Chapter – 1

INTRODUCTION TO COMPUTER FUNDAMENTALS

Learning Objective

At the end of this module you should be able to understand

- 5 Parts of Computer
- Difference between Hardware & Software
- Difference Between Data and Information
- Types of Computers – Server (Types), Clients (Types of Portable Computer)
- Application Software
- System Software
- Software Copyright- Freeware, Shareware, Licensed

INTRODUCTION:

The term "Computer" could literally be used to identify any device that calculates. Initially, the Computer was designed as a tool for manipulation of numbers and to solve arithmetic problems, this original use is understandable, since most of the early designers and users were mathematicians, scientists, and engineers. However, people began to realize that the Computer could process alphabets as well as numbers and special characters. Therefore the literal interpretation of the word "Computer" makes the word some thing of a misnomer, since the computer does more than just carry out addition, subtraction, multiplication, and division. Indeed, the computer can read input data, Store data, retrieve data and process the data to store, retrieve data and process the data to produce the output results. In view of the fact that its functions are broader than just computing, the Computer is sometimes more descriptively called an "Electronic Data Processing Device".

Define Computer: "Computer is an Electronic device which stores, reads and processes the Data or Information to produce the meaningful results, /outputs".

In the case of Computers, two kinds of Inputs are required

1. The basic raw Data and
2. A set of instructions containing the methodology to process the data that are called as Program.

Process: It involves the series of calculations or series of changes to be done on Information.

CHARACTERISTICS OF A COMPUTER:

The major characteristics that make the computer such a powerful machine can be enumerated as speed, storage, accuracy, ability to operate automatically, diligence, scientific approach and versatility.

1. **Speed:** The speed however is incredibly faster than what man can possibly record or calculate normally. The speed of computer is usually given in terms of the following time units for the access time.

   TIME:

   Millisecond   [1 ms]   A thousand of a second or 10^{-3}
   Micro seconds [1μs]   A millionth of a second or 10^{-6}
   Nano seconds [1 ns]   A thousand millionth of a second or 10^{-9}
   Pico second   [1 ps]   A million millionth of a second or 10^{-12}

   The speed of computers is also measured in terms of instructions per second. There are two such measures.

   1. KIPS - Kilo Instructions Per Second
   2. MIPS - Million Instructions Per Second.

2. **Storage:** One of man's failing is perhaps his inability to remember and 'store' large volume of information in his brain. The computer is capable of overriding this deficiency as it can store.

   In computer, the terminology in regard to storage capacity applies to both, 'primary' and 'secondary' storages. It is normally measured in terms of Nibble, Byte, Kilobyte [1 kB], Mega Byte [MB], Giga Byte [GB] and Tera Byte [TB].

   So in computer's memory, large volume of data can be maintained more prominently on secondary media. Example: Floppy disks, Magnetic disks & tapes etc.

UNITS	MEANING
Nibble	4 bits
Byte	8 bits
1 Kilo Byte [1 kB]	1024 bytes
1 Mega Byte [1 MB]	1024 KB
1 Giga Byte [1 GB]	1024 MB
1 Tera Byte [1TB]	1024 GB

3. **Accuracy and Reliability:** In spite of high speed, the computers are quite accurate and reliable in its calculations. The accuracy of operation of computer is always 100%. Computer is only a machine and does not make errors on its own. It is thus reliable.
4. **Automatic:** As stated earlier, the computer is quite capable of functioning automatically, once the process has been initiated. It does not require a prompt from an operator at each stage of the process.
5. **Diligence / Endurance:** Man suffers from physical and mental fatigue, lack of concentration and laziness which do not permit him to carryon his task at the same level of speed and accuracy through the entire day. The computer, on the other hand is capable of operating at exactly the same level of speed and accuracy even if it has to

carry- out the most voluminous and complex operations for a long period of time.

6. **Scientific Approach:** The entire approach to solving problems is highly scientific, objective and sequentially carried out, leaving no room for emotional and subjective evaluations made by man, which are sources of potential errors and unjustified results.

7. **Versatility:** The wide use of computers in so many areas such as scientific, commercial applications, Educational institutions and Industrial areas in day-to-day life. There is an ample evidence of its versatility.

(BLOCK DIAGRAM OF COMPUTER)

A block diagram of a typical microcomputer system as shown below consist of the following parts (a) Central processing Unit (CPU) comprising of Arithmetic Logic Unit (ALU), Control Unit and Memory Unit, (b) Input Device like a keyboard or mouse and (c) Out unit like VDU or printer.

OUTLINE OF A COMPUTER

A computer possesses five important parts - the processor; the memory, the Input/Output *(I/O),* the disk storage and programs.

5 PARTS OF COMPUTER:

1.   **Processor:** The processor is the brain of the computer. It carries out instructions to the other words, the processor executes our programs. It is that part that knows how to add, subtract and carry out logical operations. Usually in large computers like mainframes, the processor is often called the Central Processing Unit or CPU. However, in microcomputers, the processor is called a microprocessor Speed of operation of a computer depends upon the operating frequency of the processor. The processor can read and write data from and, in the memory of the computer. It recognizes and executes a series of commands or instructions so that our programs are carried out. The processor only makes a vital distinction between programs and data.

2.   **Memory:** It is the computer's work area. It is the place where all activity takes place. It is usually rated in terms of Kilobytes and Megabytes. It contains of both ROMs and RAMs, each having a specific function as will be described late The ROM IC contains some system programs that are permanently built into it. They perform the most fundamental kind of supervisory and supporting functions, which include providing essential services, which all the application programs use. These are Basic Input/Output services. Hence the ROM is often referred to as ROM BIOS

3.   **Input/Output:** Input means taking in, the data while output means sending out, the data. What we type on the keyboard is the input and what the computer shows on the video display screen or on the printouts is the output. Every time the computer takes in or sends out the data it uses the *I/O* devices, which are also called peripheral devices.

4.   **Disk Storage:** Disk storage is a very important kind of I/O. It's the place where the computer keeps data when it's not in use this is the memory center of computer. It consists of storage devices like magnetic tapes, magnetic disks - floppy disks, hard disks etc and many other newly emerging devices like CD-ROM, DVD etc.

5.   **Programs:** It is the last of the five key parts of the computer. It is what makes the computer go i.e. it brings into life. It is called the software of the computer. It is what that turns the computer from a heap of fancy parts to a powerful working tool. The whole point of the computer is to carry out the series of steps that we call a program. There are two kinds of programs: *systems programs* **and** *application programs.* All programs accomplish some kind of work. Systems programs help operate the computer. The computer system is so complex that we cannot get it to work without the help of system programs. An applications program carries out the task that we want done, whether it's adding up a column of numbers or checking out the spelling we have fed to the computer.

DIFFERENCE BETWEEN HARDWARE AND SOFTWARE:

Software is a general term used to describe a collection of computer programs, procedures, and documentation that perform some task on a computer system. Practical computer systems divide software systems into three major classes: system software, programming software, and application software, although the distinction is arbitrary and often blurred. Software is an ordered sequence of instructions for changing the state of the computer hardware in a particular sequence. Software is typically programmed with a user-friendly interface that allows humans to interact more more efficiently with a computer system.

Hardware is best described as a device, such as a hard drive, that is physically connected to the computer or something that can be physically touched. A CD-ROM, computer

display monitor, printer, and video card are all examples of computer hardware. Without any hardware, a computer would not function, and software would have nothing to run on. Hardware and software interact with one another: software tells hardware which tasks it needs to perform.

Hardware:

- Physical parts of the computer are called hardware.
- You can touch, see and feel hardware.
- Hardware is constructed using physical materials or components.
- Computer is hardware, which operates under the control of a software.
- If hardware is damaged, it is replaced with new one.
- Hardware is not affected by computer viruses.
- Hardware cannot be transferred from one place to another electronically through network.
- User cannot make new duplicate copies of the hardware.

Software:

- A set of instructions given to the computer is called software.
- You cannot touch and feel software.
- Software is developed by writing instructions in programming language.
- The operations of computer are controlled through software.
- If software is damaged or corrupted, its backup copy can be reinstalled.
- Software is affected by computer viruses.
- Software can be transferred from one place to another electronically through network.
- User can make many new duplicate copies of the software.

DIFFERENCE BETWEEN DATA AND INFORMATION:

Data and information are interrelated. In fact, they are often mistakenly used interchangeably. Data is considered to be raw data. It represents 'values of qualitative or quantitative variables, belonging to a set of items.' It may be in the form of numbers, letters, or a set of characters. It is often collected via measurements. In data computing or data processing, data is represented by in a structure, such as tabular data, data tree, a data graph, etc.
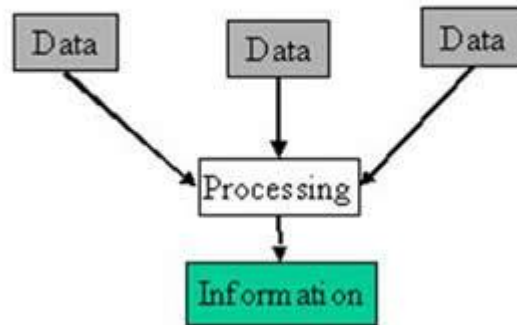
Data usually refers to raw data, or unprocessed data. It is the basic form of data, data that hasn't been analyzed or processed in any manner. Once the data is analyzed, it is considered as information.

Information is "knowledge communicated or received concerning a particular fact or circumstance." Information is a sequence of symbols that can be interpreted as a message. It provides knowledge or insight about a certain matter. Information can be recorded as signs, or transmitted as signals.

Basically, information is the message that is being conveyed, whereas data are plain facts. Once the data is processed, organized, structured or presented in a given context, it can become useful. Then data will become information, knowledge.

Data in itself is fairly useless, until it is interpreted or processed to get meaning, to get information. In computing, it can be said that data is the computer's language. It is the output that the computer gives us. Whereas, information is how we interpret or translate the language or data. It is the human representation of data.

Information is created from data

Some differences between data and information:

- Data is used as input for the computer system. Information is the output of data.
- Data is unprocessed facts figures. Information is processed data.
- Data doesn't depend on Information. Information depends on data.
- Data is not specific. Information is specific.
- Data is a single unit. A group of data which carries news and meaning is called Information.
- Data doesn't carry a meaning. Information must carry a logical meaning.
- Data is the raw material. Information is the product.

