

Let us Learn

- Definition of IT and ICT
- To understand concepts like data and information.
- Various concepts used under IT
- Different types of Operating Systems with its features and uses
- Architecture of Computer System
- Units of Memory
- Concepts related to Internet and Network with its types
- Recent trends, IT Enabled Services and careers in IT

1.1 An introduction to IT (Information Technology)

Information Technology has great influence on all aspects of life. Almost all work places and living environments are being computerized and the use of Information Technology is being enhanced.

Definition of Information Technology :

“IT (Information Technology) encompasses all of the technologies that we use in order to create, collect, process, protect and store information. It refers to hardware, software (computer programs), and computer networks”.

ICT (Information and Communication Technology) concept involves transfer and use of all kinds of information. ICT

is the foundation of economy and a driving force of social changes in the 21st century. Distance is no longer an issue when it comes to accessing information; for example, work-from-home, distance learning, e-banking, and e-governance are now possible from any place with an internet connection and a computing device. Lets first perceive two important concepts - Data and Information :

1.2 Data and Information

It is being said that the terms "data" and "information" are interchangeable and mean the same thing. However, they are not same and there is a difference between the two words. Data can be any character, text, word, number or raw facts. However, Information is data formatted in a manner that allows it to be utilized by human beings in some significant way. In

Example of Data :

Umbar, 1234, Xyz, MG Road,
Calcutta, 9111111111, 84084

Example of Information :

Xyz, 1234, MG Road, Umbar 84084,
Calcutta, 9111111111

the above example, the data appears to be a set of random words and numbers. However, when that data is interpreted, organized and formatted, one can tell that it is contact information of a person named as XYZ.

Need of information : Information is required to take short term and long term decisions and also to make strategic decisions in an organization. Since we live in the “Information age”, Information Technology has become a part of our everyday life.

1.3 Various concepts used under IT

Before getting started let us learn some of the important concepts used under Information Technology :

1.3.1 Computer : The word Computer is derived from a Latin word “computare” which means to “to calculate”, “to count”, “to sum up” or “to think together”. An electronic device which accepts input from the user, processes it according to the instructions given to it and gives the required result in the form of output, is a computer.

Computer System :

A computer can process data, images, audio, video and graphics. A computer performs five major computer operations or functions irrespective of their size and make. These are -

- 1) It accepts data or instructions by way of input.
- 2) It stores data.
- 3) It can process data as required by the user.
- 4) It gives results in the form of output.
- 5) It controls all operations inside a computer.

1.3.2 Architecture of Computer : Computer Architecture is a specification detailing of how a set of software and hardware technology standards interact to form a computer system. In short, computer architecture refers to how a computer system is designed and how it works.

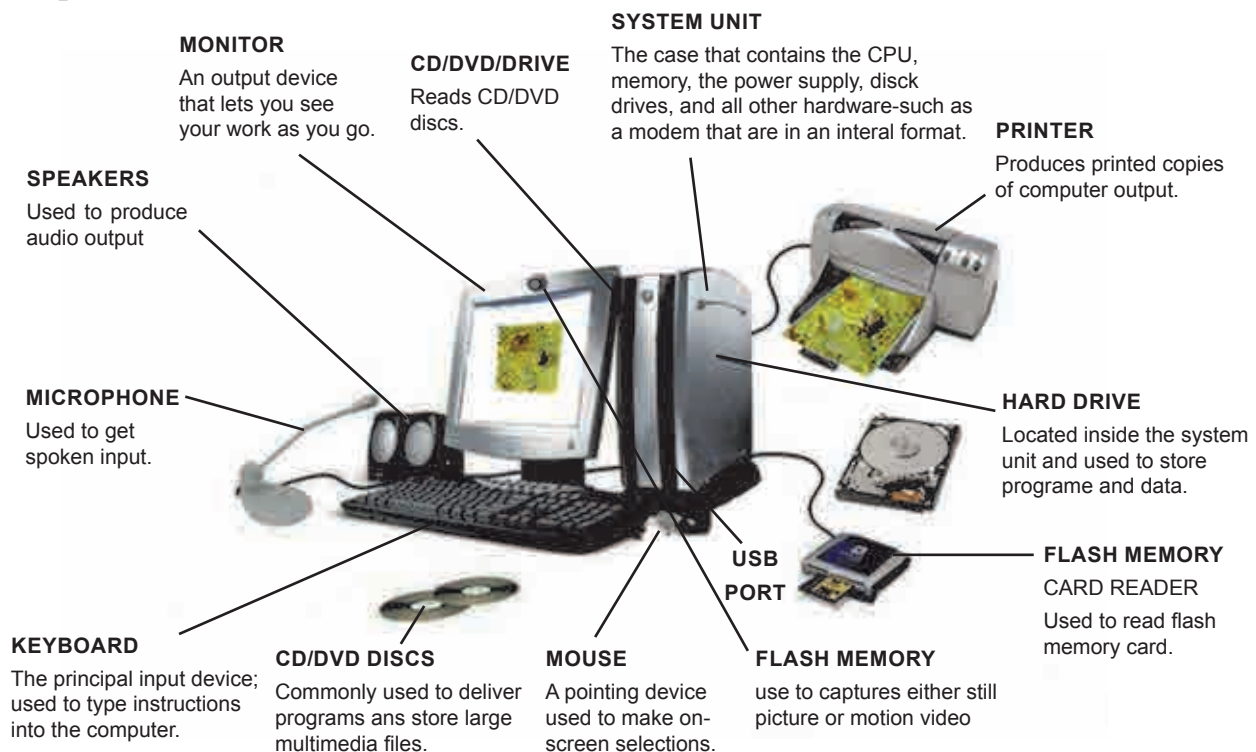


Fig : 1 Computer System and Peripherals

Every computer system has the following three basic components :

1. Input Unit
2. Central Processing Unit
3. Output Unit

1. Input Unit : This unit helps users to enter data and commands into a computer system. Data can be in the form of numbers, words, actions, commands, etc. The main function of input devices is to direct commands and data into computer. Computer then uses its CPU to process data and produce output.

