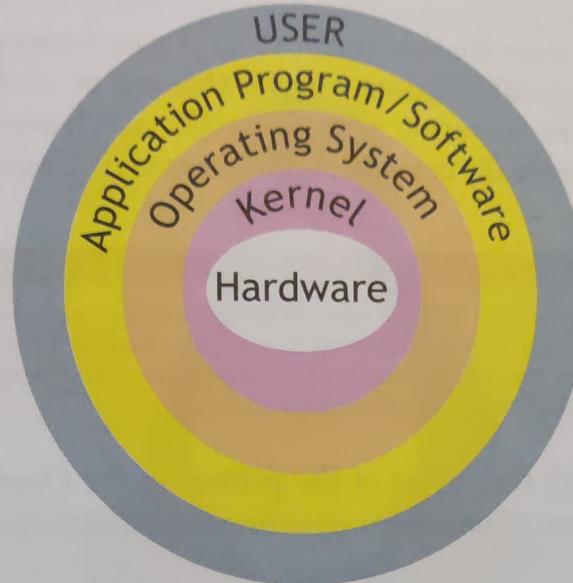
OPERATING SYSTEM

An Operating System (OS) is a system software that acts as an interface between hardware and the user. It manages and co-ordinates the operation and the sharing of resources of the computer.



It acts as a host for applications that run on the computer and handles the operation of the hardware.

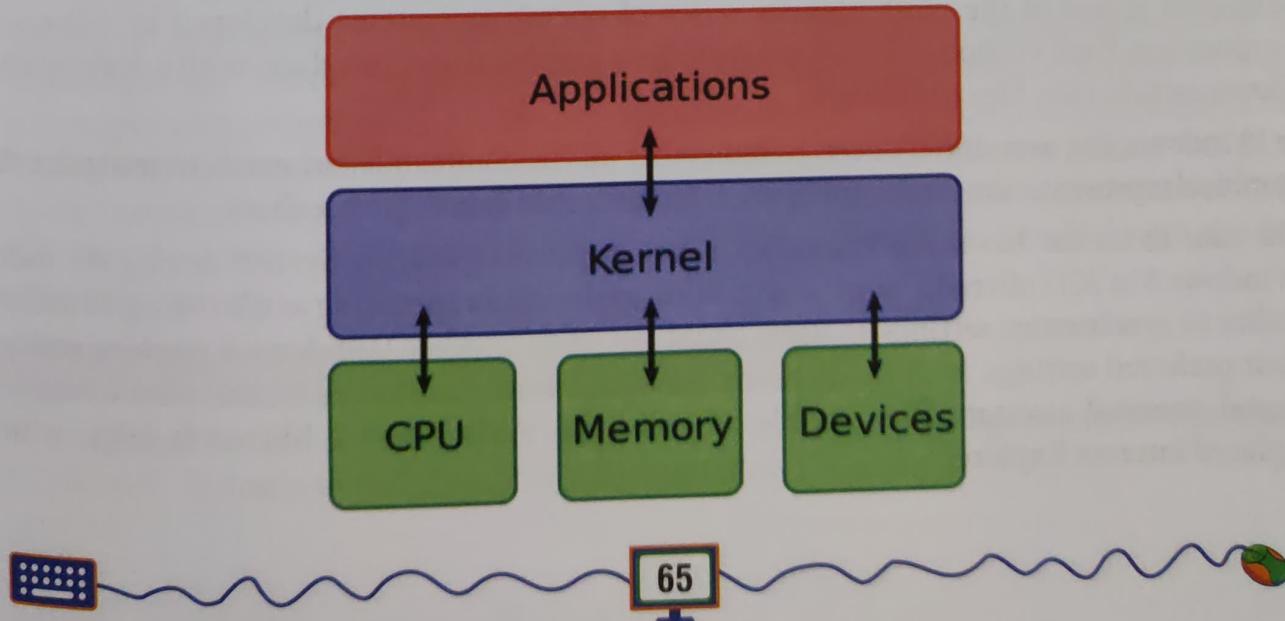
It performs basic tasks, such as booting the system, recognizing input, sending output, keeping track of the location of files and directories on the disc, controlling peripheral devices such as disc drives, printers, etc.