Data and information are interrelated. Data usually refers to raw data, or unprocessed data. It is the basic form of data, data that hasn't been analyzed or processed in any manner. Once the data is analyzed, it is considered as information. Information is "knowledge communicated or received concerning a particular fact or circumstance." Information is a sequence of symbols that can be interpreted as a message. It provides knowledge or insight about a certain matter.

TYPES OF COMPUTERS:

Now let us discuss the varieties of computers that we see today. Although they belong to the fifth generation they can be divided into different categories depending upon the size, efficiency, memory and number of users. Broadly they can be divided it to the following categories.

1. **Microcomputer:** Microcomputer is at the lowest end of the computer range in terms of speed and storage capacity. Its CPU is a microprocessor. The first microcomputers were built of 8-bit microprocessor chips. The most common application of personal

computers (PC) is in this category. The PC supports a number of input and output devices. An improvement of 8-bit chip is 16-bit and 32-bit chips. Examples of microcomputer are IBM PC, PC-AT.

2. **Mini Computer**: This is designed to support more than one user at a time. It possesses large storage capacity and operates at a higher speed. The mini computer is used in multi-user system in which various users can work at the same time. This type of computer is generally used for processing large volume of data in an organization. They are also used as servers in Local Area Networks (LAN).

3. **Mainframes:** These types of computers are generally 32-bit microprocessors. They operate at very high speed, have very large storage capacity and can handle the work load of many users. They are generally used in centralized databases. They are also used as controlling nodes in Wide Area Networks (WAN). Example of mainframes are DEC, ICL and IBM 3000 series.

4. **Supercomputer:** They are the fastest and most expensive machines. They have high processing speed compared to other computers. They have also multiprocessing technique. One of the ways in which supercomputers are built is by interconnecting hundreds of microprocessors. Supercomputers are mainly being used for whether forecasting, biomedical research, remote sensing, aircraft design and other areas of science and technology. Examples of supercomputers are CRAY YMP, CRAY2, NEC SX-3, CRAY XMP and PARAM from India.

CLIENT–SERVER MODEL

The **client–server model** is a distributed application structure that partitions tasks or workloads between the providers of a resource or service, called servers, and service requesters, called clients. Often clients and servers communicate over a computer network on separate hardware, but both client and server may reside in the same system. A server host runs one or more server programs which share their resources with clients. A client does not share any of its resources, but requests a server's content or service function. Clients therefore initiate communication sessions with servers which await incoming requests. Examples of computer applications that use the client–server model are Email, network printing, and the World Wide Web.

TYPES OF SERVERS

Typically servers are of four types, but due to an exponential growth in networking technologies, we are witnessing multiple other server types. Traditionally know servers are:

1. Ftp Servers
2. Proxy Servers
3. Online Game Servers
4. Web Servers.

1. **FTP Server** : File Transfer Protocol (FTP) is one of the oldest server types. It is responsible for transferring files from server to a computer and vice versa. FTP server ensures the security and integrity of data during the transfer. It is commonly used by web servers, it enables user to upload, edit or delete files from websites using FTP clients.

2. **Proxy Servers** : The Proxy server is responsible for a connection between a client(web browser or an app) with and an external server to entertain the request for connection, performance enhancement, and accessibility

Consider an example of the restricted website or an app, if you connect your computer/smartphone with a proxy server, it will update its IP geographical location and let you access the restricted data.

3. **Online Gaming Server** : Gaming server has gained its popularity in a recent decay. This type of server is responsible for connecting hundreds of gamers around the world to an external server(s) for accessing gaming data.

Xbox live is one of the examples for gaming servers. We can also develop our own gaming servers at home to play games with our friends under one roof. A normal computer can perform as a server, every other computer will make a connection to a gaming server and access gaming data and play a game.

4. **Web Servers** : The web server is responsible for hosting website files and serve it up through a web browser. It loads an individual file of a web page and loads it to display in the browser as one complete page. HTTP or HTTPS (Hypertext Transfer Protocol or Hypertext Transfer Protocol Secure) communicate between server and web browser to load a web page.

WHAT IS SOFTWARE?

As you know computer cannot do anything without instructions from the user. In order to do any specific job you have to give a sequence of instructions to the computer. This set of instructions is called a computer *program*. Software refers to the set of computer programs, procedures that describe the programs, how they are to be used. We can say that it is the collection of programs, which increase the capabilities of the hardware. Software guides the computer at every step where to start and stop during a particular job. The process of software development is called *programming*.

You should keep in mind that software and hardware are complementary to each other. Both have to work together to produce meaningful result.

SOFTWARE TYPES:

Computer software is normally classified into two broad categories.

- Application Software
- System software

Application Software: Application Software is a set of programs to carry out operations for a specific application. For example, payroll is an application software for an organization to produce pay slips as an output. Application software is useful for word processing, billing system, accounting, producing statistical report, analysis of numerous data in research, weather forecasting, etc. Application softwares are Word Processor, Spreadsheet, Database Management, Presentation, Media, Outlook, Browser and Utility Software like Acrobat Reader etc.

System Software: You know that an instruction is a set of programs that has to be fed to the computer for operation of computer system as a whole. When you switch on the computer the

programs written in ROM is executed which activates different units of your computer and makes it ready for you to work on it. This set of program can be called system software. Therefore system software may be defined as a set of one or more programs designed to control the operation of computer system.

System software are general programs designed for performing tasks such as controlling all operations required to move data into and out of the computer. It communicates with printers, card reader, disk, tapes etc. monitor the use of various hardware like memory, CPU etc. Also system software are essential for the development of applications software. System Software allows application packages to be run on the computer with less time and effort. *Remember that it is not possible to run application software without system software*.

System Softwares are Windows, Linux, Android etc.

Hardware versus Software comparison chart

	Hardware	Software
Definition	Devices that are required to store and execute (or run) the software.	Collection of instructions that enables a user to interact with the computer. Software is a program that enables a computer to perform a specific task, as opposed to the physical components of the system (hardware).
Types	Input, storage, processing, control, and output devices.	System software, Programming software, and Application software.
Examples	CD-ROM, monitor, printer, video card, scanners, label makers, routers , and modems.	QuickBooks, Adobe Acrobat, Winoms-Cs, Internet Explorer , Microsoft Word , Microsoft Excel
Function	Hardware serves as the delivery system for software solutions. The hardware of a computer is infrequently changed, in comparison with software and data, which are "soft" in the sense that they are readily created, modified, or erased on the computer	To perform the specific task you need to complete. Software is generally not needed to for the hardware to perform its basic level tasks such as turning on and responding to input.
Inter dependency	Hardware starts functioning once software is loaded.	To deliver its set of instructions, Software is installed on hardware.
Failure	Hardware failure is random. Hardware does have increasing failure at the last stage.	Software failure is systematic. Software does not have an increasing failure rate.
Durability	Hardware wears out over time.	Software does not wear out over time. However, bugs are discovered in software as time passes.

Hardware versus Software comparison chart

	Hardware	**Software**
Nature	Hardware is physical in nature.	Software is logical in nature.

SOFTWARE COPYRIGHT:

1) Freeware: Is computer software that is available for use at no cost or for an optional fee, but usually with one or more restricted usage rights. Freeware is in contrast to commercial software, which is typically sold for profit. The term does not imply that the software is free and open source software. Freeware is a loosely defined category, which includes both closed and open source proprietary software.

2) Shareware: The term shareware (also known as trialware or demoware) refers to proprietary software that is provided to users without payment on a trial basis and is often limited by any combination of functionality, availability, or convenience. Shareware is often offered as a download from an Internet website or as a compact disc included with a periodical such as a newspaper or magazine. The rationale behind shareware is to give buyers the opportunity to use the program and judge its usefulness before purchasing a license for the full version of the software. Shareware is usually offered either with certain features only available after the license is purchased, or as a full version but for a limited trial period of time. Once the trial period has passed, the program may stop running until a license is purchased. Shareware is often offered without supports or updates which only become available with the purchase of a license.

3) Licensed: A software license is a legal instrument (usually by way of contract law) governing the usage or redistribution of software. All software is copyright protected, except material in the public domain. Contractual confidentiality is another way of protecting software. A typical software license grants an end-user permission to use one or more copies of software in ways where such a use would otherwise potentially constitute copyright infringement of the software owner's exclusive rights under copyright law. Some software comes with the license when purchased off the shelf or an OEM (Original Equipment Manufacturer) license when bundled with hardware. Software can also be in the form of freeware or shareware. Software licenses can generally be fit into the following categories: proprietary licenses and free and open source licenses, which include free software licenses and other open source licenses. The features that distinguishes them are significant in terms of the effect they have on the end-user's rights.

Chapter – 2

SOFTWARE

Learning Objective

At the end of this module you should be able to understand

- Application Software- Word Processor, Spreadsheet, Database Management, Presentation, Media, Outlook, Browser and Utility Software, Acrobat Reader
- System software- Operating System (Windows, Linux, Android)
- Device Driver
- Utility Software- VLC Player, File Converter

Application Software :

Application software consists of programs designed to perform specific tasks for users. Application software can be used as a productivity/business tool; to assist with graphics and multimedia projects; to support home, personal, and educational activities; and to facilitate communications. Specific application software products, called software packages, are available from software vendors.

Word Processor: A word processor is a type of software application used for composing, editing, formatting and printing documents. Word processors have a variety of uses and applications within the business environment, at home and in educational contexts.

A word processor, does exactly what the name implies. It processes words. It also processes paragraphs, pages, and entire papers. Some examples of word processing programs include Microsoft Word, WordPerfect (Windows only), AppleWorks (Mac only), and OpenOffice.org.

The first word processors were basically computerized typewriters, which did little more than place characters on a screen, which could then be printed by a printer. Modern word processing programs, however, include features to customize the style of the text, change the page formatting, and may be able to add headers, footers, and page numbers to each page. Some may also include a "Word Count" option, which counts the words and characters within a document.

While all these features can be useful and fun to play with, the most significant improvement over the typewriter is the word processor's ability to make changes to a document after it has been written. By using the mouse, you can click anywhere within the text of a document and

add or remove content. Since reprinting a paper is much easier than retyping it, word processing programs have make revising text documents a much more efficient process.

Word processors are used to create, edit and print documents, and well as save them electronically.