For example, a keyboard is an input device that enters numbers and characters. Similarly, even a mouse can be an input device for entering directions and commands. Other examples include barcode reader, Magnetic Ink Character Reader (MICR), Optical Character Reader (OCR), etc.

Another example of input devices is touch-screens. Users can simply touch these screens without using any other device to enter commands. From smartphones to ATM machines, these input devices are becoming very popular now a days.

2. Central Processing Unit (CPU) : After receiving data and commands from users, a computer system has to process it according to the instructions provided. Here, it has to rely on a component called the Central Processing Unit. The CPU further uses these three elements :

- a) Arithmetic and Logic Unit :** This part of the CPU performs arithmetic operations. It does basic mathematical calculations like addition, subtraction, division, multiplication, etc. Further, it can

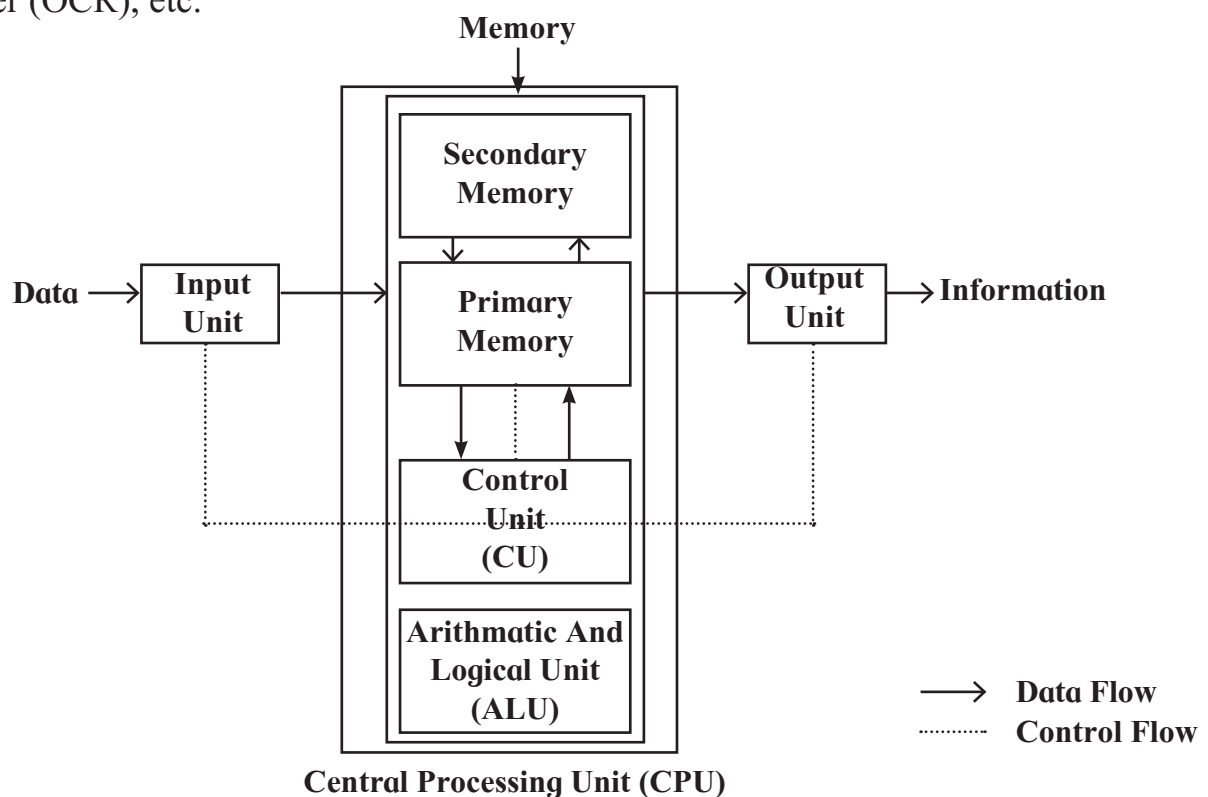


Fig : 2 Block Diagram of a Computer

even perform logical functions like the comparison of data.



Fig : 3 CPU Internal View

b) Control Unit: This unit is the backbone of computers. It is responsible for coordinating tasks between all components of a computer system. The control unit collects data from input units and sends it to processing units depending on its nature. Finally, it further transmits processed data to output units to facilitate users.

c) Memory Unit : Once a user enters data using input devices, the computer system stores this data in its memory unit. This data will now remain here until other components of CPU process it. The memory unit uses a set of pre-programmed instructions to further transmit this data to other parts of the CPU.

Types of Memory– There are two types of memory

1) Primary Memory 2) Secondary Memory

1) Primary Memory : Primary memory is internal memory of the computer. It is also known as main memory.

Primary Memory holds the data and instruction on which computer is currently working.

Types of Primary Memory– Primary memory is generally of two types.

1. RAM 2. ROM

1. RAM (Random Access Memory): It stands for Random Access Memory. RAM is known as read /write memory. It is generally referred to as main memory of the computer system. It is a temporary memory. The information stored in this memory is lost as the power supply to the computer is switched off. That's why RAM is also called as "Volatile Memory".

2. ROM (Read Only Memory) : It stands for Read Only Memory. ROM is a Permanent Type memory. The content is not lost when power supply is switched off. Content of ROM is decided by the computer manufacturer and permanently stored at the time of manufacturing. ROM cannot be overwritten by the computer. It is also called "Non-Volatile Memory".

