Unit :1 - Information Technology

Notes

Structure

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Objectives

- To understand the definition of a computer and its various components.
- To understand the concept of memory and its capacities.
- To define Database Management Systems along with its components and understand the facilities available in it.
- Explain the representation of data in secondary storage device.
- Define data communication and concept of transmission modes.
- Understand different transmission media.
- Explain concept of networking and internet along with its terminology.
- Explain the multimedia and its creation along with its application in various fields.
- Describe E-commerce along with its characteristics and types.
- Describe EDI and its implementation.

1.0 Introduction

A computer is an electronic device made up of electronic circuits and wires, etc. In the modern age, computer is the most advanced tool for solving wide range of practical problems. More precisely, “a computer is an electronic device which works under the instructions of stored programmes, automatically accepting result or output of that processing”.

It manipulates the number of symbols, which it accepts input, processes this input and reproduces this as output in a formatted manner. The word Computer has been derived from the word COMPUTE.

Any computer must have a place for holding the instructions and data on which the programme will operate. The place, which is used for this purpose is called memory and most often it is referred to as Main Memory.

Computer

1.1 Fundamentals of Computer Architecture

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Speed: Computers can calculate at very high Speeds.

Storage: Computers have their main memory and auxiliary memory systems. A computer can store a large amount of data.

Accuracy: The accuracy of a computer system is very high.

Versatility: Computers are very versatile machines. They can perform activities ,ranging from simple calculations to performing complex CAD modeling and simulation for navigating missiles and satellites.

Automation: Computers can be programmed to perform a series of complex tasks, involving multiple programmes. Computers can perform things flawlessly.

Diligence: Diligence means being constant and earnest in effort and application.

Computer Uses:

Military application: The first digital computers, with their large and cost, mainly performed scientific calculations, often to support military objectives.

Creative Art: They have also been used for entertainment, with video games becoming a huge industry.

Robotics: Computers have been used to control mechanical devices since they became small and chief.

Net working and the Internet: Computers have been used to coordinate information in multiple locations.

Different types of Computer Systems

Super Computers: The mightiest computers, and of course the most expensive are known as Super Computers. They process billions of instructions per second. One uses super computers for tasks that require mammoth data manipulation, such as worldwide weather forecasting and weapons research.

Main Frame: In the jargon of the computer trade, large computers are called main frame. Main frame are capable of processing data at very high speeds – millions of instruction per second and have access to billions of characters of data. The principal use of it is for processing vast amounts of data quickly.

Personal Computer: Personal Computer are often called as PC. A PC is based on a microprocessor originally made by the Intel Company with other companies such as – AMD. PCs usually use an operating system.

MAC: The computers made Macintoshes which uses power PC processer made by Motorola are referred as MAC. Macintoshes use operating system, called MAC OS created Apple.

The Generation of the Computer

A generation refers to the state of improvement in the development of a product. It also is used for major state of different advancements/achievements of computer technology. With each new generation, the circuitry has become smaller and more advanced than the previous generation before it. The time span of era of computer generation may vary in different prospects.

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a. The First Generation : 1946 – 1958 (The Vacuum Tube Years)

The first generation of computers were huge, slow , expensive and often undependable and used Vacuum Tubes in CPU's.

In 1946 two Americans, Presper Eckert and John Mauchly, built the ENIAC electronic computer which used vacuum tubes instead of the mechanical switches of the Mark I. The ENIAC used thousands of vacuum tubes, which took up a lot of space and gave off a great deal of heat.

First generation computers relied on machine language to preform operations and they could only solve one problem at a time.

Input was based on punched cards and paper taps and output was displayed on printouts.

b. The Second Generation : 1959 – 1964 (The Era of the Transistor)

33 Transistors replaced vacuum tubes and ushered in the second generation of computers.

In 1947 three scientists, John Barden, William Shockley, and Walter Brattain, working at AT&T's Bell Labs, invented the transistor the which functions like a vacuum tube.

The transistor was faster, more reliable, smaller and much cheaper to build than vacuum tube.

Second generation computers moved from cryptic binary machine language to symbolic or assembly languages. High level programming languages such as versions of COBOL and FORTRAN were also developed at this time.

c. The Third Generation: 1965-1970 (Integrated Circuits – Miniaturising the Computer)

Integrated Circuits (IC) have started replacing transistors.

The integrated circuits, or as it is sometimes referred to as semiconductor chip, packs a huge number of transistors onto a single wafer of silicon. Placing such large numbers of transistors on a single chip vastly increased the power of a single computer.

Instead of punched cards and printouts, users interacted with third generation computers through keyboards and monitors and interfaced with an operating system, which allow the device to run may different applications at one time with a central programme that monitore the memory.

Computers, for the first time, became accessible to a mass audience because they were smaller and cheaper than their predecessors.

d. The Fourth Generation: 1971- Today (The Microprocessor)

This generation can be characterised by both the jump to monolithic integrated circuits (millions of transistors put onto one integrated circuit chip) and the invention of the microprocessor.

By putting millions of transistors onto on a single chip, more calculation and faster speeds could be reached by computers.

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Microprocessors moved out of the realm of desktop computers and into many areas of life as more and more everyday products began to use microprocessors.

As these small computers became more powerful, they could be linked together to form networks, which eventually led to the development of the Internet.