Word processors have the following main functionalities:

- Insert
- Copy
- Cut and paste
- Delete
- Find and replace
- Print
- Word wrap

Advanced word processors, referred to as full-featured word processors, support additional features such as:

- File management
- Graphics
- Font specification
- Footnotes
- Cross reference
- Headers and footers
- Macros
- Layout
- Spell check
- Thesaurus

Spreadsheet: A spreadsheet is a software application that enables a user to save, sort and manage data in an arranged form of rows and columns.

A spreadsheet stores data in a tabular format as an electronic document. An electronic spreadsheet is based on and is similar to the paper-based accounting worksheet.

A spreadsheet may also be called a worksheet.

A spreadsheet is primarily designed to provide a digital form of the paper-based worksheet. Spreadsheets work through spreadsheet application software. The rows and columns within the spreadsheet contain cells that are filled with data to create unique operations. A typical spreadsheet program can have multiple functions such as:

- Numerous rows and columns for data and values storage

- Support for mathematical formulas and calculations
- Data sorting and analysis
- Multiple worksheets and their interlinking
- Integration and visualization of data in the form of graphs and charts

Microsoft Excel and Lotus 1-2-3 are among the most popular spreadsheet applications.

Database Management: A database (DB), in the most general sense, is an organized collection of data. More specifically, a database is an electronic system that allows data to be easily accessed, manipulated and updated.

In other words, a database is used by an organization as a method of storing, managing and retrieving information. Modern databases are managed using a database management system (DBMS).

Software programmers are well acquainted with database concepts through relational databases like Oracle, SQL SERVER and MySQL, etc. Typically, a database structure stores data in a tabular format.

Database architecture may be external, internal or conceptual. The external level specifies the way in which every end-user type comprehends the organization of its corresponding relevant data in the database. The internal level deals with the performance, scalability, cost and other operational matters. The conceptual level perfectly unifies the different external views into a defined and wholly global view. It consists of every end-user required generic data.

Presentation: Presentation is a category of application software that is specifically designed to allow users to create a presentation of ideas by stringing together text, images and audio/video. The presentation tells a story or supports speech or the presentation of information.

Presentation can be divided into business presentation and general multimedia authoring, but most presentation applications already provide tools that allow users to create both professional-looking business presentations and general multimedia presentations.

Presentation software is also known as a presentation program.

Presentation software is generally used for creating slideshows that display information. The software has three main components:

- Text editor for inputting and formatting text
- Facility for inserting graphics and other multimedia files

- Slideshow system for displaying the content

Before the advent of presentation software, presenters commonly used an easel to hold posters that contained illustrations to support the report or a slide projector to display graphics printed on a transparent plastic film. These methods were inflexible; for example, changing small things in the printed materials used could result in mismatched graphics or illustrations, sometimes requiring redoing the entire thing. With presentation software, not only authoring but also correcting illustrations can be done easily.

Microsoft's PowerPoint and Apple's Keynote are two of the best-known commercial presentation software applications in the market.

Media: Media describes any channel of communication. This can include anything from printed paper to digital data, and encompasses art, news, educational content and numerous other forms of information. Digital media, which makes up an increasingly vast portion of modern communications, is comprised of intricately encoded signals that are transmitted over various forms of physical and virtual media, such as fiber optic cable and computer networks.

Outlook:. Typically the messages are notes entered from the keyboard or electronic files stored on disk. Most mainframes, minicomputers, and computer networks have an email system.
Some electronic mail systems are confined to a single computer system or network, but others have gateways to other computer systems, enabling users to send electronic mail anywhere in the world. Companies that are fully computerized make extensive use of e-mail because it is fast, flexible, and reliable.

Browser: A browser is an application program that provides a way to look at and interact with all the information on the World Wide Web. The word "browser" seems to have originated prior to the Web as a generic term for user interfaces that let you browse (navigate through and read) text files online.
Technically, a Web browser is a client program that uses HTTP (Hypertext Transfer Protocol) to make requests of Web servers throughout the Internet on behalf of the browser user. Most browsers support e-mail and the File Transfer Protocol (FTP) but a Web browser is not required for those Internet protocols and more specialized client programs are more popular.
The first Web browser, called WorldWideWeb, was created in 1990. That browser's name was changed to Nexus to avoid confusion with the developing information space known as the World Wide Web. The first Web browser with a graphical user interface was Mosaic, which appeared in 1993. Many of the user interface features in Mosaic went into Netscape Navigator. Microsoft followed with its Internet Explorer (IE).
As of September 2006, Internet Explorer is the most commonly used browser, having won the so-called browser wars between IE and Netscape. Other browsers include:

- [Firefox](), which was developed from [Mozilla]().
- [Safari](), a browser for [Apple]() computers.
- [Opera](), a fast and stable browser that's compatible with most relatively operating systems.

8) Utility Software:

A **utility** or **software utility** is computer system software intended to analyze, configure, monitor, or help maintain a computer. Typically a utility is smaller than an [program]() in size and may be included with an [operating system]() or [installed]() separately.

List of computer utilities

Below is a list of different utility software that can be installed on a computer. For a list of all of the different types of computer software see our [software]() page.

- [Antivirus]()
- [Backup software]()
- [Clipboard]()
- [Compression utility]()
- [Cryptography software]()
- [Debuggers]()
- Disk checkers, e.g. [Defrag](), [Disk Cleanup](), and [ScanDisk]()
- Disk [partition]() editors
-

VIRUS

A virus is piece of programming code that usually disguises itself and causes an unexpected and usually undesirable event. A virus is often designed so that it automatically spreads to other computers. Viruses can be transmitted from e-mail attachments, file downloads, or be present on a diskette or CD. They may quite harmful, erasing data or causing the computer's hard disk to be reformatted.

Antivirus Software

Antivirus software protects our computer from unexpected virus attacks. Apart from protecting our system, they perform the following tasks:
It detects the name of the virus and its type
It comes with alert features that warn users about the virus
With regular updates, antivirus software can instruct the computer on new virus.
Some few examples for antivirus software's are:

McAfee

McAfee is the world's largest dedicated security technology. It delivers proactive and proven solution and services that help secure systems and networks around world. McAfee protects consumers and businesses of all sizes from latest malware and emerging online threats

Kaspersky

Kaspersky Antivirus 2012 is the backbone of a personal computer's security system, delivering real time protection from the latest malware and viruses. It works behind the scenes with intelligent scanning and small frequent updates, while proactively protecting us from known and emerging threats.

Norton Antivirus

Norton Antivirus system provides four unique layers of powerful protection to proactively stop online threats before they can infect computer. It checks where the files came from and how long they have been around to stop new online threats before they can cause trouble. It protects us while we surf the web by warning and blocking unsafe and fake websites in our search results.

9) Acrobat Reader : Adobe Acrobat is a family of application software and Web services developed by Adobe Systems to view, create, manipulate, print and manage files in Portable Document Format (PDF).

The family comprises Acrobat Reader, Acrobat and Acrobat.com. The basic Acrobat Reader, available for several desktop and mobile platforms, is freeware; it supports viewing and printing of PDF files. You can use it as a standalone reader or as a plug-in in a Web browser.

Acrobat is actually a set of products. The latest version includes a "toolkit" that lets you scan in or otherwise capture documents created with Word, Pagemaker, and other desktop publishing products. The resulting PDF files can then be available for viewing either directly with the Reader or they can be viewed as embedded files within the browser.

<u>SYSTEM SOFTWARE</u>

System software is software on a computer that is designed to control and work with computer <u>hardware</u>. The two main types of system software are the <u>operating system</u> and the software installed with the operating system, often called <u>utility</u> software. The operating system and utility software typically depend on each other to function properly.

Some system software is used directly by users and other system software works in the background. System software can allow users to interact directly with hardware functionality, like the <u>Device Manager</u> and many of the utilities found in the <u>Control Panel</u>.

Software that allows users to create documents (e.g. <u>Microsoft Word)</u>, edit pictures (e.g. <u>Adobe Photoshop)</u>, browse the Internet (e.g. <u>Microsoft Internet Explorer</u>), or check their e-mail (e.g. <u>Microsoft Outlook</u>) are considered <u>application software</u>. System software does not involve direct interaction with computer hardware or operating system functionality, but may require the use of one or more hardware components to function properly.

An Operating System (OS) is an interface between a computer user and computer hardware. An operating system is a software which performs all the basic tasks like file management,

memory management, process management, handling input and output, and controlling peripheral devices such as disk drives and printers.

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

Definition

An operating system is a program that acts as an interface between the user and the computer hardware and controls the execution of all kinds of programs.

Following are some of important functions of an operating System.

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

Microsoft Windows, or simply Windows, is a meta family of graphical operating systems developed, marketed, and sold by Microsoft. It consists of several families of operating systems, each of which cater to a certain sector of the computing industry with

the OS typically associated with IBM PC compatible architecture. Active Windows families include Windows NT and Windows Embedded; these may encompass subfamilies, e.g. Windows Embedded Compact (Windows CE) or Windows Server. Defunct Windows families include Windows 9x, Windows Mobile and Windows Phone.

Just like Windows XP, Windows 7, Windows 8, and Mac OS X, Linux is an operating system. An operating system is software that manages all of the hardware resources associated with your desktop or laptop. To put it simply – the operating system manages the communication between your software and your hardware. Without the operating system (often referred to as the "OS"), the software wouldn't function.

The **Linux open source** operating system, or Linux OS, is a freely distributable, cross-platform operating system based on Unix that can be installed on PCs, laptops, netbooks, mobile and tablet devices, video game consoles, servers, supercomputers and more.
The Linux OS is frequently packaged as a Linux distribution for both desktop and server use, and includes the Linux kernel (the core of the operating system) as well as supporting tools and libraries. Popular Linux OS distributions include Debian, Ubuntu, Fedora, Red Hat and openSUSE.

Android is a mobile operating system developed by Google, based on the Linux kernel and designed primarily for touchscreen mobile devices such as smartphones and tablets. Android's user interface is mainly based on direct manipulation, using touch gestures that loosely correspond to real-world actions, such as swiping, tapping and pinching, to manipulate on-screen objects, along with a virtual keyboard for text input. In addition to touchscreen devices, Google has further developed Android TV for televisions, Android Auto for cars, and Android Wear for wrist watches, each with a specialized user interface. Variants of Android are also used on notebooks, game consoles, digital cameras, and other electronics.

A **device driver** is a small piece of software that tells the operating system and other software how to communicate with a piece of hardware.