The operating system sets the standard for the application programs that run on the computer. It acts as a 'messenger' between the computer hardware and the application programs by ensuring or establishing a connection between the application and the hardware device through Kernel.

Kernel

Kernel is the core part of an OS, that does all major activities (such as memory allocation, CPU time, scheduling, etc.) of the operating system. Kernel helps in initialization (booting) function, such as checking memory. It allocates and de-allocates memory space which allows the software to run.



Kernel provides services that intercept the hardware request (enables the use of hardware devices such as USB, Printer, Scanner, etc.) from the application software. After intercepting the request, the kernel forwards the request to device drivers or to special program which control the functioning of hardware.

Device Driver

A device driver is a form of software that enables a hardware device to be compatible with the computer. It activates the specific hardware device that can be easily interpreted by the CPU resources. Device drivers are operating system specific and hardware dependent computer programs, which may automatically get activated whenever that hardware device is attached to the computer.

Plug and Play is sometimes, abbreviated as 'PnP'. It refers to the devices that work with a computer system as soon as it is connected. The user doesn't need to manually install drivers for the device, instead the computer recognizes the device & automatically installs its driver. For example: Whenever a pen drive is inserted into the USB, its driver is automatically installed.



Generally, we need to install the driver of the printer in the Operating System through its installation disc. Devices from different manufacturers come with their own drivers to function properly.

TYPES OF OS

There are various types of operating systems. Some popular operating systems are:

- ⑤ Disk Operating System (DOS)
- ⑤ Solaris
- ⑤ Linux
- ⑤ Mobile operating systems (Android, Symbian, Tizen)
- ⑤ UNIX
- ⑤ Microsoft Windows
- ⑤ Macintosh Operating System

Windows OS

Windows is one of the most popular series of operating systems developed by Microsoft Corporation. Each version of Windows includes a graphical user interface, with a desktop that allows users to view files and folders.

In Windows, the user doesn't need to remember all the commands but needs to recognize the graphical representation for the application on the screen in order to use them.

The ease in its use has made Windows a very popular Operating System among the users. Windows 8 in 2012 offered a 'Start' screen with applications appearing as tiles on a grid and the ability to synchronize settings so users could log on to another Windows 8 machine and use their preferred settings. In 2015 Microsoft released Windows 10, which came with Cortana, a digital personal assistant like Apple's Siri, and the Web browser Microsoft Edge, which replaced Internet Explorer.



Among all its versions, Windows 10 is the latest version of Windows Operating System released on July 29, 2015.

GNU-Linux

GNU-Linux is a popular operating system that comes in various distributions. Linux operating system is similar to Windows operating system with some exceptional features that make it a useful and flexible operating system.



Linux operating system comes in open source, i.e., its source code is freely available. Any one can use it and add features to it to enhance its functionality to suit his needs. One can also re-design it and distribute or release its developed version to others.

Another significant feature of Linux is that it is quite reliable and if a bug occurs, one can easily contact the open source community and resolve the problem. It is the backbone of many major computing centers around the world.

DOS

DOS is a kind of CUI OS (Character User Interface Operating System) in which user sends command & instructions to the Computer in character form i.e., by typing commands at the command prompt. The display on the screen does not contain any graphics or pictures. DOS was the first operating system used by IBM-compatible computers. It was originally available in two versions that were essentially the same, but marketed under two different names. "PC-DOS" was the version developed by IBM and sold to the first IBM-compatible manufacturers. "MS-DOS" was the version that Microsoft bought the rights to, and was bundled with the first version of Windows.