2) Secondary Memory : It is an external memory of the computer. It is used to store the huge amount of different programs and information.

The secondary storage devices are :

1. Magnetic (Hard) Disk
2. Magnetic Tapes
3. Pen Drive
4. Flash memory
5. Optical Disk (CD,DVD)
6. SSD etc.

3. Output Unit : The third and final component of a computer system is the output unit. After processing of data, it is converted into a format which human can understand. After conversion, the output unit displays this data to users. Examples of output devices include monitors, screens, printers and speakers etc. Thus, output units basically reproduce the data formatted by the computer for user's benefit.



Do it yourself

- Try to find out names of the modern input devices used in shops/malls.

1.3.3 Units of Memory : Computer storage and memory is often measured in Megabytes (MB) and Gigabytes (GB). Let us understand the evolution of memory.

Bit : It is a binary digit that holds only one of two values : 0 or 1.

Nibble : A group of 4 bits is called a nibble (For example: 1011, 1001, 1111).

Byte : A group of 8 bits is called a byte. A byte is the smallest unit, which can represent a data item or a character. (For example : 11101100, 10000001)

Different Units of Memory	
Data Measurement	Size
Bit	Single Binary Digit (1 or 0)
1 Byte	8 Bits
1 KiloByte (KB)	1,024 Bytes
1 MegaByte (MB)	1,024 KiloBytes
1 GigaByte (GB)	1,024 MegaBytes
1 TeraByte (TB)	1,024 GigaBytes
1 PetaByte (PB)	1,024 TeraBytes
1 ExaByte (EB)	1,024 PetaBytes

Table: 1 Different Units of Memory

1.3.4 Concept of Hardware and Software :

Hardware : Computer hardware comprises of the physical components that a computer system requires to function. In simple words hardware are the parts which we can see, we can touch them, feel them. It encompasses everything with a circuit board that operates within a Personal Computer or Laptop; including the motherboard, graphics card, CPU (Central Processing Unit), ventilation fans, webcam, power supply, and so on.

Software : A set of instructions given to the computer is known as a program. Program or set of programs are called as software. This helps us to interact with the computer in order to perform a particular task. Software is a generic term used to describe computer programs.

1.3.5 Categories of a software :

Open source software : It refers to the software which releases code in public domain for anyone to use. The source code can be copied, modified or distributed by other users and organizations. As the software is open to the public, the result is that it constantly updates, improves and expands as more people can work on its improvement. Many states are following FOSS policy i.e. Free Open Source Software Policy and it enabled them to save some million of rupees each year in licensing costs. The Kerala state is in news as they have adopted FOSS policy and saved rupees 300 crore as a license fee for proprietary or closed source software.

Closed source software : It is opposite to Open Source Software and means that the software is used by the proprietary and has a closely guarded code. Only the original authors of organization of a software can access, copy, and alter that software. In case of closed source software, user has to purchase the software before using it.

1.3.6 Computer software can be classified into two types based on its utility :

Application Software : Application software is a program or group of programs designed for end users. Applications software (also called end-user programs) include programs like database programs, word processors, web browsers, presentation software, spreadsheets etc.

System Software : System Software is a set of instructions required for a computer to work. For Example, Linux Operating system is a program that allows different applications and various components of hardware such as monitor, printer, mouse, keyboard etc. to communicate with each other.

Let's understand more about an operating system

- A computer would not be able to function correctly without an operating system.
- An operating system is a software program that empowers the computer hardware to communicate and operate with the computer software.

- The operating system boots up the computer and makes sure that everything is operational.
- The operating system is also what runs the cell phone and most of the electronic devices.
- The operating systems usually come preloaded on any computer, tablet, laptop or cell phone that you buy.
- Most people use the operating system that comes with their device as default.
- It is necessary to use licensed operating system and not a copied or a pirated one.
- There are many open source operating systems available on the web which are freely downloadable. It is advisable to use those OS instead of pirated ones.
*Refer Page 61(Software Piracy)

Do it yourself

- List out the open source and closed source software.

1.3.7 Operating Systems for Personal Computers :

DOS : DOS (Disk Operating System) was the dominant operating system for microcomputers in the 1980's and the early 1990's. For working with DOS the user needs to know how to input the commands using the Command Prompt Window.

Windows : Windows is a series of operating systems that are designed by Microsoft. The first two versions of the Windows operating system, introduced

in 1985 and 1987 respectively, were primitive. Windows is the most commonly used operating system.

Mac OS : Apple Corporation's registered operating system is called Mac OS.

Chrome OS : Chrome OS is an open-source operating system created by Google to create a better computing experience for people who spend most of their time on the web.

UNIX : UNIX was trademarked in 1969 by a group of AT&T employees at Bell Labs as a multitasking, and multi-user computer operating system.

Linux : Linux is an open-source, portable, multi-user (multiple users can access system resources like memory/RAM/application programs at the same time), multiprogramming, operating system. It is very similar to other operating systems, such as Windows and a source code is available to the public.

1.3.8 Operating Systems for Mobile Phones :

There are many different operating systems for mobile phones and devices. These are Android, Asha, Blackberry, iOS, Windows Phone etc.

Android : Android is a free and open source operating system provided by Google. It is most popular OS amongst all other OS.

Asha : Asha is used by Nokia phones. This is closed source OS.

Blackberry : This is a closed source operating system for smartphone and tablet devices.

iOS : iOS is Apple's closed source operating system for Apple's iPhone, iPod Touch, iPad and second-generation Apple TVs.

Windows Phone : Windows Phone is developed by Microsoft as a closed source operating system for mobile phones.