Fourth generation computers also saw the development of GUIs, the mouse and handheld devices.

e. **Fifth Generation – Present and Beyond :** Artificial Intelligence:

Fifth generation computing devices, based on artificial intelligence, are still in development, through there are some applications, such as voice recognition, that are being used today.

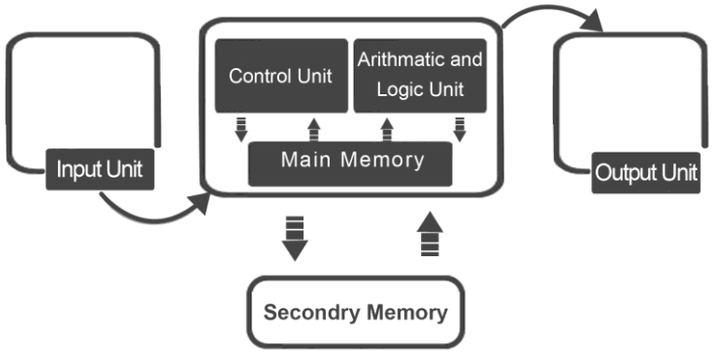
The use of parallel processing and superconductors is helping to make artificial intelligence a reality.

The goal of fifth generation computing is to develop devices that respond to natural language input and are capable of learning and self-organisation.

Components of Digital Computer

A digital computer can be broadly classified as a collection of the following components are –

- Input unit
- Central Processing Unit
- Output Unit
- Secondary memory



Block Diagram of Computer

The Input Unit

The Input Unit provides an interface between the users and the machine, for inputting data and instructions etc. One of the most common examples is the keyboard. Data can be input in many more forms – audio, visual, graphical, etc. Some common input devices are – Keyboard, Mouse, Joystick, Light pen and Scanner.

The data in many forms is first digitised, i.e., converted into binary form, by the input device before being fed to the Central processing Unit (CPU).

Central Processing Unit (CPU): Most important part of a computer system. It interprets the instructions in the programme and executes these one by one. It consists of three major units which are:

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- **Control unit:** It controls and directs the transfer of programme instructions and data between various units.
- **Arithmetic and Logic unit (ALU):** Performs arithmetic operations like (+, -, *, ^, /), logical operations like (AND, OR, NOT) and relational operations like (<, >, <=, >=).
- **Registers:** They are used to store instructions and data for further use.

The Output Unit

Like the Input Unit, the Output also provides an interface between the user and the machine. A common example is the visual display unit (monitor) of a personal computer. The output unit receives the data from the CPU in the form of binary bits. This is then converted into the desired form (graphical, audio, visual, etc., understandable by the user. Some common output devices are Visual Display unit (Monitor), Printers, Speakers, Secondary Storage Devices.

The input and output unit collectively are referred to as 'peripherals'.

Memory Systems

By memory system, we mean some storage device along with information on how to manage and control these storage devices.

Even computer system must have memory to store and retrieve the instructions and data. A computer system can have different variety of memories to store the information which are required for operation. The information stored on computer is classified into two categories – instruction and data.

A memory system is a simple system, but it exhibits a wide range of technology and types. It has fast, as well as slow, memories. Different technologies are employed to manufacture these memories. The fast memories are expensive because the technology used to develop these it is expensive. Also, fast memories require continuous power supply as long as they have to store the data. The slow memories are cheap and they are slow because of high access time. The high access time results in slower operation of the CPU.

A word is a group of bits, which are stored and retrieved as a unit. A memory system is organised to store a number of words. A byte consists of 8 bits. A word may store one or more bytes. The storage capacity of a memory is the number of bytes it can store. The time taken to write a word is known as write time and the time to retrieve information is called as the Access Time of the Main Memory.

Capacity of Memory

In computers, the capacity of memory is measured in Mega Bytes, Byte is the smaller unit and means a set of 8 bits. Higher units are kilobytes, Mega bytes and Giga Bytes.

1 character	=	1 byte = 8 bits
1 kilobytes (KB)	=	1024 bytes or 210 bytes
1 Mega byte (MB)	=	1024 KB
	=	1024 X 1024 bytes or 220 bytes.
I Giga byte (GB)	=	1024 MB
	=	1024 X 1024 X 1024 bytes or 230 bytes

A memory system consists of three main groups of memories. These are –

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- Internal processor memory
- Primary Memory
- Secondary Memory

Primary Memory : This memory consists of some chips either on the mother board or on a small circuit board attached to the motherboard. This built – in memory allows the CPU to store and retrieve data very quickly. This built-in memory is called as main memory. There are two types of built-in memory –

Non-Volatile Memory and Volatile memory

Non Volatile Memory:

ROM: Read only memory, as the name specifies, there is no way of changing it, i.e., they are nonvolatile and in addition the data in them cannot be changed. Putting data permanently into this kind of memory is called “burning in the data”.

One of the main reasons that a computer needs, ROM is that it helps in knowing what to do when the power is first turned on. It contains a set of startup instructions that check to see that the rest of memory is functioning properly and look for an operating system and hardware devices. There are other types of ROM, viz, PROM, EPROM, EEPROM, which can be programmed after manufactured.

Volatile Memory:

RAM : Random Access Memory: Memory that can be changed is called RAM. The purpose of RAM is to hold programmes and data. Information can be read off a RAM chip and written to it. When a computer is switched off, any information stored in RAM is lost, i.e., memory is volatile. RAM is also called read/write memory or user memory. It is used to store user program and data.