WORKING WITH WINDOWS OPERATING SYSTEM

In this section, we will discuss how to work with Windows operating system in reference to 'Windows 8'. To begin working with 'Windows 8' follow the steps:



After the installation of 'Windows 8' in the host computer:

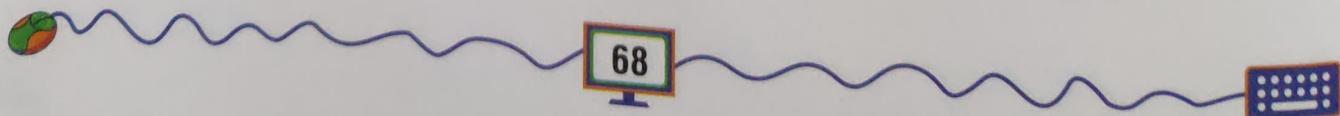
- Switch 'ON' the computer, it starts with the initial booting screen.
- Press the 'Window' key of the keyboard, the 'Start' screen appears as shown below:



- Click on 'Desktop App' to open 'Desktop' screen, that opens as shown below:

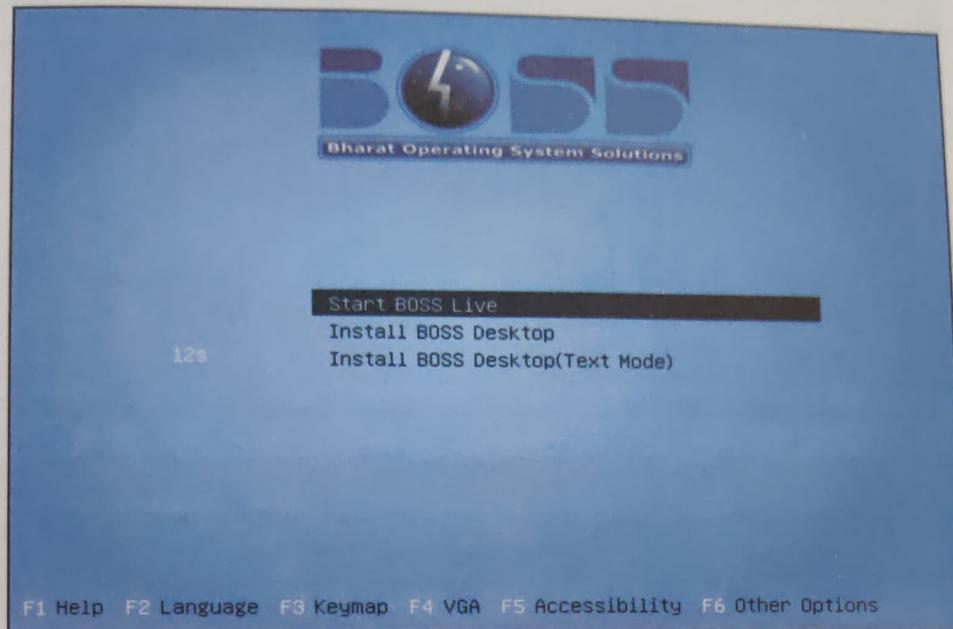


The desktop is a graphical screen that contains some icons and pictures. The desktop of Windows 8 includes a Taskbar, Icons of Programs / Applications / Files / Folders in the form of



LINUX BOSS

We can begin to work in BOSS Linux once it is installed in the system or a system can be installed or booted with BOSS Linux by selecting any option on the screen which is displayed when a BOSS installer DVD is inserted in the DVD drive.



The different options for booting or starting BOSS Linux are:

Start BOSS Live: It enables to work with BOSS operating system in Live mode i.e. from DVD without installing it in the hard disk.

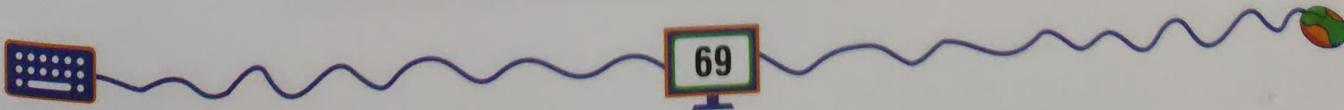
Install BOSS Desktop: It enables to install the BOSS operating system in graphics mode in hard disk.

Install BOSS Desktop (Text Mode): It enables to install the BOSS operating system in text mode on hard disk.

To begin Linux, follow the steps.