1.4 Introduction to GNU/Linux (GNU Not Unix)

GNU/Linux is a family of operating systems that are created by various companies, organizations, and individuals. It is created by using **Free Software Philosophies**. This means that GNU/Linux operating systems are usually free of charge, free to distribute, and they are open source. Open Source is when a person can view and modify the code for a piece of software. This is important because by having the ability to look and audit the code, user can be sure that the program does not perform malicious tasks. It also allows the user to program their own features, or fix problems, and help the developers. This results in higher quality code and more secure programs. This is why GNU/ Linux is used as the predominantly backbone of the Internet. Most websites that user visits run on GNU/Linux. In fact, as of 2018, all the world's fastest 500 computers run Linux.

Ubuntu is one of the most popular GNU/Linux distribution.

There are two main ways to interact with the computer : The GUI (Graphical User Interface) and the CLI (Command Line Interface)

Graphical User Interface (GUI)

The graphical user interface is when the user interacts with the computer using images, icons, and dialog boxes. The Fig. no. 4 shows what the Ubuntu 18.04 looks like. This GUI is called GNOME. There are a lot of GUI's (Or desktop environment) that user can install, but this is the default.

The left bar is called the Panel. There are shortcuts to programs, as well as currently open programs. The top bar has the date and time. If it is clicked a menu will pop up with the calendar and notifications. Fig. no. 4 shows that the top right side will show user the battery information, if on a laptop, network information (such as WiFi, or Ethernet), and options for logging in, restarting, and shutting down the computer.

At the bottom left, there is an icon for the app menu. Clicking on it will show

a list of all the apps installed on the computer. The search option is used for quick search of the application.

The home folder is where all the personal documents and settings are stored, and every user has their own home folder.

Note : Installing new software on Ubuntu is done using the 'Ubuntu Software' Center.

Do it yourself

- Open the Ubuntu Software Center from the panel.
- Search for GIMP (it is an image editing program) and install.
- Run updates and uninstall software from the software center.
- Log out, Log in, and Restart the computer.

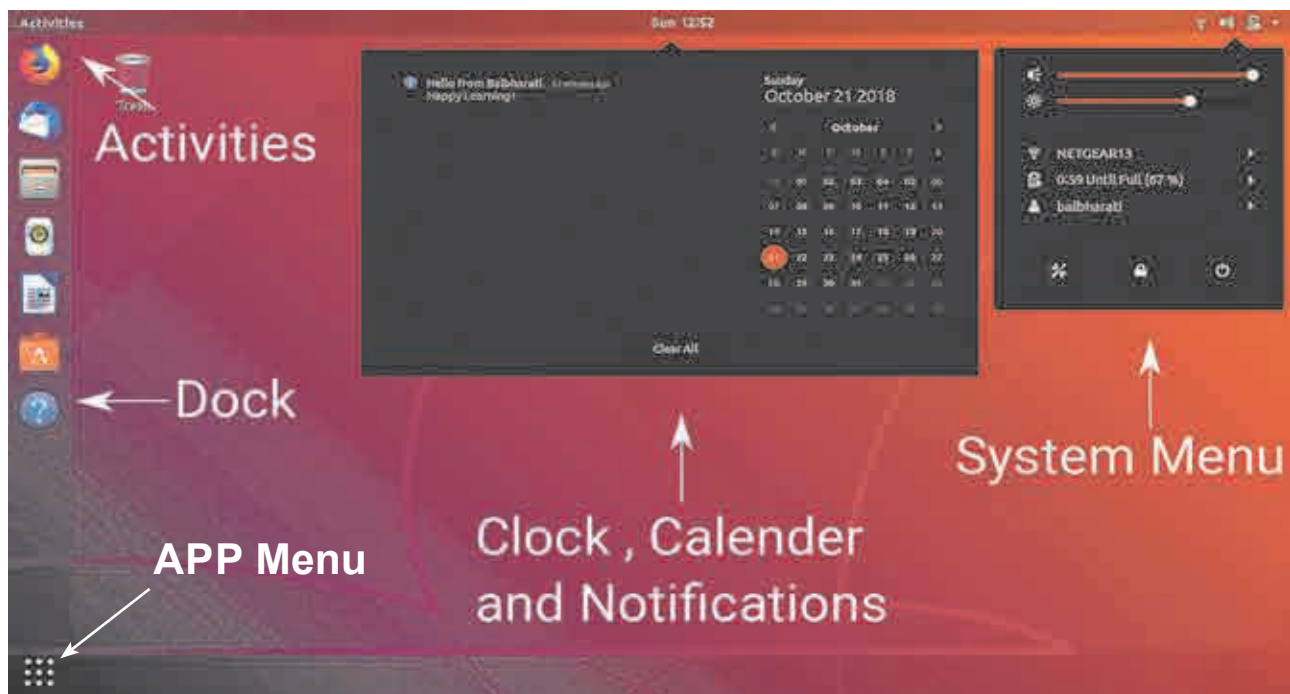


Fig. : 4 Desktop Environment of Ubuntu 18.04

Command Line Interface (CLI)

The command line interface is when user interacts with the computer using text. This is done by typing commands into a terminal. The default CLI on Ubuntu 18.04 is called 'bash'. It is a command processor that runs in a text window where the user types commands that causes actions. The commands are programs that are run when user types command name. There are number of different commands that user can use. Some are explained in Table no. 2.

Do it yourself

- Open Firefox browser from the command line.
- Create a new file on the Desktop called hello.txt.
- Change directory to Desktop using 'cd' command.
- Open hello.txt in Nano text editor.
- Write a message in hello.txt and save it.
- Print the contents of hello.txt with 'cat' command.