Secondary Memory: These are also known as auxiliary memory or backup storage device. These are the slowest memories in memory hierarchy. They are very cheap and are used in bulk usually in terms in Giga Bytes. These are normally used for storage the big programs and huge software.

The secondary memory is permanent in nature, i.e., the information stored in these devices is not lost unless specifically deleted. Secondary storage devices being permanent in nature can also be used for transportation of data from one computer to another.

Magnetic Disk: Magnetic Disk is a rigid plastic disk coated with an oxide for easy magnetisation. The working principle is similar to the functioning of the gramophone records. The sound waves are converted to electromagnetic signals and stored on the record surface and while playing the reverse process occurs. In magnetic disk the data stored is in the form of magnetic spots.

Magnetic disk is, in fact, a pack of many plastic disks. These disks are placed together over one another to form a hard disk. One magnetic disk pack may consist of 5 or more disks which can be used from both the sides. All these disks are covered by a metallic shield to form one hard disk.

Hard Disk: A hard disk is a magnetic disk on which one can store computer data. Hard disk hold more data and a faster than floppy disk. A single hard disk usually consists of several platters. Each platter requires read/write heads, one for each side.

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All the read/write heads are attached to a single access arm so that they cannot move independently. Each platter has the same number of tracks, and the track location that cuts across all platters is called a cylinder. Hard disks are less portable than floppies, although it is possible to buy removable hard disk.

Compact Disk - Read only memory (CD_ROM): CD- ROM means Compact Disk-read only memory and are also known as optical disks. Usually they consist of a single removable plastic or metal disk coated on one side with tellurium. They are protected by a 1 mm layer of transparent plastic. In this storage device the information is stored in compact form. The data is stored in the form of minute pits which are burned into the tellurium coating with a laser beam. These pits which are too tiny in size 9about one micro) and are not visible by naked eyes, stored in tracks on disk.

These disks are read only i.e., the information stored in compact disk can only be read by the computer by unlike the floppy disks computer cannot store anything on these disk.

Information storage or writing on compact disks is possible by laser beam only. Normally the size of compact disk is 12cms in diameter. Approximately 20000 pages can be stored on a compact disk.

Input and Output Devices

Input Devices

On the basis of input, computer gives an output. Accurate input is therefore vital to protect these files from contamination. Some of the input devices are –

Keyboard: A computer keyboard is a peripheral partially modeled after the typewriter keyboard. Keyboards are designed for the input of text and characters and also to control the operation of a computer. Most of the more common keyboard layouts (QWERTY-based and similar) were designed in the era of the mechanical typewriters, so their ergonomics gad to be slightly compromised in order to tackle some of the technical limitations of the typewriters.

Keyboard

Mouse: Mouse is a small device held in hand and pushed along a flat surface. It can move the cursor in any direction. Mouse has a use in Windows and other graphical user Interface (GUI) applications.

Mouse

Scanners: Scanners allow us to transfer pictures and photographs to our computer. A scanner ‘scans’ the image from the top to the bottom, one line at a time and transfers it to the computer as a series of bits or a bitmap.

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Scanner

Bar Coding: In this method, small bars of varying thickness and spacing are printed on packages, books, badges, tags, etc., which are read by optical readers and converted to electrical pulses. The patterns of bars are unique and standardised.

Bar codes

Output Devices

Output devices are hardware components, which are used to display or print the processed information. We are discussing below the structure, working and uses of the common output devices.

Monitor or video Display unit (VDU): It provides visual display of data. They are of different types and have different display capabilities. Display capabilities are determined by a special circuit called the Adapter card. Some popular adapter cards are: Color Graphics Adapter (CGA), Enhanced Graphics Adapter (EGA), Video Graphics Array (VGA), Super Video Graphics Array (SVGA). The smaller dot that can be displayed is called a pixel. The number of pixels that can be displayed vertically and horizontally gives the maximum resolution of the monitor. The resolution of the monitor determines the quality of the display. The higher the resolution, the better is the quality.

Monitor

Printers: Printer is the most important output device, which is used to print information on paper. Printers are essential for getting output of any computer-based application

Types of printers

There are many types of printers, which are classified on various criteria. Printers can be broadly categorized into the following two types:

Impact Printers: The printers that print the characters by striking against the ribbon and onto the paper are called Impact printers. These printers are of two types –

a) Character Printer

b) Line Printer

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Dot Matrix Printer

Non-impact printer: The printers that print the characters without striking against the ribbon and onto the paper are called Non-impact printers.

Plotter: Plotter is an important output device, used to print high quality graphics and drawings. Although the graphics can be printed on printers, the resolution of such printing is limited on printers. Plotters are generally used for printing/drawing graphical images such as charts, drawing, maps, etc. of engineering and scientific applications.

Output can be of two forms Hardcopy and Softcopy

Hardcopy: Information output on to paper often produced at the same time that information is output in machine readable form or produced as a transient display on a visual display unit (VDU). Hardcopy is a permanent copy of a display image generated on an output device such as printer and which can be carried away.

Softcopy: Information that is displayed on a screen, given by voice, stored in a form that can't be read directly by a person as on magnetic tape, disk or microfilm.

1.2 Concept of Software & Languages

A computer system consists of Hardware and Software for its proper functioning.

Hardware represents the physical and tangible components of the computer i.e., the components that can be seen and touched. Input devices, output devices CPU, Hard disk are the examples of computer hardware.

Software represents the set of programs that govern the operation of a computer system and makes the hardware run.