- 1 Switch on the computer, it opens with the initial booting screen (as discussed earlier).
- 2 After the booting process, the login screen appears.
- 3 Type the user name in the box besides the 'Username' option (as created at the time of installation of Linux) and press the 'Enter' key.
- 4 The password box appears on the screen.
- 5 Type the password in the box beside the 'Password' option (as created at the time of installation of Linux).
- 6 Press 'Enter' key.

The Linux BOSS desktop appears as shown:





Linux BOSS supports different desktop environments like; GNOME (GNU Object Model Environment), KDE (K Desktop Environment), etc.

USING A COMPUTER

POST (Power ON Self-Test)

POST is the initial set of self-diagnostic tests performed by the computer right after it is powered ON or Restarted, with the intent to verify all hardware is working properly before starting the boot process. The POST process checks computer hardware, like memory (RAM), hard drive, CD-ROM drive, keyboard, and other hardware, to make sure all are working correctly.

POST doesn't rely on any specific operating system as the test is handled by the system's BIOS.

The computer will continue to boot after the POST but only if it was successful. If all hardware successfully completes the POST, the computer will continue the boot up process. If POST is unsuccessful, it will generate a beep sound to indicate the error encountered and the computer will not boot up in that case.

Boot

Booting is the process of powering ON a computer and getting into the operating system. After completing POST process, the BIOS checks the hard drive for the boot loader, located in the first sector of the hard drive.

The boot loader looks for the operating system on the hard drive and begins loading the operating system that is found, like Windows, Linux, etc. Hardware drivers are loaded, allowing the operating system to interact and utilize the hardware components of the computer.



Other additional software programs that are configured to start with the operating system, known as startup programs, are loaded. Common startup programs include antivirus software, printer management software, etc.

Shut down

Shut down is a term used to describe the process of closing all running applications in preparation to turn OFF a computer. The operating system is the last program to be closed as part of a computer's shut down process. It is highly recommended to shut down the computer to prevent data corruption.

Restart

To restart (or reboot) a system means that the computer goes through a complete shutdown process, then starts back up again. Rebooting is sometimes necessary after installing a software program, installing operating system updates, to recover from an error, or to re-initialize drivers or hardware devices. Rebooting a computer can also help in resolving many issues such as slow Computer's response, Internet connectivity problems, software issues, etc.

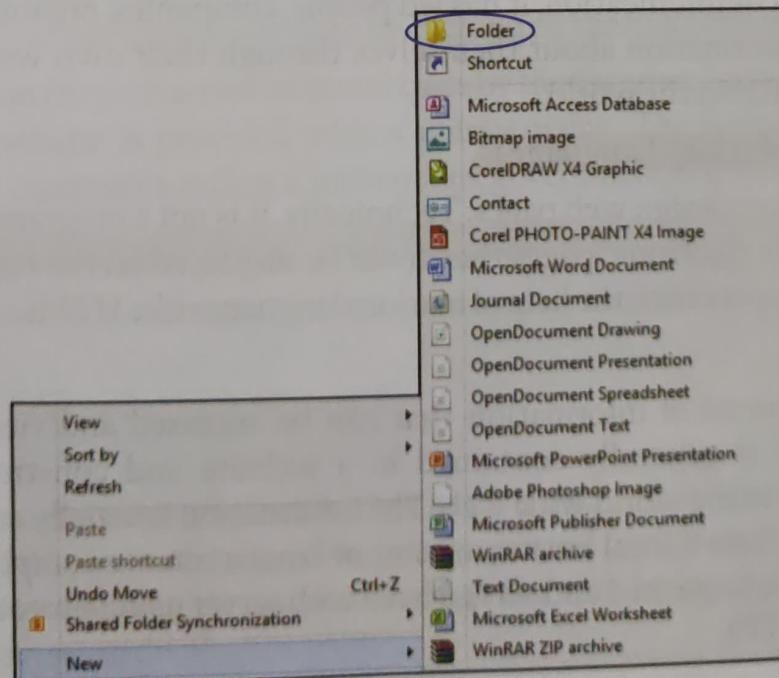
When a computer starts up from a completely OFF state where the power to the motherboard is cut OFF is known as 'Cold or Hard boot' whereas restarting a computer from running state where the power to the motherboard didn't cut off is known as 'Soft or Warm Reboot'.