Fig. : 5 Ubuntu Dashed



Fig. : 6 File Explorer and Software Center

Command	Short Discription	Usage example	Detailed description
ls	List Directories	ls	[List Directories] Prints the list of directories in the current one.
pwd	Print Working Directory.	pwd	[Print Working Directory] Prints the path to the current directory.
whoami	Who Am I ?	whoami	[Who Am I ?] Prints the name of the current user on terminal.
lscpu	List CPU	lscpu	[List CPU] Prints information about your CPU on terminal.
touch	Touch	touch filename.txt	[Touch] Creates a new file.
cd	Change Directory	cd Down-loads	[Change Directory] Control goes to a different directory.
nano	Nano is a text editor	nano filename.txt	[Nano] Nano is a text editor. This command will open the file FileName.txt (or create it if it doesn't exist). You can type text in Nano, and when you are done you can press Control + O followed by Enter to save and Control + X followed by Enter to exit Nano.
cat	Concatenate	cat file1.txt file2.txt	[Concatenate] Prints the contents of the files listed on the screen.
Echo	A built in command	echo --help	Used to display line of text or string that are passed as an argument.
Clear	To clear	clear	To clear the command prompt.

Table: 2 Few Linux Commands

The GNU/Linux File System Hierarchy Standard

In GNU/Linux, the topmost directory is called the root directory, and it is written as /. All directories are stored under the root directory. For example if the user is ABC, the home directory will be created at /home/ABC. Everything in Linux is represented as a file, this includes Cameras, Storage devices, Microphones, Network devices, etc.

This is a brief summary of the file system :

- **/** : The root directory. All files and directories are stored under this directory, including all hard drives, pen drives, CD-Drives, etc.

- **/bin** : Essential system programs are stored here.
- **/dev** : All connected devices are stored here. Including internal devices, temperature sensors, and batteries.
- **/etc** : System configuration files are stored here.
- **/proc** : Files that provide information about processes. This is information like, how much RAM is free, or how fast the CPUs are running.
- **/tmp** : Temporary files are stored here
- **/home** : Users home directories are stored here.

There are many more directories. The user can read more about them by

searching for "File System Hierarchy Standard (FHS)" online.

Why Learn and Use GNU/ Linux ?

There are huge number of benefits of learning GNU/Linux. Sooner or later in the career, GNU/Linux will be used in the workplace. Millions of desktops and servers run on GNU/Linux. The Android operating system, that the smartphone runs on, is a modified version of GNU/Linux.

1. Linux is Free and Open Source :

The word "Free" here does not just mean free of charge but also means "Freedom". Anyone is free to use this software, distribute them freely and even study and modify the source code to suit one's own need.

2. Linux Operating System is free from viruses :

The user need not install any anti-virus software. This saves money as well as valuable time. The users are free from the trouble of updating the virus definitions and checking unknown USB disk that is plugged in. Moreover, anti-virus software is not hundred percent reliable. The user always runs the risk of losing the data if the computer is infected due to the failure of anti-virus software. Finally, anti-virus software often gives a false alarm and may delete the files assuming the existence of the virus.

3. Easy to keep all the software up-to-date :

Proprietary operating systems can update themselves. But they cannot update other software, especially proprietary software. The user has to keep track of each

application on his own. Linux distributions mostly use free software so it keeps track of all the softwares through repositories. Repositories is a collection of software for a Linux distribution on the server. The package manager updates the operating system as well as other softwares periodically.

4. Linux is flexible and easily customizable :

The user can change the desktop, the position of the menus, status bar position, style, default file manager, icon theme and lot more. Almost everything in Linux is customized.

5. Excellent Support :

There are thousands of forums and millions of people ready to help open source software users. Each distribution has its own community of users and they help each other. Many software companies and developers of free software also offer solutions to the problems through community platforms and also through professional channels.

1.5 Computer Network

1.5.1 Introduction : It is a group of interconnected computers or devices to have communication within themselves. A computer network consists of a collection of computers, printers and other equipment that is connected together so that they can communicate with each other.

1.5.2 Types of networks : There are three types of network based on the geographical area they cover : LAN, MAN and WAN.

The entire use and implementation of these types depends upon the geographical area they cover, i.e. LAN covers the smallest area; MAN covers an area larger than LAN and WAN comprises the largest of all.

Local Area Network (LAN) :

- LAN covers smaller geographical area (Size is limited to a few kilometers) and are privately owned.
- Usage area is limited to areas such as an office building, home, hospital, schools, etc.
- It covers a short distance, and so the error and noise are minimized.
- LAN is easy to setup.
- Data transmits at a very fast rate as the number of computers linked are limited.
- It is a less expensive hardware and maintenance cost is also low.

Metropolitan Area Network (MAN) :

- MAN is larger area than that of a LAN and smaller area as compared to WAN.
- It connects two or more separate computers that reside in the same or different cities.
- It covers a large geographical area and may serve as an ISP (Internet Service Provider).
- It is hard to design and maintain a Metropolitan Area Network.

- Examples of a MAN are the part of the telephone company network that can provide a high-speed DSL line to the customer or the cable TV network in a city.

Wide Area Network (WAN) :

- Wide Area Network is a computer network that extends over a large geographical area.
- It might be confined within the bounds of a state or country.
- A WAN could be a connection of LAN connecting to other LAN's via telephone lines and radio waves.
- The technology is high speed and relatively expensive.
- A Communication medium used for WAN is Telephone Network or Satellite Link.
- Due to long distance transmission, the noise and error tends to be more in WAN.

1.6 Network Configurations :

Network architecture is the design of a computer network. It is a framework for the specification of a network's physical components and their functional organization and configuration.

Two of the most widely used types of network architecture are peer-to-peer and client/server.

1. Peer-to-Peer Architecture : In this type of architecture, all the machines, called as “peers”, have the same status and they can communicate with

any other peer directly. A Peer-to-Peer network has no dedicated servers. Its implementations are meant for small networks. For Example, when students creates a network to share files through Bluetooth or SHAREit, the mobile device forms peer-to-peer network for transfer of files.