For example, printer drivers tell the operating system, and by extension whatever program you have the thing you want to print open in, *exactly* how to print information on the page

Sound card drivers are necessary so your operating system knows exactly how to translate the 1's and 0's that comprise that MP3 file into audio signals that the sound card can output to your headphones or speakers.

The same general idea applies to video cards, keyboards, monitors, etc.

Keep reading for more on why drivers are important, including some more examples, as well as information on how to keep your drivers updated and what to do if they're not working properly.

How Exactly Do Device Drivers Work?

Think of device drivers like translators between a program you're using and a device that that program wants to utilize somehow. The software and the hardware were created by different people or companies and speak two *completely* different languages so a translator (the driver) allows them to communicate.

In other words, a software program can provide information to a driver to explain what it wants a piece of hardware to do, information the device driver understands and then can fulfill with the hardware

In computers, a utility is a small program that provides an addition to the capabilities provided by the operating system. In some usages, a utility is a special and nonessential part of the operating system. The print "utility" that comes with the operating system is an example. It's not absolutely required to run programs and, if it didn't come with the operating system, you could perhaps add it. In other usages, a utility is an application that is very specialized and relatively limited in capability. A good example is a search-and-replace utility. Some operating systems provide a limited capability to do a search-and-replace for given character strings. You can add a much more capable search-and-replace utility that runs as an application program. However, compared to a word processor, a search-and-replace utility has limited capability.

Examples of utility programs are antivirus software, backup software and disk tools.

VLC media player (commonly known as **VLC**) is a free and open-source, portable and cross-platform media player and streaming mediaserver written by the VideoLAN project. VLC is available for desktop operating systems and mobile platforms, such as Windows 10 Mobile, Windows Phone, Android, Tizen, iPad, iPhone, and iPod Touch. VLC is also available on App stores such as Apple's App Store, Google Play store and Microsoft Windows Windows Store.

VLC media player supports many audio and video [compression](#) methods and [file formats](#), including [DVD-Video](#), [video CD](#) and streaming [protocols](#). It is able to stream media over [computer networks](#) and to [transcode](#) multimedia files

Using a File Conversion Utility

PDF documents can fortunately be shared in a very easy manner but there are other file formats existing that may not always be compatible with each other. With a file conversion utility you can quickly solve this problem by converting file formats from one to another in any manner you'd like. A file conversion utility will also allow you to convert folders of files into any different formats offered without much hassle.

Do You Need a File Conversion Utility?

People constantly transfer files but at some points, the recipient may not have a compatible system that can access the downloaded file. This problem is easily solved with a file conversion utility when you're capable of changing files into any format needed. If a document is in Microsoft Word format, you can change it to PDF to make it viewable to those who don't have the Microsoft software by with file conversion utility. With better organization of your files, you can become more productive and practical using the file conversion utility.

Chapter – 3

HARDWARE

Learning Objective

At the end of this module you should be able to understand

- Introduction of Central Processing Unit
- Processor – Intel, AMD, Clock Speed
- Input Devices – Keyboard, Mouse, Mic, Scanner, Barcode Reader, RFID, Touch Screen
- Output Devices – Displays (CRT, TFT, LCD, Plasma, LED, Projector)
- Display Resolution
- Printers – Inkjet, Laser, Thermal
- Storage Devices – Primary (RAM & ROM), Secondary (HDD, Flash Drive, USB, CD/DVD, Blue Ray, Media Players)

CENTRAL PROCESSING UNIT:

The Central Processing Unit (CPU) performs the actual processing of data. The data it processes is obtained, via the system bus, from the main memory. Results from the CPU are

then sent back to main memory via the system bus. In addition to computation the CPU controls and co-ordinates the operation of the other major components. The CPU has two main components, namely:

The Control Unit -- controls the fetching of instructions from the main memory and the subsequent execution of these instructions. Among other tasks carried out are the control of input and output devices and the passing of data to the Arithmetic/Logical Unit for computation.

The Arithmetic/Logical Unit (ALU) -- carries out arithmetic operations on integer (whole number) and real (with a decimal point) operands. It can also perform simple logical tests for equality and greater than and less than between operands.

MICROPROCESSOR:

A microprocessor incorporates the functions of a computer's central processing unit (CPU) on a single integrated circuit (IC, or microchip). It is a multipurpose, programmable, clock-driven, register based electronic device that accepts binary data as input, processes it according to instructions stored in its memory, and provides results as output.

Brands: Intel AMD

CLOCK SPEED:

The clock speed of a CPU is defined as the frequency that a processor executes instructions or that data is processed. This clock speed is measured in millions of cycles per second or megahertz (MHz). The clock itself is actually a quartz crystal that vibrates at a certain frequency when electricity is passed through it. Each vibration sends out a pulse or beat, to each component that's synchronized with it.

INPUT DEVICE:

An **input device** is any <u>hardware</u> device that sends data to the computer, without any input devices, a computer would only be a display device and not allow users to interact with it, much like a TV. Below is a complete listing of all the different computer input devices that can be used on a computer.

- Barcode reader
- Digital camera
- Joystick
- Keyboard
- Microphone
- Mouse (pointing device)
- Scanner
- Webcam
- RFID
- Touch Screen

- **Barcode**

Barcode

||.|.|.|.|||.|.|.|.|.|.||.|

Lines of different widths and sizes representing data, that when read will determine what the scanned object is. Bar codes are often used to help organize and index information or prices about an object. Barcodes used by the U.S. postal service that helps speed the delivery of mail is another perfect example of how a barcode could be used. In the picture to the right, is an example of what a barcode for an address may look like.

Barcode readers and scanners

A **barcode reader** or **scanner,** also known as a **point of sale (POS) scanner** is a hardware device capable of reading a barcode and printing out the details of the product or logging that product into a database. A perfect example of a barcode reader is a super market barcode scanner that reads and logs the price of a product.

Barcode Printers

A hardware device capable of printing out adhesive barcodes that can be attached to a product. This helps identify the product or a company keep track of its inventory.

- **Digital camera**

A camera that stores the pictures or video it takes in electronic format instead of to film. There are several features that make **digital cameras** a popular choice when compared to film cameras. First, the feature often enjoyed the most is the LCD display on the digital camera. This display allows users to view photos or video after the picture or video has been taken, which means if you take a picture and don't like the results, you can delete it; or if you do like the picture, you can easily show it to other people. Another nice feature with digital cameras is the ability to take dozens, sometimes hundreds of different pictures. To the right is a picture of the Casio QV-R62, a 6.0 Mega Pixel digital camera used to help illustrate what a digital camera may look like.

- **Keyboard**

One of the main input devices used on a computer, a PC's **keyboard** looks very similar to the keyboards of electric typewriters, with some additional keys. Below is a graphic of the Saitek Gamers' keyboard with indicators pointing to each of the major portions of the keyboard.

Finally, today most users use the QWERTY style keyboards. Below is a graphic illustration of where each of the keys are on a U.S. QWERTY style keyboard.

QWERTY KEYBOARD

~ `	! 1	@ 2	# 3	$ 4	% 5	^ 6	& 7	* 8	(9	) 0	_ -	+ =	Delete
Tab	Q	W	E	R	T	Y	U	I	O	P	{ [	}]	| \\
Caps	A	S	D	F	G	H	J	K	L	: ;	" '		Enter
Shift	Z	X	C	V	B	N	M	< ,	> .	? /		Shift	
Ctrl		Alt						Alt		Ctrl			

- **Microphone**

Sometimes abbreviated as **mic**, a **microphone** is a hardware peripheral originally invented by Emile Berliner in 1877 that allows computer users to input audio into their computers.

- **Mouse**

The **mouse** allows an individual to control a pointer in a graphical user interface (GUI). Utilizing a mouse a user has the ability to perform various functions such as opening a program or file and does not require the user to memorize commands, like those used in a text-based command line environment such as MS-DOS. Today, a pointing device is found on virtually every computer.

Computer mice

- Cordless
- Joystick
- Mechanical
- Optical
- Touchpad
- Trackball
- TrackPoint
- Wheel mouse

How a mouse may interface with a computer

- Bluetooth
- Infrared
- PS/2 Port
- Serial Port
- USB

- **Optical scanner**

Hardware input device that allows a user to take an image or text and convert it into a digital file, allowing the computer to read or display the scanned object. A **scanner** is commonly connected to a computer USB, Firewire, Parallel or SCSI port.

Other scanners include: **sheetfed scanner**, which is a scanner that scans paper fed into it, **handheld scanner**, which is a scanner that is held and drag over a page to scan it, and a **card scanner**, which is a small scanner capable of scanning business cards.

- **RFID**

Radio-frequency identification (**RFID**) is a technology that uses communication through the use of radio waves to transfer data between a reader and an electronic tag attached to an object for the purpose of identification and tracking.

RFID makes it possible to give each product in a grocery store its own unique identifying number, to provide assets, people, work in process, medical devices etc. all with individual unique identifiers - like the license plate on a car but for every item in the world. RFID tags (those without a battery) can be read if passed within close enough proximity to an RFID reader. It is not necessary to "show" the tag to the reader device, as with a bar code. In other words it does not require line of sight to "see" an RFID tag, the tag can be read inside a case, carton, box or other container, and unlike barcodes RFID tags can be read hundreds at a time. Bar codes can only read one at a time.

Some RFID tags can be read from several meters away and beyond the line of sight of the reader. The application of bulk reading enables an almost-parallel reading of tags.

Radio-frequency identification involves the hardware known as interrogators (also known as readers), and tags (also known as labels), as well as RFID software or RFID middleware.

- **Touch Screen**

A touch screen is a particular kind of monitor screen covered with a plastic layer. Behind this layer are crisscrossed invisible beams of infrared light. This arrangement enables someone to select actions or commands by touching the screen with a finger. Touch screens are easy to use, especially when people need information quickly. They are commonly used at restaurants, automated teller machines (ATMs), and information centers.

OUTPUT DEVICE:

Any peripheral that receives or displays output from a computer.

Display

Term used to describe the device used to view images or text. For example, today the most commonly used form of **display** are LCD, Monitors, Flat-Panel displays, projector.

- **Cathod Ray Tubes**

The most common type of monitor of the office and the home is the cathode ray tube (CRT). These monitors are similar in size and technology to the televisions. Compares to other types of monitors their primary advantages are low cost and excellent resolution.