Log-Off: When a logged-In user has ended the session, but has left the computer running for someone else is known as 'Log Off'. It is also known as Log Out, Sign Out, etc. This is faster than a reboot and a better choice when a computer system is shared between multiple users.

TO CREATE A NEW FOLDER

- Right click on the desktop and select 'New' option. A sub-menu appears on the screen.



- To create a folder, click on 'Folder' option.
- A folder named 'New Folder' will appear on the screen.
- Type the desired name of the folder and then press 'Enter' key.

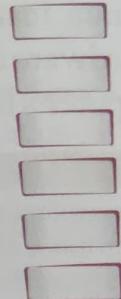


File names can contain upto 255 characters and can contain letters, symbols, numbers, etc.



Lab Assignment 'n Activity

- Start/Switch On the Computer.
- Observe Booting procedure of the OS.
- Explore the interface of Windows or Linux BOSS operating system.
- Create a folder namely 'Keyboard' on the desktop screen.
- Create another folder namely 'Keys' on the desktop screen.
- Shut Down the Computer.



INTERNET

Internet is also referred to as "Network of Networks". It establishes a high level of connectivity which has resulted into an unparallel degree of fastest, easiest and the cheapest ways to transfer or share data and information around the globe. It provides access to communication services and information resources to millions of users around the globe, round the clock.

Apart from one to one communication, it has led people, companies, organizations, government bodies, etc. to flash information about themselves through their own websites which can be viewed by any person across the world.

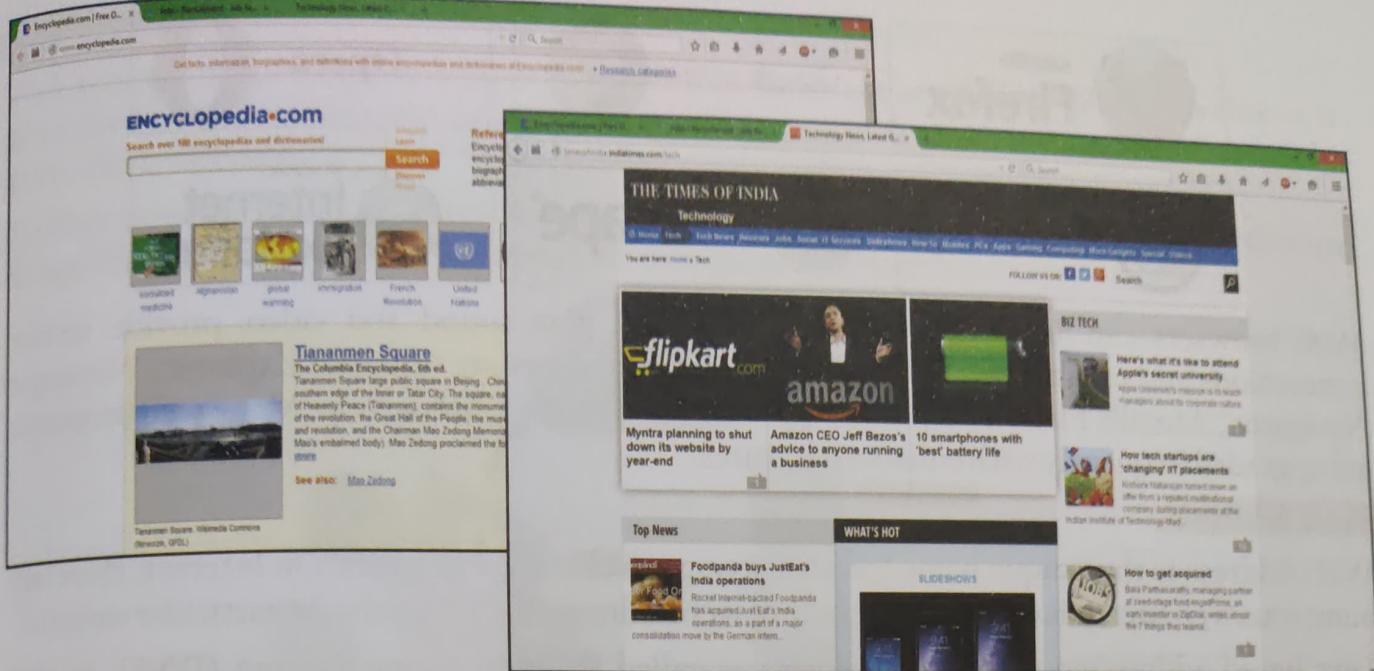
HTML (Hyper Text Markup Language)