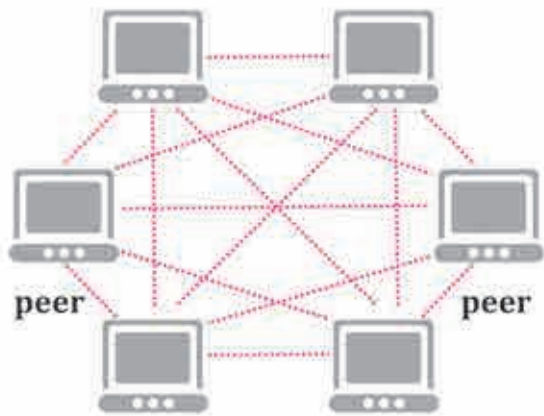


Fig. :7 Peer-to-Peer Architecture

2. Client-Server Architecture : This type of architecture is most suitable for larger network. So there are two types of machines in network, client and server.

Client : A computer which is seeking any resource from another computer is a client computer. For Example: Downloading a image file from a website, browsing Intranet/Internet etc. The network user normally uses a client computer to perform his day to day work.

Server : If a computer has a resource which is served to another computer, it is a server computer. The client establishes a connection to a server and accesses the services installed on the server. A server is not meant

for a network user to browse in internet or do spreadsheet work. For Example : Multimedia server, File storage servers, Webserver etc.

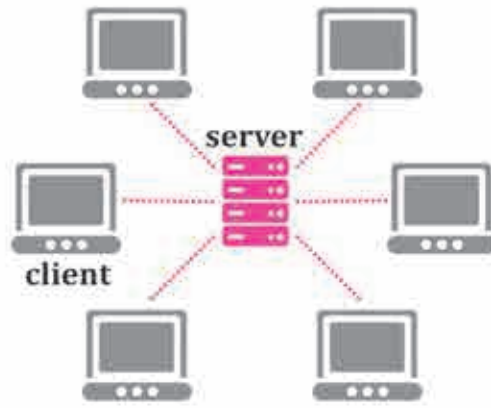


Fig. : 8 Client-Server Architecture

1.6.1 Internet :

Internet means connecting computer to any other computer anywhere in the world. Internet is the highway of information.

The Internet has one very simple job: to move computerized information (known as data) from one place to another. The Internet is generally defined as a global network connecting millions of computers.

The Internet is a massive network of networks, a networking infrastructure. With the help of the internet one can easily be in touch with any one in the whole world by sending electronic mail, by chatting. Travel bookings can be made very easily, one can order books or buy anything online. In simple terms it can be said that internet provides a very

strong connection or network between computers globally, bringing people and their working close to each other.

1.6.2 History of Internet :

The first workable prototype of the internet came in the late 1960's with the creation of ARPANET, or the Advanced Research Projects Agency Network. Originally funded by the U.S. Department of Defense, ARPANET used packet switching to allow multiple computers to communicate on a single network. The technology continued to grow in the 1970's after scientists *Robert Kahn* and *Vinton Cerf* developed Transmission Control Protocol and Internet Protocol, or TCP/IP, a communications model that set standards for how data could be transmitted between multiple networks. ARPANET adopted TCP/IP on January 1, 1983, and from there researchers began to assemble the “network of networks” that became the modern Internet. The online world then took on a more recognizable form in 1990, when computer scientist *Tim Berners-Lee* invented the World Wide Web (WWW).

1.6.3 Protocols :

A protocol is a set of rules that governs the communications between computers on a network. In order to have two computers to talk to each other, they must be speaking the same language.

Examples of Protocols are-

- **TCP/IP** : Transmission Control Protocol & Internet Protocol - It breaks down the message into packets and sends them out into the network.

- **DNS** : Domain Name System-It translates network address (such as IP addresses) into terms understood by humans (such as Domain Names) and vice-versa.
- **DHCP** : Dynamic Host Configuration Protocol - It can automatically assign internet addresses to computers and users.
- **FTP** : File Transfer Protocol - A protocol that is used to transfer and manipulate files on the internet.
- **HTTP** : HyperText Transfer Protocol- An internet-based protocol for sending and receiving web pages.
- **IMAP** : Internet Message Access Protocol - A protocol for receiving e-mail messages from server on the Internet. It maintains a copy of all the emails on server. We can sort, filter emails.
- **IRC** : Internet Relay Chat - A protocol used for Internet chat and other communications. It facilitates communication in the form of text.
- **POP3** : Post Office Protocol Version 3 - A protocol used for receiving e-mail from remote mail servers. It does not maintain copy on the server.
- **SMTP** : Simple Mail Transfer Protocol - A protocol for sending e-mail messages to the Server on the Internet.

1.7 IT Enabled Services

1.7.1 Meaning of IT Enabled Services :

IT Enabled Services (ITES), also called web enabled services or remote services or tele-working, covers the entire amount of operations which exploit Information Technology for improving efficiency of an organization. The most important aspect is the value addition of IT Enabled Service. The value addition could be in the form of Customer relationship management, improved database, improved look and feel, etc. The outcome of an IT Enabled Service is in two forms :

- Direct Improved Service.
- Indirect Benefits.

Whereas direct benefits can be realised immediately, indirect benefits can occur over a period of time, and can be harnessed very effectively, if planned well up front.

1.7.2 Popular IT Enabled Service centers :

Popular IT Enabled Service centers are -

- Call Centers
- Electronic Publishing
- Medical Transcription
- Data Centers
- GIS Mapping
(Geographic Information System)
- ERP (Enterprise Resource Planning)
- Knowledge Management & archiving.