A monitor's clarity is indicated by its resolution, which is measured in pixels. Pixels are individual dots or "picture elements" that form images on a monitor. For a given size monitor, the greater the resolution (the more pixels), the better the clarity of the image. For a given level of clarity, larger monitors require a higher resolution (more pixels).

- **FLAT PANEL MONITORS**

Because CRTs are too bulky to be transported, portable monitors known as flat panel monitors or liquid crystal display (LCD) monitors were developed. Unlike the technology used in CRT's the technology for portable monitors involves liquid crystals. Flat panel monitors are much thinner than CRTs. These monitors are developed exclusively for portable computer but now they are also used for desktop computer.

- **Thin Film Transistor (TFT)**

Alternatively referred to as **active-matrix display** is a liquid crystal display (LCD) first introduced with the IBM ThinkPad in 1992. With active-matrix displays, each pixel is controlled by one to four transistors that can make the screen faster, brighter, more colorful and capable of being viewed at different angles. Because of this improved technology, active-matrix screens are often more expensive but better quality than a passive matrix display.

- **Gas-plasma display**

Display that is a collection of neon gas materials between two plates. Each plate contains a conductive print, one with a horizontal and the other with a vertical. **Gas-plasma displays** are sometimes found with older portable computers. However, because of advances in portable LCD technologies and the power requirements, gas-plasma displays are often used for large displays.

- **LCD**

Liquid Crystal Display Monitors use cold cathode fluorescent lamps for backlighting. LCD displays manipulate external light to pass through polarized liquid crystals. Which means in order to produce an image on the monitor, the pixels in LCD have to be backlit. This technology uses fluorescent backlights for producing the image on the screen.

- **LED**

The basic technology used in LED and LCD is same. They both use backlight for producing image. The only difference is that while LCD uses fluorescent light, LED uses Light Emitting Diodes (LED) for creating the image on screen. Moreover, LED screens are basically LCD only. LED is an advancement of LCD technology.

- **Projector**

An output device that can take the display of a computer screen and project a large version of it onto a flat surface. Projectors are often used in meetings and presentations so that everyone in the room can view the presentation. Projectors used with computers are small devices that are rarely much larger than a toaster and typically weigh a few pounds.

Printer

Dot-Matrix Printer

The dot-matrix printer uses print heads containing from 9 to 24 pins. These pins produce patterns of dots on the paper to form the individual characters. The 24 pin dot-matrix printer produces more dots that a 9 pin dot-matrix printer, which results in much better quality and clearer characters. Dot-matrix printers are inexpensive and typically print at speeds of 100-600 characters per second.

An external hardware device responsible for taking computer data and generating a hard copy of that data. Printers are one of the most used peripherals on computers and are commonly used to print text, images, or photos. The image to the right is a visual example of the Lexmark Z605 printer and is an example of what a **printer** may look like.

Inkjet printer

The most popular printer for home computer users that prints by spraying streams of quick-drying ink on paper. The ink is stored in disposable ink cartridges, often a separate cartridge is used for each of the major colors. These colors are usually Black, Red/Magenta, Green/Cyan, and Yellow (CYMK). To the right is an example of an inkjet printer.

Although **inkjet printers** themselves are often relatively inexpensive, the ink cartridges used in the printers can quickly increase the overall cost of the printer. If you have no plans on printing in color we highly recommend a laser printer instead of an Inkjet printer.

Laser printer

First developed at <u>Xerox PARC</u> by Gary Starkweather and released in <u>1971</u>, a **laser printer** is a printer that utilizes laser technology to print images on the paper. Laser printers are often used in corporate, school, and other environments that require print jobs to be completed quickly and in large quantities. To the right is an example of what a laser printer may look like. This picture is of the Lexmark C782n laser printer and as can be seen much larger than an ink jet printer found in most homes. Finally, below is a chart of the steps a laser printer takes to print.

Thermal printer

1. A **thermal impact printer** or **electro thermal printer** is a printer that uses heated pins to "burn" images onto heat-sensitive paper. These printers are commonly used in calculators and fax machines; and although they are inexpensive and print relatively fast, they produce low resolution print jobs.
2. A **thermal printer**, **thermal transfer printer**, or **thermal wax-transfer printer** is a high quality printer that commonly utilizes a thermal wax ribbon that melts a colored wax onto the paper creating near photo-realistic images.

Storage device

A **storage device** is a hardware device capable of storing information. There are two storage devices used in computers; a primary storage device such as computer RAM and a secondary storage device such as a computer hard disk drive.

Primary storage device

Alternatively referred to as **internal memory** and **main memory**, **primary storage** is a storage location that holds memory for short periods of times while the computer is on. For example, computer RAM and cache are both examples of a primary storage device. This storage is the fastest memory in your computer and is used to store data while it's being used. For example, when you open a program data is moved from the secondary storage into the primary storage.

Primary Memory or Main Memory

It may be called as MAIN MEMORY or Internal Memory which is built within the computer that stores the unprocessed and processed data as well as the program instructions. It is Immediate Access Memory. It is of a limited in-capacity and temporary in nature. The information resides in the secondary memory, is needed by CPU for current execution, is transferred from the Secondary Memory to the Main Memory.

The standard base memory is 640 K or KB. It may enhance up to 1 MB, 2MB, 8MB, 16MB, 32MB, 64MB, 128 MB and 256 MB depending on need of the user.

Functions of Primary Memory

• To hold the Operating, When System Instructions Boot the Computer. [Turned on the System]
• It holds the copy of the programming instructions and data input from the Keyboard through user temporarily, which are currently being executed.
• It stores the result temporarily, which is generated after processing until it is transferred to corresponding output device.

Types of Main/Primary Memory

1.   RAM - Random Access Memory
2.   ROM - Read Only Memory
        ▪ PROM - Programmable Read Only Memory
        ▪ EPROM - Erasable Programmable Read Only Memory
        ▪ EEPROM - Electronic Erasable Programmable Read Only Memory

RAM:

RAM is identical to core memory in function and is a read / write memory. Data can be stored in RAM by addressing one RAM cell. The data and instructions fed in via the input device are stored in the RAM so it may be called as users memory. RAM instructions are temporary in nature and are present only for the time that the program is being used. RAM instructions can be updated.

There are two vital types of RAM

1. Static RAM [SRAM]   : It retains stored information till computer is under Working.
2. Dynamic RAM [DRAM]: It loses its stored information in a very short span of time even though computer is under working.

ROM:

It is permanent memory storage, as the name suggests, is that part of the memory which is only 'Read' by the computer. This memory is non-volatile, has fixed instructions on it. Instructions are related to the operating system of computer. These instructions are written by machine manufacturers and these instructions cannot be updated by the user.

When you turn on the system, the ROM instructions are instantly activated to get activated of all Input /Output Devices.

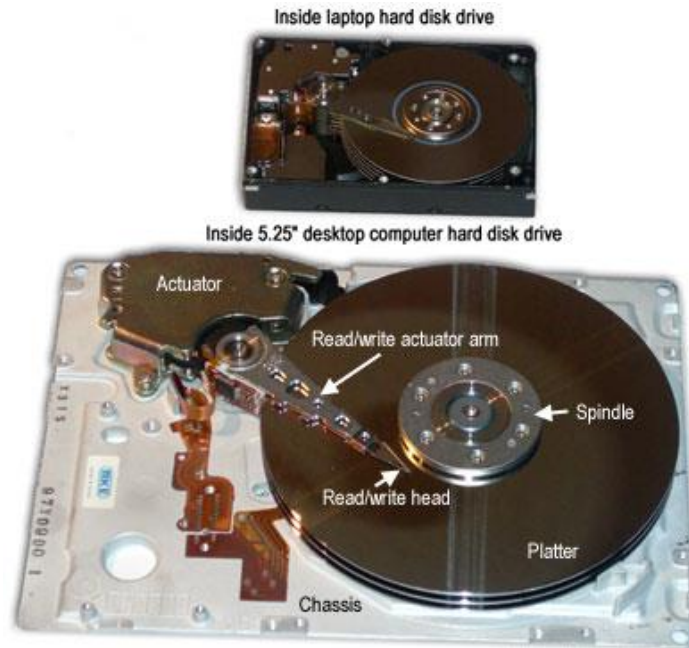| RAM	ROM
1. Random Access Memory	1. Read-only memory
2. RAM instructions are temporary in nature	2. ROM instructions are permanent in nature
3. Random Access Memory or RAM is a form of data storage that can be accessed randomly at any time, in any order and from any physical location. Allowing quick access and manipulation.	3. Read-only memory or ROM is also a form of data storage that cannot be easily altered or reprogrammed. Stores instructions that are not necessary for re-booting up to make the computer operate when it is switched off. They are hardwired.
4. Instructions can be updated (Add, modify, delete) by user	4. Instructions cannot be updated by user.
5. RAM is volatile i.e. its contents are lost when the device is powered off.	5. It is non-volatile i.e. its contents are retained even when the device is powered off
6. The two main types of RAM are static RAM and dynamic RAM.	6. The types of ROM include PROM, EPROM and EEPROM
7. A RAM chip can store multiple gigabytes (GB) of data, up to 16 GB or more per chip	7. A ROM chip typically stores only several megabytes (MB) of data, up to 4 MB or more per chip.

Secondary storage device:

Alternatively referred to as **external memory** and **auxiliary storage**, **secondary storage** is a storage medium that holds information until it is deleted or overwritten regardless if the computer has power. For example, a floppy disk drive and hard disk drive are both good examples of secondary storage devices. As can be seen by the below picture there are three different storage on a computer, although primary storage is accessed much faster than secondary storage because of the price and size limitations secondary storage is used with today's computers to store all your programs and your personal data.
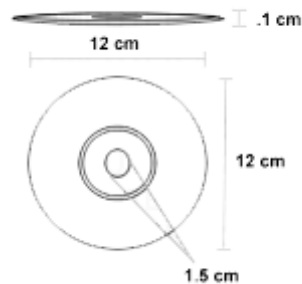
Hard drive

The computer's main storage media device used to permanently store all data on the computer. Also referred to as a **hard disk drive** or abbreviated as **HD** or **HDD**, the **hard drive** was first introduced on September 13, 1956 and consists of one or more hard disk platters inside of air sealed casing. Most hard drives are permanently stored in an internal drive bay at the front of the computer and are connected with either ATA, SCSI, or a SATA cable and power cable. Below is an illustration of the inside of a hard disk drive.