HTML is used to develop/design web pages. Technically, it is not a programming language but it was developed to create electronic pages that could be displayed on the Internet. A web page is designed by web developers with the help of markup languages like HTML.

Web Page

A web page is a document of information that can be accessed and viewed through a web browser. A web page is generally contained in a website and constitutes as a source of information that floats in the world wide web. The information is usually coded in HTML. Web page may be retrieved from a local host computer or from a remote computer with the help of Internet. Web pages are requested and served from web server using protocols like-Hyper Text Transfer Protocol (HTTP).





Web pages may consist of static pages (which are stored within a file system of a web server) and/or dynamic pages (which contain files of run-time nature i.e., which facilitates online data transformation). Web pages may contain information in the form of text, images, pictures, sound, audio, video, etc.

Web Site

A location on the web server where an individual or a company or any organization uploads its information is known as website. A website is a collection of one or more web pages which display information with the help of a web browser. A website can be compared to a book which contains different chapters in the form of web pages.

The first page of a website is known as '**Home Page**'. The pages on a website are linked to one another and a person can navigate to any page by clicking on the links called '**Hyperlinks**'.

Websites are hosted on the web server on rental basis by the 'Internet Service Providers'. In order to access them every website is provided with a unique name. The websites may be owned by individuals, agencies, companies, colleges, universities, government bodies, etc.

Tim Berners-Lee created the first website. Its URL is <http://info.cern.ch>. The first online website was launched in 1991.



Web Browser

A web browser is an application software that helps a user to navigate through different web sites on Internet and display web pages. The user requests a page from web server with the help of web browser. After receiving the request through the web browser, the web server makes it available for web browser to display the page.





Web browsers can also display animated images, play sound and video, provide secure connections and much more. Some common web browsers are 'Internet Explorer', 'Netscape Navigator', 'Mozilla Firefox', 'Opera', 'Apple Safari', 'Google Chrome', etc. Many web browsers are upgraded frequently with enhanced features.

Web Address

Web Address is the unique name for identifying a website on Internet. On Internet, there are numerous web sites; it is only with the help of web address, that we can find a particular website.

Text based addressing system on Internet is called **Domain Name System (DNS)**. In this system, each website has a unique name such as: oracle.com, cbse.nic.in, etc.

The last three letters of the web address is known as **Top Level Domain (TLD)** that provides information about the root of the domain for the type of organization to which the address belongs to. It is alphabetical and helps to identify an address in Domain Name System.

Some common Top Level Domains are:

Abbreviations	Used To Denote
.com	Commercial Firms
.edu	Universities/Educational firms
.gov	Government Bodies/Organisations
.mil	Military Organizations
.net	ISP'S/Networks
.org	Non-Government/Non-Profit Organizations
.co	National & Multinational Companies
.int	International Organizations

In DNS, codes of country can also be included. The code comprises of two letters. Some common codes of certain countries are:

Code	Denotes the Country
.au	Australia
.uk	United Kingdom
.jp	Japan
.fr	France
.in	India
.us	United States of America
.nz	New Zealand

Web Servers

Web server is the principal computer or server that stores the contents of different websites. It provides data and information to computers on request which are connected to it through the network via Internet.

In other words, it can be said that it is a computer that stores data and runs software that are designed to send web pages in file format when requested by web browsers.



The server is usually a computer of high configuration i.e., with large storage capacity and high speed processor that stores data and executes the instruction very fast.