1.8 Careers in IT

Various career opportunities are available for IT professions. These vary from operator to Specialised skilled programmers. Some of the career opportunities are as follows :

1. **Web Designer and Developer :** One can develop interactive websites using knowledge of HTML, PHP and various other programming languages.
2. **Software Developer :** It is possible to have career as a software developer with the scripting skills.
3. **Database Manager :** After getting knowledge about Database management one can work as a Database Manager with the help of SQL skills.
4. **Information Security Analyst :** Information Security Analysts are responsible for ensuring that networks are watertight. They educate staff to avoid unintended disclosures and keep up to speed with potential external threats.
5. **Professional Accountant :** Using computerized accounting software one can successfully handle accounting work of any small or large scale organization.
6. **Financial Advisor :** After getting IT knowledge one can advise and guide others in investing the money in various investment schemes with their calculations and benefits in future.
7. **Cyber Advisor :** Anyone can develop his or her career as a cyber-advisor.

8. **Animator**: This is the most demanding career in today's era. It is possible to become a successful animator using one's own creation and innovation with the help of software like GIMP, Inkscape etc.
9. **Games developer** : Perhaps one of the trendiest and most fun jobs in the sector, a games developer gets to work on titles for consoles, computers, smart phones, tablets and online. Creativity and imagination are important but the ability to work in a highly pressurised environment is also crucial.
10. **Audio / Video Editor** : As a career opportunity, to become an Audio / Video Editor, one should be good in tools such as Kdenlive, Audacity. With the help of these tools one can develop a career as a video journalist.

1.9 Recent trends in IT

1. **Green Computing** : It is the study and practice of environmentally sustainable computing or IT.

The goals of green computing are similar to green chemistry :

- To reduce the use of hazardous materials
- To maximize energy efficiency during the product's lifetime
- To recycle or biodegradation of non-functional products and factory waste.

Green computing is important for all classes of systems, ranging from handheld systems to large-scale data centers.

2. **Internet of Things (IoT)** : The Internet of Things (IoT) is the network of physical devices, vehicles,

home appliances, and other items embedded with electronics, software, sensors, actuators, and connectivity which enables these things to connect, collect and exchange data creating opportunities for more direct integration of the physical world into computer-based systems, resulting in efficiency improvements, economic benefits, and reduced human exertions.

3. **Cloud Computing** : It is the delivery of computing services - servers, storage, databases, networking, software, data analytics and more - over the internet.

4. **Data Analytics (DA)** : It is the process of examining data sets in order to draw conclusions about the information they contain, increasingly with the help of specialized systems and software. Data analytics technologies and techniques are widely used in commercial industries to enable organizations to make more-informed business decisions and by scientists and researchers to verify or disprove scientific models, theories and hypothesis.

5. **Artificial Intelligence (AI)** : It is intelligence demonstrated by machines, in contrast to the natural intelligence displayed by humans and other animals. Computer science defines AI research as the study of "intelligent agents": any device that perceives its environment and takes actions that maximize its chance of successfully achieving its goals.

6. **Machine Learning (ML)** : It is the scientific study of algorithms and statistical models that computer systems use to effectively perform a

specific task without using explicit instructions, relying on patterns and inference instead. It is seen as a subset of artificial intelligence.

7. Big Data : It refers to data sets that are too large or complex for traditional data-processing application software to adequately deal with. Data with

many cases offer greater statistical power, while data with higher complexity may lead to a higher false discovery rate.

8. Blockchain : It is a growing list of records, called blocks, which are linked using cryptography. It can be defined as a distributed, decentralized, public ledger.

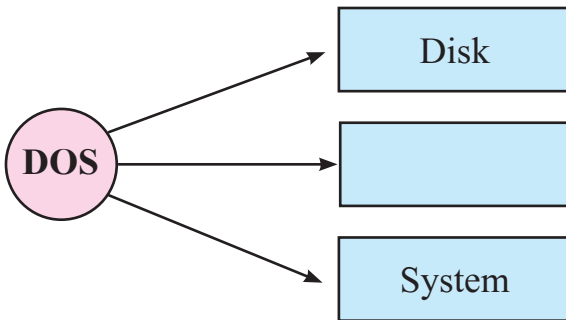
Summary

- Data can be any character, text, word, number or raw facts. Information is data formatted in a manner that allows it to be utilized by human beings in some significant way.
- IT (Information Technology) involves all of the technology that we use to collect, process, protect and store information.
- Computer architecture refers to how a computer system is designed and how it works.
- Computer hardware is the set of physical components that a computer system requires to function.
- Software is a set of instructions or programs instructing a computer to do specific tasks.
- Computer storage and memory is often measured in MegaBytes (MB) and GigaBytes (GB).
- Computer software can be classified into two types—Application Software and System Software.
- Open Source Software is a code free software available freely to copy and modify.
- Closed source Software is having proprietary rights with the developers and are paid ones.
- GNU/Linux operating systems are usually free of charge, free to distribute, and they are open source.
- There are two main ways to interact with the computer : GUI and CLI
- Internet means connecting computer to any other computer anywhere in the world.
- A protocol is a set of rules that governs the communications between computers on a network.
- A computer network consists of a collection of computers, printers and other equipment that is connected together so that they can communicate with each other.
- LAN, MAN, WAN are types of network
- Massive career opportunities are available for IT professionals.