Software can be classified into two categories – system software and application software.

Systems Software:

The programme that allow a computer to operate are collectively referred as Systems Software. The main systems software is the operating system, which start up the computer and control its operation. Common operating system tasks include setting up new hardware, allowing the users to run other software and allowing the users to manage the document to store on their computers. Without an operating systems computer cannot function. Common operating systems are Windows, Linux.

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Function of Operating System

Input/Output Operations

The operating system is responsible for handling various types of inputs, e.g., input from keyboard, input from mouse, etc., and various types of output in the appropriate manner. For instance, if the input is coming from the mouse, it requires different types of handling as compared to output coming from the keyboard. Similarly, if an output is targeted for the printer, it requires different types of handling as compared to output targeted for the monitor.

Handling File System

This task involves the making of decisions regarding the storage of files, i.e., where and how a particular file is to be stored, may be on pen drive or hard disk.

Allocation of Resources

This task aims at proper use of the resources available. For example, if multiple files are to be printed, then “who and the order in which this task will take place” will be decided by the operating system.

Detection of Errors

The operating system is also responsible for detecting any type of error that occurs and then properly handling it.

Language processors

In the beginning, when computers came into existence, there were no softwares available for users. They have to write programmes in machine level language. Writing a programme in machine level instructions was tedious and time-consuming. For every instruction, there was a unique string of 0’ and 1’s and for different machines, these instructions varied.

To overcome these problems some codes, known as Mnemonics codes were developed. Now these codes represent string of 0 and 1 in the form of words.

After some time, standardisation of some languages began. Due to this standardization, the codes were similar for all the machines. This made some translators to come into existence and they were called Compilers and Interpreters.

Compilers compile full programmes and generate machine level machine instructions which are written into new files, which need generation of instructions, for execution.

While using interpreter, line-by-line instructions are translated into machine instructions and are executed immediately. Complied programmes are faster than interpreted programmes. For debugging purpose, interpreters are more useful than compilers.

Utilities

Utilities are generally written and supplied by software developers of hardware manufacturers. These utilities are used by the users in their day-to-day operation. Some of the commonly used utilities are text editors and linkers debuggers.

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Application Software

A programme written for a specific area or application is called application software, Such application software which can be utilised by different users are general purpose applications.. They are called readymade application software, or simply packages.

Application software written for specific users is called tailor made application software. These application softwares satisfy the needs of a specific user only for example, payroll programme written for university and inventory programme written for a factory.

Programming Languages

The language of a computer, or method of representing information in a computer, is a collection of electrical pulses. A computer recognises only the presence and absence of a pulse and this leads to binary representation. For example, 0 represents the absence of a pulse and 1 its presence. A sequence of binary numbers has some specific meaning for the computer. Broadly, there are only two classes of programming languages.

a. Low level languages
b. High Level Languages

Any language used is called low level language or high level language, depending on how close they are to the language understood and used by the computer (0s and 1s – low) or to the language understood and used by people (English like language).

Machine level Language (Low level Language)

Machine level language or low level language is a programming language in which we write the instruction by using only 0s and 1s. Machine level languages are machine dependent. The machine language instructions are represented as a string of binary codes. The binary code of an instruction is known as machine code or machine language.

Assembly Level language

To overcome the problem of the machine level language, assembly level language was developed. In this language, some codes, known as Mnemonic codes, were developed. Now these codes represent strings of 0 and 1 in the form of words. For instance, ADD, SUB, for adding and subtracting and memory addresses were represented in the form of variable means. This made programming more easier than machine level languages. But still these codes were different for different machine. Assembly level language is also known as symbolic language.

High level language

High level language has English like sentences. These English like sentences are easily understood by users or programmers. That is why it is the most popular language.

This is a language in which the instructions are given to the computer by using certain letters of the English alphabet, words and conventional mathematical notations. By using high level language, a programmer saves himself from a great deal of time and efforts. However, a computer cannot understand high level language directly So there is need for conversion from high level language to machine level language.

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1.3 Database Management Systems

1.3.1 Introduction

A database is a collection of related information stored so that it is available to many users for different purposes. The content of a database is obtained by combining data from all the different sources in an organisation so that the data is available to all users and redundant data can be eliminated or at least minimised. A computer database gives us some electronic filing system which has a large number of ways of cross-referencing and this allows the user many different ways in which to reorganise and retrieve data. A database can handle business inventory, accounting and filing and use the information in its files to prepare summaries, estimates and other reports. There can be a database which stores newspaper articles, magazines, books and comics. There is already a well-defined market for specific information for highly selected group of users on almost all subjects. MEDLINE is a well-known database service providing medical information for doctors. The management of database system is done by means of a general purpose software package, called a database management system. The database management system is the major software component of a database system. Most database management systems have the following facilities/capabilities:

a) Creation of a file, addition to data, deflection of data, modification of data; creation and deletion of entire files.

b) Retrieving data collectively, or selectively.

c) The data stored can be sorted or indexed at the user's discretion and direction.

d) Various reports can be produced from the system. These may be either standardised reports or specifically generated according to specific user definition.

1.3.2 Objectives of a Database

An organisation must have accurate data and information for effective decision making. All organisations need to collect, store and process data for their functions. The database is used to store and process data for providing useful information to the organisation. The database must have the following basic objectives:

1. **Centrally Controlled:** A database must be centrally controlled. It is possible that the data of a particular system may be spread in different branches of a company, but it must be controlled from one central location.