Inside laptop hard disk drive

Inside 5.25" desktop computer hard disk drive

Actuator

Read/write actuator arm

Spindle

Read/write head

Platter

Chassis

Compact Disc

CD-ROM DISK SPECIFICATIONS

.1 cm

12 cm

12 cm

1.5 cm

Abbreviated as **CD**, a **compact disc** is a flat round storage medium that is read by a laser in a CD-ROMdrive that was first created by A Philips on August 17,1982. The standard CD is capable of holding 72 minutes of music or 650 MB of data. 80 minute CDs are also commonly used to store data and are capable of containing 700 MB of data.

DVD

Short for either **Digital Versatile Disc** or **Digital Video Disc**, **DVD** or **DVD-ROM** is a disc drive that allows for large amounts of data on one disc the size of a standard Compact Disc. DVD drives were first sold in 1997 and today are widely used for storing and viewing movies and other data. To play a DVD on a computer a user must have a DVD drive as well as a DVD player, which is a software program designed to play and control a DVD disc. The movie Twister became the first featured film put on DVD on March 25, 1996.

BD

Blu-ray blue laser
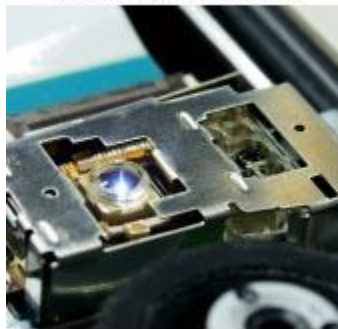
Short for **Blu-ray Disc**, **BD** or **BD-ROM** is an optical disc jointly developed by thirteen consumer electronics and PC companies such as Dell, Hitachi, Hewlett Packard, LG, Mitsubishi, Panasonic, Sony, TDK, and more. The Blu-ray was first announced and introduced at the 2006 CES on January 4, 2006 and is capable of storing up to 25 GB on a single-layer disc and 50 GB on a dual-layer disc, each disc being the same size as a standard CD. In the picture to the right, is an example of what the blue laser looks like in a Blu-ray disc player.

Today, Blu-ray is backed by Apple, Dell, Philips, Pioneer, Sony, Sun, TDK and other companies mentioned above and beat out HD DVD in the high-definition disc format wars on February 19, 2008 after HD DVD called it quits.

USB

USB cable and port

Short for **Universal Serial Bus, USB** is a standard that was introduced in 1995 by Intel, Compaq,Microsoft and several other computer companies. USB 1.x is an external bus standard that supportsdata transfer rates of 12 Mbps and is capable of supporting up to 127 peripheral devices. In the picture to the right, is an example of a USB cable being connected into the USB port.

USB devices

Today, there are millions of different USB devices that can be connected to your computer. Below are just a few of the more common USB devices you'll likely find and use.

- Camera
- External drive
- iPod or other MP3 player
- Keyboard
- Microphone
- Mouse
- Printer
- Joystick
- Jump drive aka Thumb drive
- Scanner
- Webcams

USB 2.0, also known as **hi-speed USB**, was developed by Compaq, Hewlett Packard, Intel, Lucent, Microsoft, NECand Philips and was introduced in 2001. Hi-speed USB is capable of supporting a transfer rate of up to 480 Mbps and is backwards compatible, meaning it is capable of supporting USB 1.0 and 1.1 devices and cables.

USB flash drive

A USB flash drive consists of a flash memory data storage device integrated with a USB (Universal Serial Bus) interface. USB flash drives are typically removable and rewritable, and physically much smaller than a floppy disk. Most weigh less than 30 g (1 oz). Storage capacities in 2010 can be as large as 256 GB with steady improvements in size and price per capacity expected. Some allow 1 million write or erase cycles and offer a 10-year shelf storage time.

USB flash drives are often used for the same purposes for which floppy disks or CD-ROMs were used. They are smaller, faster, have thousands of times more capacity, and are more durable and reliable because of their lack of moving parts. Until approximately 2005, most desktop and laptop computers were supplied with floppy disk drives, but floppy disk drives have been abandoned in favor of USB ports.

USB Flash drives use the USB mass storage standard, supported natively by modern operating systems such as Linux, Mac OS X, Windows, and other Unix-like systems. USB drives with USB 2.0 support can store more data and transfer faster than a much larger optical disc drives like CD-RW or DVD-RW drives and can be read by many other systems such as the Xbox 360, PlayStation 3, DVD players and in some upcoming mobile smart phones.

Chapter – 4

NETWORKING

Learning Objective

At the end of this module you should be able to understand

- Types of Network (LAN, WAN, MAN)
- Topology (Bus, Star, Ring, Mesh & Tree)
- Network Hardware- (Cables- RJ45, RJ 11, MTRJ, Switch, Routers, Access Point, Modem)
- IP, and MAC address, Subnet, Gateway, DNS
- Understanding Network address & Node Address
- Network Security- Firewalls (Hardware & Software)
- Bandwidth

Types of Network (LAN, WAN, MAN)

Today's age is of Information Superhighway. Everybody requires the information to access and send across the world. In earlier days, work is done on a stand-alone machine, which stores data independently. To access the data the same machine required. If it is busy with any other work, it is quite impossible to access the information from it on the other machines that are not at work. This leads to the formation of the Network among the machines.

Classification by Geographical Spread

Based on geographical spread, networks can be classified into the following three categories.

- Local Area Network (LAN)
- Metropolitan Area Network (MAN)
- Wide Area Network (WAN)

Local Area Network (LAN) : LAN is a computer network that consists of few or more computers and other communication devices connected in the form of a network within a well-defined area such as a room or a building. A typical example is a college or university computer network. Users in a LAN can share both hardware and sharable software resources. For example, hardware resources include expensive laser printer, plotter, fax machines, modem, etc. Almost all local area networks use a single communication media, as it is restricted to a limited area. All network resources and their management activities are controlled by means of special system software called Network Operating System (NOS).

Metropolitan Area Network (MAN) : MAN is a network larger than a LAN. The name metropolitan is due to the ability to cover a relatively larger area of a city, from a few tens to a maximum of hundred kilometers. Different hardware and transmission media are often used in a MAN for efficient transmission of information

Wide Area Network (WAN) : WAN is a computer network that spans a large geographical area. It uses dedicated or switched connections to link computers in geographically remote locations Wide area networks are implemented to connect large number of LANs and MANs. Due to this reason, it is possible to see a large number of heterogeneous components in a wide area network. Different communication media are used and the network spreads across several national boundaries. Computers connected to a WAN are often connected to a public network. They can also be connected through leased lines or satellite links. WAN is mostly used by government or large concerns because of the huge investment made to implement them.

Topological Classification

A second possible way to classify computer networks is based on the underlying topology used for constructing the networks. *Topology* is defined as the geometrical arrangement of nodes. Node refers to various computer resources and communication devices. The following are the different classes of network based on the topological structure.

- Bus Network
- Star Network
- Ring Network
- Mesh Network
- Tree Network

Bus Network : In a bus network, all nodes are connected to a single communication channel called bus. It is also referred as a time-shared bus. The bus permits only one pair of nodes to establish communication at a time. This property restricts the total number of nodes connected to form a reliable bus network. However, many protocols were developed for a bus to make communication more efficient and reliable. CSMA/CD and Token bus protocols are good examples. The structure of a bus network is shown in Figure.

Advantage of a bus network is its ability to connect any number of nodes without extensive hardware. Nodes can also be removed from the bus easily. It is easy to maintain the bus network.

Bus Network
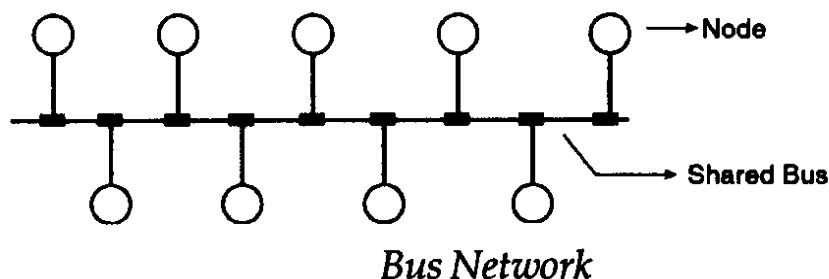
Star Network : In a star network, each node is connected by means of a dedicated point-to-point channel to a central node called server that acts as a switch. The central server provides the connectivity for all pair of nodes willing to communicate with each other. If the central server fails, the whole network also fails. The transmission media may be a twisted pair, coaxial cable, or optical fibre. Structure of a star network is shown in Figure. Some of the advantages of a star network are:

- Easy implementation
- Centralized control
- Simple access protocols

Star networks suffer from the problem of central node failure; also, they require long cable length; each new device requires an exclusive cable. Campus PBXs are often implemented using star network topology.
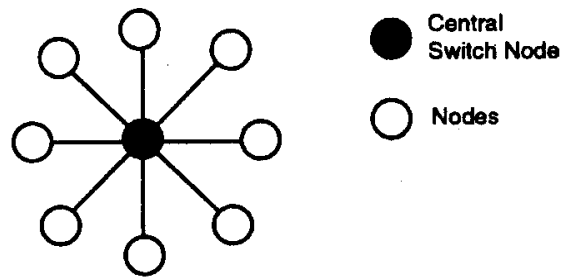
Star Network

Ring Network : Nodes in a ring network are connected in the form of a closed loop. A single communication channel is often implemented to provide the connectivity. Data from the sending node circulates around the ring until it reaches the destination. A ring can be unidirectional or bi-directional. In an unidirectional ring, data moves in one direction only. In a bi-directional ring, data moves in both directions, but in one direction at a time. Single node failure may paralsee the transmission of data to a set of nodes in a unidirectional ring. But messages can be sent to nodes in either side of the affected node.
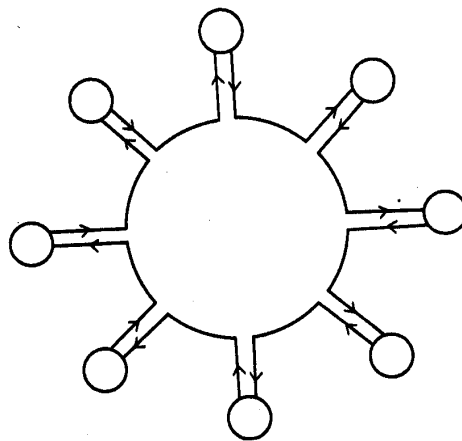
Ring Network

Ring network with a method called token passing (Token Ring) was proposed by IBM and approved by IEEE as one of the standard for LAN. Advantages of a ring network are its short cable length, suitability for optical fiber implementation, and its flexibility to include new nodes (Network expansion). Drawbacks include the failure of entire network in the presence of a single node failure, difficulty in diagnosing faults, and its non-adaptability to structural changes.