Web server is responsible for accepting requests from client, i.e., web browser and responding in the form of web pages. It accepts connections from web browsers all over the Internet and when requested sends them HTML documents using HTTP protocol. The server computer should have a high-speed connection of internet and should be powerful enough to handle multiple simultaneous connections at a time.

Some popular web servers are Apache, IBM Lotus, 'Internet Information Server (IIS)' of Microsoft, etc. *Apache is an open source web server.*

A web client is the host computer that requests different types of services from the web server. The clients may be PCs, Software or workstations.

World Wide Web (WWW)

The 'World Wide Web' is a framework for accessing the linked documents spread over millions of computing devices over the Internet.

WWW was introduced in 1989, by the English Physicist, Sir Tim Berners Lee. The web creators wanted to create a simple way to provide and access different types of document on the network, without having to search through indexes or directories of files or without copying documents from one computer to another before viewing them. To do so, they established a way to 'link' documents that were stored in different locations on different computers on the network but under a single frame and thus, WWW evolved.

The World Wide Web (WWW) is a service of information in combination of text, photographs, graphics, audio, video, etc. that are presented on the internet.



It allows the multimedia and hypertext files to be displayed and linked on the internet. Before WWW, internet was mainly used for obtaining textual information. Due to its distinct features, the popularity of WWW is increasing day by day.

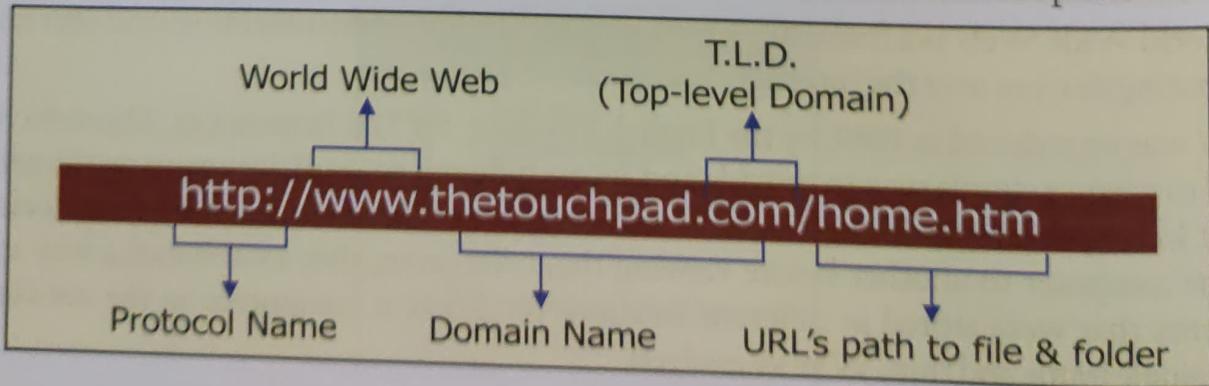
Protocol

A protocol is a convention or standard that regulates the operation and transference of data between two computers. It can be defined as the set of rules governing the syntax, semantics and synchronization of communication. Protocols may be applied by hardware, software, or a combination of the two.

The primary protocol of internet is TCP/IP protocol which stands for Transmission Control Protocol/Internet Protocol. TCP is responsible for connection oriented transmission and IP is responsible for connectionless transmission that represent logical address of the host machine, for example: http:// for accessing HTML documents, https:// for accessing some 'Secure' HTML documents.

Uniform Resource Locator (URL)

It identifies the location of a web site or a web page on the internet. Each web page has a unique address called URL that identifies its location on the Internet. Web browsers utilize the URL to open or to retrieve files on Internet. The format of a URL consists of different parts.



The first part of the address (URL) indicates the protocol or service being used. It gives information to the browser about the type of server to connect to and by which protocol. The second part of the URL is a Full Qualified Domain Name (FQDN) which identifies the web address running on the server.

The third part is the path name that refers to the location of files. The path name is always preceded by single slash "/" after the domain name. The fourth part is the file extension. URLs can be categorized into : Absolute URL and Relative URL.