2. **Logically Organised:** The database must be organised in a logical manner. For example. If the user wants to see the name of person whose basic salary is greater than ` 5000 and is working in EDP Dept., the database must be organised in that logical order so that the data can be accessed faster.

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3. **Shared:** In a multi-user application, the database is designed such that the data can be shared or accessed by different users. The sharing of data is possible, only if the database is integrated.

4. **Data independence:** The most important objective of a database is the provision of data independence. Most of the present day applications are generally data-dependent. It means that the logic of the 'programming depends on the organisation of the database and hence the storage structure of the data files. If the storage structure of the data files is to be changed, the programme should also be modified accordingly. However, the database should be designed such that, if the data storage structure is needed to be changed in future, there should not be any need to change the programme's logic or coding.

1.3.3 Components of DBMS

DBMS can be divided into the following components:

Database: This itself is a major component of database management system which has already been discussed.

Database Administrator (DBA): He or She is responsible for the overall control of the database management system. The DBA is responsible for the following functions:

- To define the content of the database
- To specify the storage structure
- To decide the data access strategy
- To provide validation procedures
- To provide authorisation checks
- To liaise with the users
- To provide the method for data backup, retrieval and recovery
- To monitor the overall performance of the system

Database users: The people who use the database system, by entering the data and retrieving the information are called the users. The users are the major components of a DBMS can include:

- Application programmers, who are computer professionals who interact with the system through DML calls, which are embedded in a programme written in a host language (for example, Cobal, Pascal and C). these programmes are commonly referred to as application programmes.
- Specialised Users interact with the system without writing programmes. Instead, they form their requests in database query language.
- Sophisticated Users write specialisation database applications. Among these applications are computer aided design systems, knowledge base and modeling systems.

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- Naïve Users are unsophisticated users who interact with the system by invoking one of the permanent application programmes that have been written previously.

Database Programmes: the set of instructions given to the database system to perform the arithmetic and logical operations on data are also the important components of a DBMS. These sets of instructions are called programmes. These instructions are given to interact among the different elements of the database. These instructions generally comprise a set of rules and relationships.

1.3.4 Advantages of a DBMS

The database management system is essential for computerised management. It is required to meet the objectives of the database which we discussed in the previous section. The major objectives and advantages of a DBMS are summarised below:

- Provide the way for storage of data and information (Data Definition).
- Provide centralised control and an easy access to the data.
- Provide the way for tackling simple and complex queries on a database.
- Arrange the data in various ways.
- Maintain non-redundancy of data.
- Maintain the integrity to ensure that the data is correct.
- Maintain security and privacy of data.
- Provide access to multiple users.
- Provide an integrated and shared system.
- Provide the method for data independence.

1.3.5 Disadvantages of a DBMS

A DBMS has certain disadvantages too, which are summarised below:

- Costly due to requirements of expensive hardware and higher operating costs.
- Greater complexity of backup and recovery in multiuser environments.
- High risk of data loss, due to centralisation of the database.

Despite these disadvantages, today, a DBMS has become an essential system of data Management for all organisations.

1.3.6 Database Basics

The DBMS of an organisation reflects the nature of activities in the organisation, some familiarity with the basic concepts, principles and terms uses in the field are important. Components of a DBMS include:

- **Fields:** These contain a set of related characters. A field is the lowest level logical unit in the data hierarchy. For example, a single character, viz; A has little meaning out of context. But when characters are combined to form a name (e.g; AJAY or AMIT), they form a logical unit.

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- **Records**: These are a collection of related itmes. Thus on the publisher's mailing list, author's name, address, city, pincode and phone number constitute a record.

- **Files:** These are a collection of related records. The term file is also used to refer to a named area on a secondary storage device that contains a programme, textual material or even an image. All the records about authors for the publisher comprise a file.

- **Database:** Thise is a collection of interrelated files stored together with minimum redundancy. For example, if records are kept in a traditional file environment and an author moves, his or her address must be changed in all files that maintain the address data. In a database, data about addresses of authors are stored only once and are made available to all departments. Therefore, only one update is needed.

- **Data Items:** The term data is the word for what has traditionally been called the field in data processing and is the smallest unit of information that has meaning to its users. The phrase data element, or elementary item, is also sometimes used. Although the data item may be treated as a molecule of the database, data items are grouped together to form aggregates described by various names. For example, the data recurred is used to refer to a group of data items and a programme usually reads or writes the whole records. The data items could occasionally be further broken down into what may be called an automatic level for processing purpose. For example, IGNOU uses a 9 digits enrollment number. The first 2 digits of these number reflect the year of admission, the next 2 digits refer to the Regional Centre where the student has first opted for admission, the next 4 digits are simple sequence numbers and the last digits are check digits. For the purpose of processing, it may sometimes be necessary to split the data item.

- **Entities and Attributes:** the real world which is being attempted to market on to the database would consist of occasionally a tangible object such as an employee, a component in an inventory or a space or it may be intangible such as an event, a job description, identification numbers or an abstract construct. All such items about which relevant information is stored in the database are called Entities. The qualities of the entity which we store as information are known as attributes. An attribute may be expressed as a number or as a text. It may even be a scanned picture, a sound sequence, a moving picture, which is now possible in some visual and multi-media database.

- **Data Dictionary:** It holds detailed information about the different structures and data types, the details of the logical structure that are mapped into the different structure, details of relationship between data items, details of all privileges and access rights, performance of resources with details.