Exercise

Q.1 Complete the following activity

1)

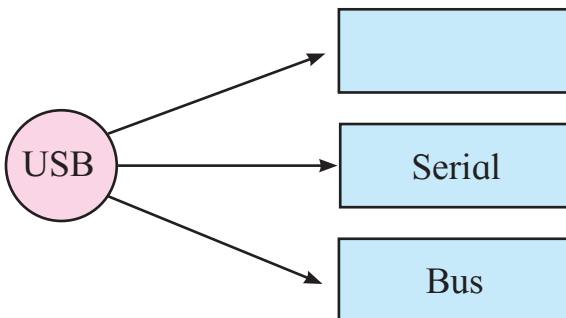


2) Tick the appropriate box

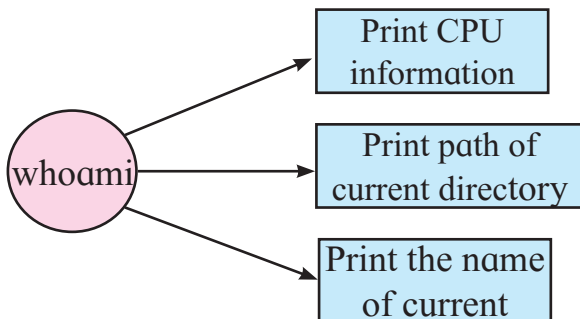
Internet is a network connecting millions of computer.



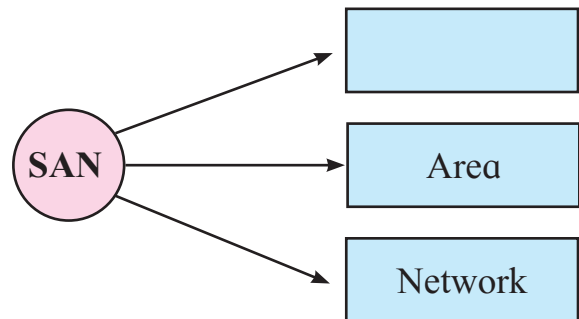
3)



4) Tick the appropriate box.



5)

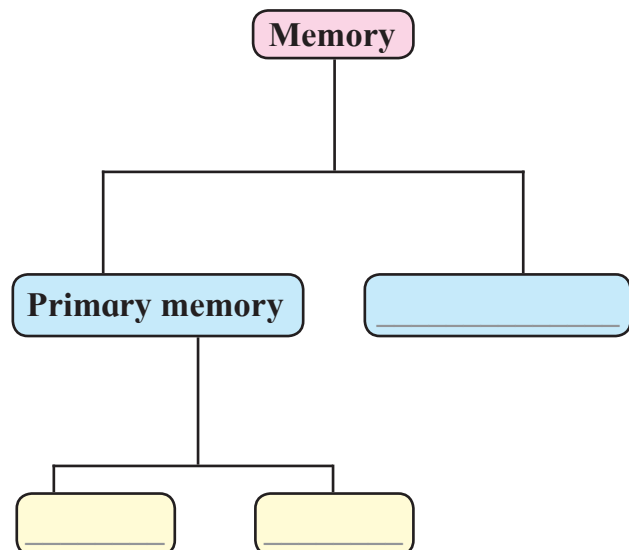


Q.2 Divide the following list of devices into appropriate categories.

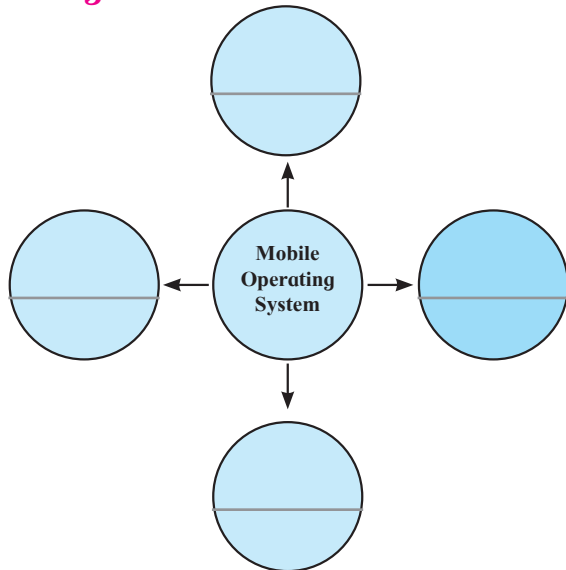
(Monitor, Barcode reader, Printer, Keyboard, Optical character reader, Speaker)

Categories	Names
Input Devices	
Output Devices	

Q.3 Complete the Tree Diagram.



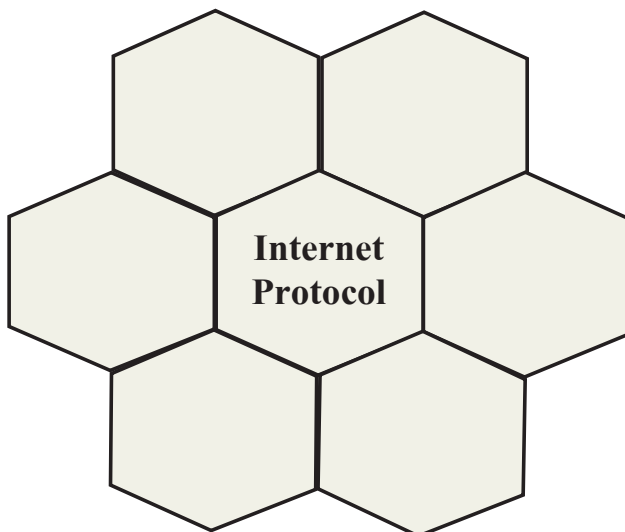
Q.4 Name the following and complete the diagram.



Q. 5 Complete the following with Linux commands with their use.

Commands	IT's Use
pwd	
ls	

Q.6 Complete the list of following protocols.



Q.7 Complete the following Long form.

LAN	LocalNetwork
GUI	User interface
OSS	Open Source.....

Q.8 Identify the following activity.

You are typing a letter using a computer and suddenly there is a power failure.

Which type of Memory does this activity deal ?

Q.9 Answer the following

- 1) What is Data and Information? Give examples of data and information.
- 2) Explain functional units of a computer system.
- 3) What is a storage unit ? Explain types of primary memory storage.
- 4) Explain how Linux is different from Windows.
- 5) Write down the difference between LAN, MAN and WAN.