Absolute URL: Absolute URLs are the URLs with complete internet address specifying the location of a resource. An Absolute URL includes protocol, host, path and name of the resource. For example : www.thetouchpad.com/index.htm.

Relative URL: A relative URL is not fully complete but it inherits the protocol, host and path information from its parent document (the document file that links to it). Relative URLs are used to refer links on the same server as the page that contains them.

Most of the web pages are identified by relative URL where hyperlinks point to (last destination) documents and other files which are located on the same site. eg. link.htm.



Some URLs refers to a location within a resource. Such kind of URL ends with "#" followed by an anchor identifier called the fragment identifier, for instance;
http://somesite.com/htm/top.html#section_2

Hyper Text Transfer Protocol (HTTP)

It is a protocol that is used to transfer information on the World Wide Web. It defines how messages are formatted, transmitted and detail of actions web servers and web browsers should take in response to various commands. Its main purpose is to provide a way to display and retrieve HTML pages.

It is a request/response protocol between clients and server. The originating client, such as a web browser, web spider or other end-user tools, is referred as the user agent.

The server which stores or creates resources such as HTML files and images is called the origin server. In between the user agent and origin server, there may be several intermediaries, such as proxies, gateways, tunnels, etc. HTTP is called a stateless protocol because it does not keep the previously executed command in memory.





1. Fill in the Blanks:

- (a) Facebook was created by
- (b) is the inventor of Keyboard.
- (c) MICR code consist of digits.
- (d) The quality of image captured by Digital Camera is measured in
- (e) A group of 4 bits is called a
- (f) The first page of a website is known as

2. Select the most suitable alternative:

- (a) The head-quarter of Twitter is in

 - (i) San Francisco, California
 - (ii) London
 - (iii) Germany
 - (iv) New Delhi

- (b) Which of the following is not a type of Keyboard?
 - (i) QWERTY
 - (ii) AZERTY
 - (iii) QWERTZ
 - (iv) DVRKOA
- (c) Which of the following is a Web Browser?
 - (i) Opera
 - (ii) Internet Explorer
 - (iii) Safari
 - (iv) All of these
- (d) Which of the following is not a Top Level Domain?
 - (i) .com
 - (ii) .org
 - (iii) .net
 - (iv) None of these
- (e) In a web address it is the second part of the URL:
 - (i) DN
 - (ii) TLD
 - (iii) FQDN
 - (iv) None of these
- (f) It is used with digital audio/video camcorders, PC and offers sustained data transfer rate over 3200 mbits:
 - (i) Fire wire
 - (ii) RJ-11
 - (iii) RJ_45
 - (iv) None of these
- (g) The D-shaped sub connector consisting of 15 pins in 3 rows is called:
 - (i) DE-153
 - (ii) DE-315
 - (iii) DE-15
 - (iv) None of these
- (h) Printer port is an example of:
 - (i) Serial port
 - (ii) Parallel port
 - (iii) Print port
 - (iv) None of these

3. Differentiate between:

- (a) Smartphone and Tablet
- (b) RAM and ROM
- (c) Printer and Plotter
- (d) RJ11 and RJ 45

4. Expand these Abbreviations:

- (a) ICT
- (b) NIC
- (c) TCP/IP
- (d) OMR
- (e) WWW

5. Write short notes on:

- (a) Internet
- (b) Windows OS
- (c) WhatsApp
- (d) Joystick
- (e) Blu-ray Disc
- (f) Device Driver
- (g) Firewire

6. Short Answer Questions:

- (a) List the name of three mobile operating system.
- (b) What is 'Tweet'?
- (c) What is 'Data Bus'?
- (d) What is FDES ceycle?
- (e) What is BIOS?
- (f) What is the use of SMPS?
- (g) What is a Kernel?
- (h) What is POST?
- (i) Why HTTP is considered as Stateless Protocol?

7. Long Answer Questions:

- (a) Explain about the usage of ICT in our daily life.
- (b) Explain about five (5) common mobile app.
- (c) Explain the Applications of Internet.
- (d) What is a 'Computer'? Explain Input, Processing and Output.