1.3.7 Database Management System Facilities

Database management system (figure) is a collection of programmes required to solve retrieve data from the database. The principal components of a DBMS are a data description module and a data manipulation module.

The data description module of the DBMS analyses the data requirements of applications programmes and transfers control to the data manipulation module, which retrieves the data from the database.

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When properly prepared, database management systems enable people to easily access complex file systems. Most people are able to use a database management without knowing its underlying structure. This ease, of course, is made possible by the four components of DBMS software: data definition language, data manipulation language, query language and report generator.

1. Data Definition Language

Database management systems provide a facility, known as the data definition language (DDL), which can be used to define the conceptual schema and also give some details about how to implement this schema in physical devices used to store the data. This definition includes all the entity sets and their associated attributes, as well as the relationships among the entity sets. The definition also includes any constraints that have to be considered, including the constraints on the value that can be assigned to given attribute and the constraints on the values assigned to different attributes in the same, or different, records.

2. Data Manipulation Language (DHL)

This is a language that enables users to access or manipulate as organised appropriate data model. Data manipulation involves retrieval of data from the database, insertion of new data into the database and deletion or modification of existing data. The first of these data manipulation operations is called a query.

3. Query Language

This language enables users to ask specific questions to the database. A marketing vice president trying to decide which items to sell at a discount, for example, might ask a database programme to list all inventory items with a profit margin greater than 30 percent. The most popular query language is structured Query language (SQL).

4. Report Generator

The report generator helps the user to design and generate reports and graphs in printed form. Report headings, column headings, page numbers and totals are just some of the features that are easy to include with the report generator.

File Organisation:

Based on the differences in the speed and method of access, there are three major methods of storing files of data in secondary storage:

1. Sequential file organisation, in which records are organised in a particular order.

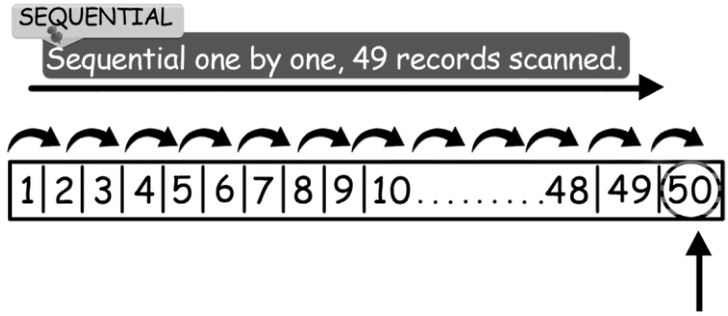
2. Direct file organisation, in which records are not organized in any particuler order.

3. Indexed Organisation, in which records are organised sequentially, but indexes built into the file allow a record to be accessed, either directly or sequentially.

Sequential file processing means records are in order according to a primary key field. If a particular record in a sequential file is wanted, all the prior records in the file must be read before reaching the desired records. Tape storage is limited to sequential file organisation. Operationally, the magnetic tape is same as the one in home and automobile tape decks.

Notes

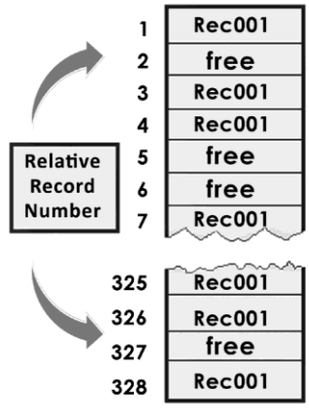
Sequential files, used for sequential processing, contain records ordered according to a key field. If the key field in an employee record is employee name, the records are ordered and processed alphabetically by last name. A sequential file is processed from start to finish. The entire file must be processed, even if only one record is to be updated.



Sequential Access File

Direct File Organisation

Direct access, allows the computer to go directly to the desired record by using a primary key. The computer does not have to read all preceding records in the file as it does if the records are arranged sequentially. Direct access requires disk storage. In fact, a disk device is called a direct-access storage device (DSAD) because the computer can go directly to the desired record on the disk. An added advantage of direct access organisation is the ability to read and return a record to its same place on the disk. This is called updating in place.



Direct Access File

Indexed File Organisation

It is useful in applications where a file needs to be in sequential order but, in addition, access to individual records is needed. In indexed file organisation, records are stored in the file in sequential order, but the file also contains an index. The index is like a directory, with the keys to all records listed in order (ascending or descending). To access a record directly, the record key (primary key) must be located in the index. The address associated with the key is then used to locate the record on the disk. To access the entire file of records sequentially, begin with the first record and proceed through the rest of records.