Mesh Network : In a mesh network, each pair of nodes is connected by means of an exclusive point-to-point link. Each node requires a separate interface to connect with the other device. Mesh networks are seldom constructed in practice. They are useful in situations, where one node or station frequently sends messages to all other nodes. Otherwise, a considerable amount of network bandwidth is wasted. The advantages are excessive amount of bandwidth and Inherent fault-tolerance. The structure of a mesh network is shown in Figure
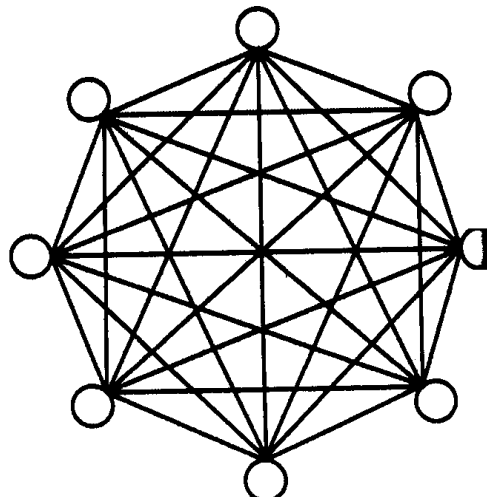
Mesh Network

Tree Network : A tree network is another form of bus. Several nodes are connected into a hierarchical form as shown in diagram

The root node may be a powerful server or a mainframe computer often called a head-end. Tree networks are suitable for organizations, where head offices communicate with regional offices and regional offices communicate with remote offices. Advantages of a tree network are its ease of expansion, identification, and isolation of faulty nodes. It also suffers from the problem of the network being highly dependent on the root node.
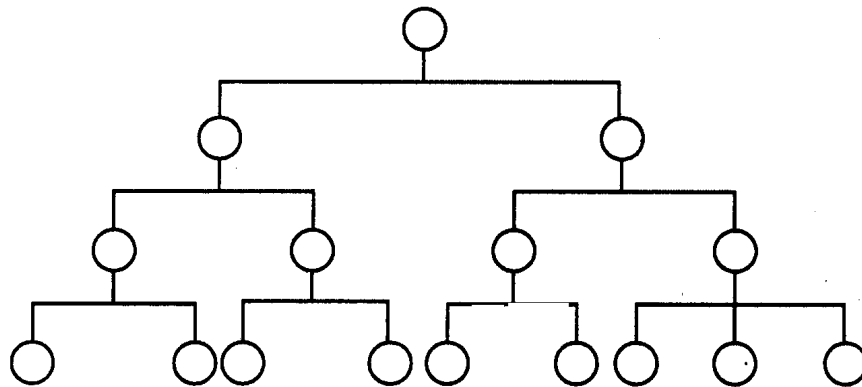

Hierarchical or Tree Network

Network Hardware:

Networking hardware, also known as network equipment or computer networking devices, are physical devices which are required for communication and interaction between devices on a computer network. Specifically, they mediate data in a computer network. Units which are the last receiver or generate data are called hosts or data terminal equipment.

Registered Jack 45 (RJ45) : An 8-pin/8-position plug or jack is commonly used to connect computers onto Ethernet-based local area networks (LAN). Two wiring schemes–T568A and T568B–are used to terminate the twisted-pair cable onto the connector interface.
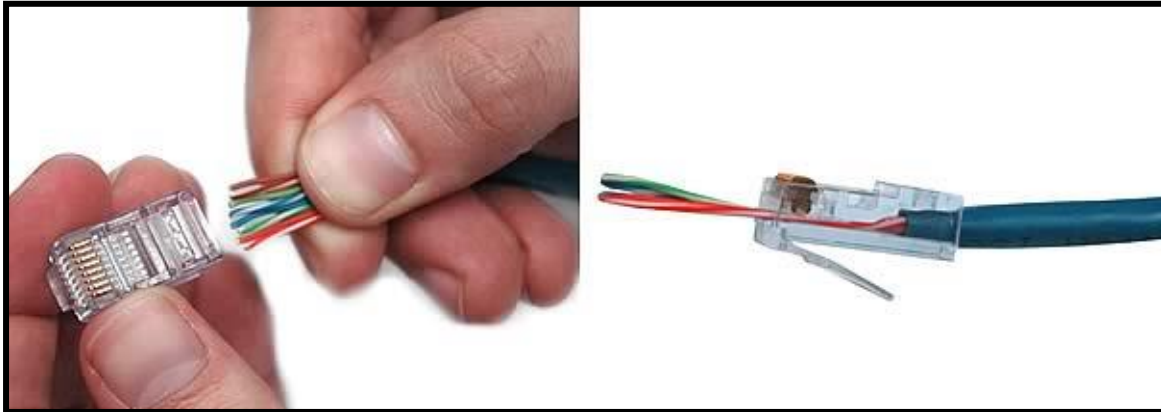
Modern Ethernet cables feature small plastic plugs on each end that are inserted into RJ45 jacks of Ethernet devices. The term "plug" technically refers to the cable or "male" end of the connection while the term "jack" refers to the port or "female" end.

Registered Jack-11 (RJ 11) : A telephone interface that uses a cable of twisted wire pairs and a modular jack with two, four or six contacts. RJ-11 is the common connector for plugging a telephone into the wall and the handset into the telephone.

RJ11 Modular Plugs

MTRJ : MT-RJ stands for Mechanical Transfer Registered Jack. MT-RJ is a fiber-optic Cable Connector that is very popular for small form factor devices due to its small size. Housing two fibers and mating together with locating pins on the plug, the MT-RJ comes from the MT connector, which can contain up to 12 fibers.

SWITCH : A network switch (also called switching hub, bridging hub, officially MAC bridge) is a [computer networking device](#) that connects devices together on a [computer network](#) by using [packet switching](#) to receive, process, and forward data to the destination device. Unlike less advanced [network hubs](#), a network switch forwards data only to the devices that need to receive it, rather than broadcasting the same data out of each of its ports.

ROUTERS : Routers are small electronic devices that join multiple computer networks together via either wired or wireless connections.

How Routers Work

In technical terms, a router is a Layer 3 network gateway device, meaning that it connects two or more networks and that the router operates at the network layer of the OSI model.
Routers contain a processor (CPU), several kinds of digital memory,and input-output (I/O) interfaces.

ACCESS POINT : In a wireless local area network (WLAN), an access point is a station that transmits and receives data (sometimes referred to as a transceiver). An access point connects users to other users within the network and also can serve as the point of interconnection between the WLAN and a fixed wire network. Each access point can serve multiple users within a defined network area; as people move beyond the range of one access point, they are automatically handed over to the next one. A small WLAN may only require a single access point; the number required increases as a function of the number of network users and the physical size of the network.

MODEM : A modem is a hardware device that allows a computer to send and receive data over a telephone line or a cable or satellite connection. In the case of transmission over an analog telephone line, which was once the most popular way to access the internet, the modem converts data between analog and digital formats in real time for two-way network communication. In the case of the high-speed digital modems popular today, the signal is much simpler and doesn't require the analog-to-digital conversion

IP ADDRESS : An Ip address or Internet Protocol address is the address assigned to your mobile, printer or computer by the network that uses Internet protocol for communication . Your IP can change with the change in network.IP addresses are divided into classes . A,B,C,D,E mostly we use class B and D

If you want to find your IP address open command prompt
windows->type cmd or
windows->run->cmd
and enter **ipconfig** on windows or **ifconfig** in our linux or mac terminal you will find your IP4 and IP6 address

MAC ADDRESS : Mac address is your machine address . This address will never change, It is the unique machine address given to your device . Your device will have communication with the local area network or any network using this address . Once you use the network your mac address is stored in the network table so that network does not have to search your mac address again and again and shortest path towards it will be stored in routing table . That's why never feel that no one will come to know if you use your neighbours wifi, remember that router stores everything, it's a smart and intelligent gateway.

SUBNET : A subnet (short for "subnetwork") is an identifiably separate part of an organization's network. Typically, a subnet may represent all the machines at one geographic location, in one building, or on the same local area network (LAN). Having an organization's network divided into subnets allows it to be connected to the Internet with a single shared

network address. Without subnets, an organization could get multiple connections to the Internet, one for each of its physically separate subnetworks, but this would require an unnecessary use of the limited number of network numbers the Internet has to assign. It would also require that Internet routing tables on gateways outside the organization would need to know about and have to manage routing that could and should be handled within an organization.

GATEWAY: A gateway is a network node that connects two networks using different protocols together. While a bridge is used to join two similar types of networks, a gateway is used to join two dissimilar networks.
The most common gateway is a router that connects a home or enterprise network to the internet. In most IP-based networks, the only traffic that doesn't go through at least one gateway is traffic flowing among nodes on the same local area network (LAN) segment -- for example, computers connected to the same switch.

DNS: Short for Domain Name System (or Service or Server), an Internet service that translates domain names into IP addresses. Because domain names are alphabetic, they're easier to remember. The Internet however, is really based on IP addresses. Every time you use a domain name, therefore, a DNS service must translate the name into the corresponding IP address. For example, the domain name www.example.com might translate to 198.105.232.4. The DNS system is, in fact, its own network. If one DNS server doesn't know how to translate a particular domain name, it asks another one, and so on, until the correct IP address is returned.

NETWORK ADDRESS : The network address is the first address in a range of IP addresses and is used to communicate with all network devices on a particular network. The network address contains zeroes in the host portion of the IP address.
Example Network Address
The network address in a range of IP addresses always contains all zeroes in the host portion of the address as shown below:

192	.	168	.	1	.	0
11000000		10001010		00000001		00000000

The network address is important to network equipment, to routers and to routing. Network addresses are used to represent destination networks in routing tables.

NODE ADDRESS: A node or node address is a name or number that identifies a specific computer or terminal in a group of interconnected computers on a network.