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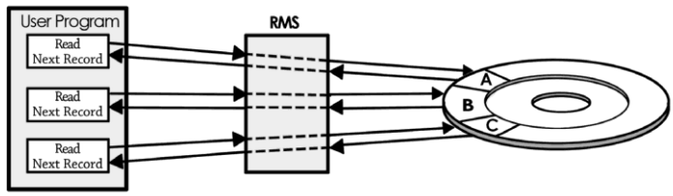


Index Sequential Access File

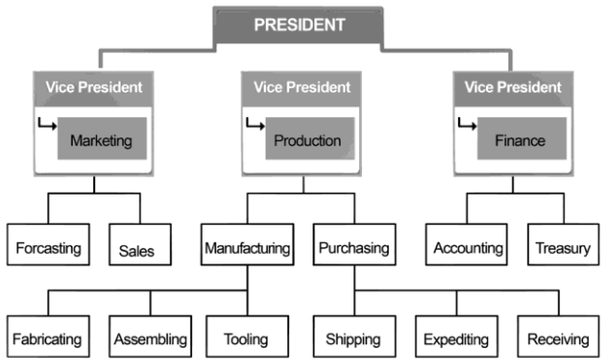
1.3.8 Data Structures

The data can be represented in many ways in the secondary storage. There are following three traditional types of data representation at the external level, which are called data structures:

- The Hierarchical Structure
- The Relational Structure
- The Network Structure

The Hierarchical Structure: in this type of structure, the records are viewed as organised into different levels of a hierarchy in the form of a tree, as shown in the figure below. The record type at the top of the tree is known as a 'root' or 'parent'. The 'root' record can have any number of independents, which are called 'children'. One 'children' record can have again any number of dependents, called 'grandchildren'.

Although the hierarchical structure is a natural way to model truly, it has certain drawbacks. The symmetry is generally missing in a hierarchical approach and anomalies arise in retrieval of records, due to the complicated programming concepts used in an hierarchical database.



Hierarchical Structure

Relational Structure: This model was developed by E.C. Codd, in 1970. In the relational data structure, data is viewed as organised in table as shown in the table on page 21. As per the systems design, there can be many Tables in a database. A two dimensional Table is the most natural way to represent data for a general user. Each Table closely resembles a conventional sequential file with rows representing records of the data, and columns representing field of the records. Actually, each Table is a special case of construct known as a relation. A database constructed using relations is referred to as a relational database. The relational approach is based on the mathematical theory of relation and therefore, the results of relational mathematics can be directly applied to such a database.

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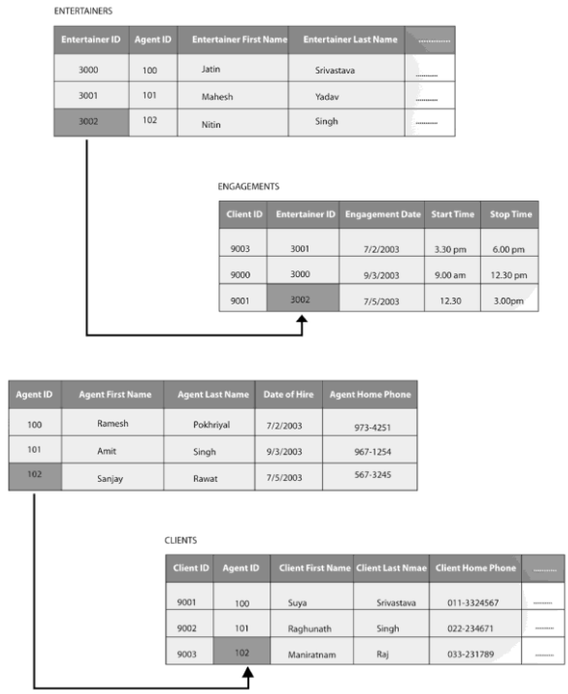
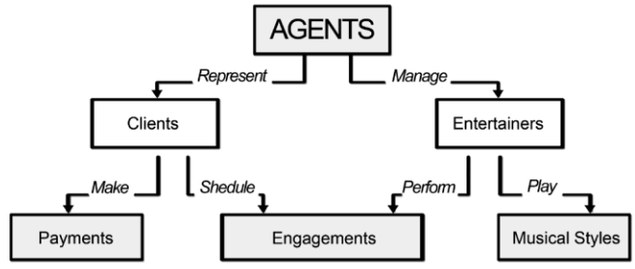


Relational Structure

Network Structure: In this type of data structure, the records are organised in such a way that each 'child' record can have more than one 'parent' record. Thus, a given entity can have any number of superiors, as well as any number of subordinates. There can be many-to-many relationships among entities (Complex network) besides one-to-many (simple Network). The relationships between entities are generally represented by using pointers, called the Link Nodes. The complex network is better than the simple network because the former can be broken into many simple networks, but it is difficult to convert data representation from simple to complex network. The general form of network structure is shown below:



Network Structure

1.4 Data Communication and Networking

1.4.1 Introduction

The capabilities of personal computers offer a wide range of computing power. If more computing power is needed, one way to get it is to buy a larger computer system. But buying a larger computer system is not possible for many small businesses or companies. Another problem arises for those who are geographically dispersed. They may need to send messages to, receive messages from, or share problems at many different locations. One solution to this problem is to keep separate data files at each location. But this approach is very costly and potentially a dangerous solution. It

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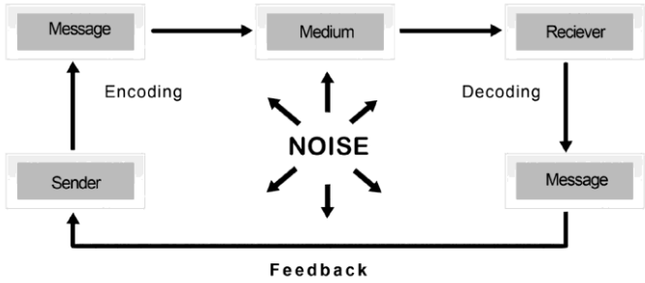
is very expensive to maintain these redundant files of data and difficult to ensure the continuing accuracy of data at any one location. The solution to both issues, the need for more power and the ability to receive messages and share data are found in data communication technology.