FIREWALLS : Most of the computer users are familiar with the term Firewall. Firewalls are *Hardware or Software* programs that monitor incoming and outgoing connections analyzing the packet data for malicious behavior. Like the definition says, there are both Software and Hardware Firewall. In this modern age, we are literally at war with hackers and malware and

virus developers, all the time and data security has become the number one concern. To protect our computers, we use security software like AntiVirus and Firewalls – and as we just mentioned, there are two kinds of firewalls – Hardware firewalls and Software firewalls.

HARDWARE FIREWALL : Hardware Firewalls are mostly seen in broadband modems, and is the first line of defense, using Packet Filtering. Before an Internet packet reaches your PC, the Hardware Firewall will monitor the packets and check where it comes from. It also checks if the IP address or header can be trusted. After these checks, the packet then reaches your PC. It blocks any links that contain malicious behavior based on the current Firewall setup in the device. A Hardware Firewall usually does not need a lot of configuration. Most of the rules are built-in and predefined and based on these inbuilt rules; the Packet Filtering is done.

SOFTWARE FIREWALL : Now that we know how Hardware Firewalls work, I'll talk a bit Software Firewalls. To be honest, Software Firewalls do not need a whole lot of explanation because most of us are aware of it and are already using it. Like I said in the Hardware Firewall section if the user is not tech savvy and if they choose to allow a connection that has Malware behavior, it could ruin the entire network and put the company in risk with data security. That's where software firewall comes into the picture, as here can we block both incoming and outgoing connections and setup trusted rules so these accidents can be avoided. Firewall vendors constantly research in this matter and see out updates as and when required, so the chances of your computer getting compromised are slim.

Chapter – 5

INTERNET

Learning Objective

At the end of this module you should be able to understand

- Intranet, Internet & Extranet
- WWW, HTTP, Domains
- VPN & VoIP
- Search Engines
- ISP
- Bandwidth

History of the Internet

The history of the Internet can be traced to an early network known as ARPANET. ARPANET was created in the late 1960s by the Department of Defense's ARPA (Advanced Research Projects Agency.) ARPANET initially connected computers at the University of California Los Angeles and the Stanford Research Institute. The Internet evolved from ARPANET and the

theory of open architecture networking, meaning internet working different networks regardless of the network technology they used.

An **INTRANET** is a network that is used by a single organization, such as a corporation or school, and is only accessible by authorized users.
The purpose of an intranet is to share information. However, a firewall is also used to lock out unauthorized users.

A firewall is a network security system that prevents unauthorized network access. An extranet extends an intranet by providing various levels of accessibility to authorized members of the public. For example, a corporation may extend their intranet to provide access to specific information, such as their ordering system, to registered customers.

The largest and most widely accessed network is the Internet, a worldwide network of computers that is not controlled by any one organization. The Internet has had an undeniable impact on modern society because it allows users worldwide to communicate in a matter of seconds.

The **Internet** is actually numerous networks all linked together through routers. A router is a device that connects different network technologies. Networks connected to routers use TCP/IP (Transmission Control Protocol/Internet Protocol) software to communicate.

Computers on the Internet are either servers or clients. The client is sent information from a server. The client/server structure of the Internet is called interactive because the information accessed is a result of selections made by the user. For example, a computer with just minimal software for accessing the Internet is a client. The client user selecting options from the Internet is receiving the information from a server, a computer with additional software and files that is also connected to the Internet.

An **extranet** is a controlled private network that allows access to partners, vendors and suppliers or an authorized set of customers – normally to a subset of the information accessible from an organization's intranet. An extranet is similar to a DMZin that it provides access to needed services for authorized parties, without granting access to an organization's entire network. An extranet is a private network organization.

Historically the term was occasionally also used in the sense of two organizations sharing their internal networks over a VPN.

The World Wide Web (WWW or W3)
 is a global collection of websites and pages that may contain text, graphics, sound and video. A common feature of websites is that the use of hyperlinks which allow users to click on an item on a page which links directly to another web page. There are virtually no regulations regarding the content of the WWW, so anyone with the appropriate software and hardware can create a website on any topic.

The World Wide Web, which is often referred to merely as the 'Web', was first developed by CERN located near Geneva near Switzerland. Web provides a common front-end interface that can be used on diverse hardware platforms and IT environments, with the additional innovation of hypertext tools and techniques which the contents of a document to be linked and cross-referenced by embedding a unique web address into pages of information that can in turn be

called up by someone browsing the information. A hypertext link can be marked by highlighting a keyword and which can be clicked on with a mouse to link to a related document or an information page. The further advantage of the Web is that it offers interactive multimedia features, such as photographs, graphics, icons, sound and video that can be incorporated and embedded into individual textual web pages. In order to achieve the hypertext and multi-media context of the Web the scientists at CERN developed two specialist software language applications known as:

1. **HTML**: HTML permits users to design web pages, and other documents, with all the necessary hypertext links to other pages and documents. The links can be local or over global networks.
2. **HTTP**: HTTP is a web communication protocol that handles the transfer of data over the Internet. When a client opens a connection to a web server, an HTTP header is sent which contains a command to, for example, get or input data. The server transmits a message back to the client which includes the format of the data being returned. This allows the browser to display different types of data such as text, images and HTML.

Electronic commerce (ecommerce) is a type of business model, or segment of a larger business model, that enables a firm or individual to conduct business over an electronic network, typically the internet. Electronic commerce operates in all four of the major market segments: business to business, business to consumer, consumer to consumer and consumer to business. It can be thought of as a more advanced form of mail-order purchasing through a catalog. Almost any product or service can be offered via ecommerce, from books and music to financial services and plane tickets.

Why is hotel e-commerce so important today?

It accelerates Internet usage worldwide.

The Internet is the lowest cost hotel-booking channel.

Most travelers research hotel reservations on the Internet.

Social media and online hotel reviews are an increasingly important decision factor.

Domain Name:

Internet address often looks like an abbreviated postal address with the parts of the address separated by periods.

Domain names are used to identify one or more IP addresses. For example, the domain name microsoft.com represents about a dozen IP addresses. Domain names are used In URLs to identify particular Webpages. For example, in the URL http://www.pcwebopedia.com/index.html, the domain name is pcwebopedia.com.
Every domain name has a suffix that indicates which top level domain (TLD) it belongs to. There are only a limited number of such domains.
For example:
1. gov - Government agencies
2. edu - Educational institutions

3. org - Organizations (nonprofit)
4. mil - Military
5. com - commercial business
6. net - Network organizations
7. ca – Canada
8. th – Thailand

Because the Internet is based on IP addresses, not domain names, every Web erver requires a Domain Name System (DNS) server to translate domain names into IP addresses.

VPN :

A **virtual private network** (**VPN**) is a network that uses primarily public telecommunication infrastructure, such as the Internet, to provide remote offices or traveling users access to a central organizational network.

VPNs typically require remote users of the network to be authenticated, and often secure data with encryption technologies to prevent disclosure of private information to unauthorized parties.

VPNs may serve any network functionality that is found on any network, such as sharing of data and access to network resources, printers, databases, websites, etc. A VPN user typically experiences the central network in a manner that is identical to being connected directly to the central network. VPN technology via the public Internet has replaced the need to requisition and maintain expensive dedicated leased-line telecommunication circuits once typical in wide-area network installations.
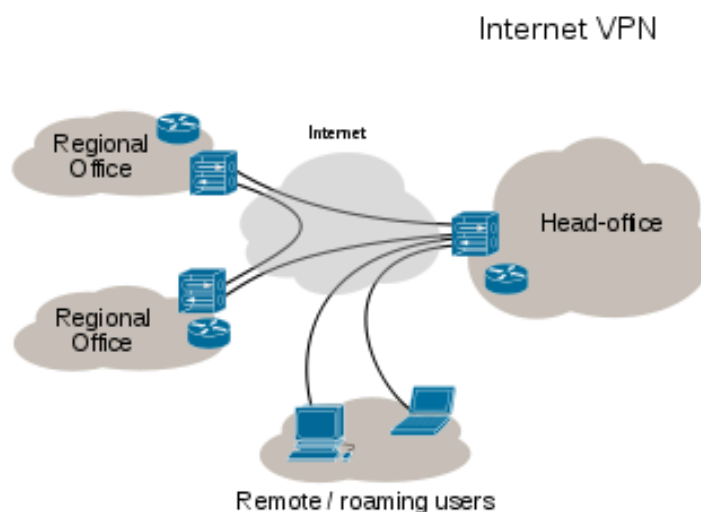
VoIP

VoIP is just a fancy acronym. The letters in VoIP stand for Voice-over-Internet Protocol. In a nutshell, VoIP allows you to make phone calls over the Internet. You still use your telephone the same as before, but instead of plugging your phone into the socket on your wall, you plug it into the back of your modem or router (the box thing that connects your computer to the internet) instead. For most people, using VoIP means much cheaper call rates. To use VoIP you'll need a broadband connection and a VoIP enabled modem or router.

Search Engine:

A web search engine is designed to search for information on the World Wide Web and FTP servers. The search results are generally presented in a list of results and are often called hits. The information may consist of web pages, images, information and other types of files. Some search engines also mine data available in databases or open directories. Unlike web directories, which are maintained by human editors, search engines operate algorithmically or are a mixture of algorithmic and human input.

Example:

1) Google.com
2) Yahoo.com
3) Webcrawler.com
4) Bing.com
5) Altavista.com

ISP:

An ISP (Internet service provider) is a company that provides individuals and other companies access to the Internet and other related services such as Web site building and virtual hosting. An ISP has the equipment and the telecommunication line access required to have a point-of-presence on the Internet for the geographic area served. The larger ISPs have their own high-speed leased lines so that they are less dependent on the telecommunication providers and can provide better service to their customers. Among the largest national and regional ISPs are AT&T WorldNet, IBM Global Network, MCI, Netcom, UUNet, and PSINet.

Bandwidth:

In computer networks, bandwidth is often used as a synonym for data transfer rate - the amount of data that can be carried from one point to another in a given time period (usually a second). This kind of bandwidth is usually expressed in bits (of data) per second (bps). Occasionally, it's expressed as bytes per second (Bps). A modem that works at 57,600 bps has twice the bandwidth of a modem that works at 28,800 bps. In general, a link with a high bandwidth is one that may be able to carry enough information to sustain the succession of images in a video presentation.