1.4.2 Data Communication

Flow of information for the purpose of efficient management and business process control requires effective use of computer systems and networking technologies. Even for a simple important exercise of printing any information from a computer by an attached printer to a computer, there is a requirement for error free data transmission from the computer to the printer. The whole concept of data communication is based upon principles of sending data, checking and confirming its receipt and following error correction technique, to ensure accurate data transmission.



Communication Process

1.4.3 Data Transmission Technique

Telephone lines are used for sending human voice. They were never planned to send Data. So to send data through telephone lines, you have to convert the data into the format which can be read by telephone lines. These are called analog signals. For data communication between computers to take place over a telephone line, the digital pulses of the data to be transmitted must be converted to an analog signal before these are transmitted.

After its journey over the telephone lines, the analog signal must be re-converted to digital pulses so that it can be used by the receiving computer. The process of converting digital pulses to an analog signal is called modulation. And the process of re-converting an analog signal to digital pulses is called demodulation. The device that accomplishes modulation-demodulation process is called a modem.

1.4.4 Transmission Modes

Data transmission may occur in one of the following modes:

Simplex Modes:

In this mode, data can be transmitted in one direction. A device using the simplex mode of transmission can either send or receive data, but it cannot do both. Simplex mode (circuit) is seldom used because a return path is generally needed to send acknowledgement, control or error signals.

Full-duplex Mode:

This mode allows a device to receive and send data simultaneously. A full duplex mode is faster since it avoids the delay that occurs in a half-duplex circuit each time the direction of transmission is changed.

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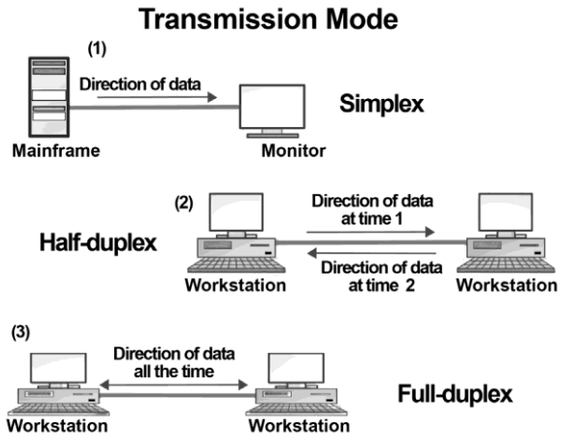
Half-duplex Modes:

Here, data can be transmitted back and forth between two stations, but data can only go in one of the directions at any point of time. An example is a citizens band radio, where the user must either talk or listen, but cannot do both at the same time.



Transmission Modes

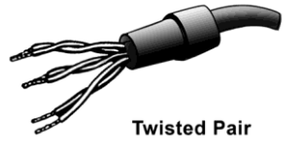
1.4.5 Transmission Media

a) Wired Network

The most common types of wired transmission are twisted-pair, coastal and fiber-optic cables.

Twisted pair Cable

This type of cable is made of pairs of thin strands of insulated wire twisted together. Twisted pair is the least expensive type of networking cable and has been in use the longest. In fact, it is the same type of cabling used inside most homes for telephone communications. Twisted pair cabling can be used with both analog and digital data and is commonly used for LANs. Twisted pair cable is rated by category, which indicates the type of data, speed, distance and other factors that the cable supports. Category 3 twisted pair cabling is a regular telephone cable with higher speed and quality cabling. For instance, Category 5 and Category 6 are Frequently used for home or business networks. The pairs of wires in twisted pair wires are twisted together to reduce interference and improve performance. To further improve performance, it can be shielded with a metal lining.



Twisted pair Cable

Coaxial Cable

This medium (also known as coax), pioneered by the cable television industry, was originally developed to carry a large number of high speed video transmissions. A coaxial cable consists of a relatively thick centre wire surrounded by insulation and then a shield of braided wire (the shield blocks electromagnetic signals from entering the cable). Coaxial cable are available in both baseband and broadband versions. Baseband coax is designed

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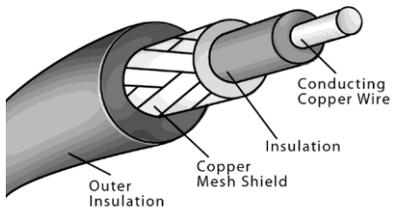
to carry one channel of digital data; broadband coax is designed to transfer multiple channels of analog data simultaneously. Both type of coaxial cabless are used today in computer networks. Coax is also used for short run telephone transmissions outside the home and for cable television delivery. Although more expensive than twisted pair cabling, it is much less susceptible to interference and can carry more data more quickly. While not used extensively for networking home PC's, there is a recent push for using existing coaxial cable in the home for multimedia networking.

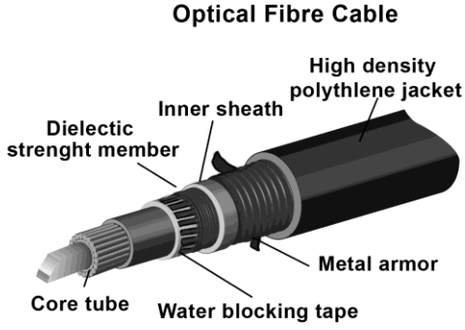


Coaxial Cable

Fiber Optic Cable

This is the newest and fastest of the three types of wired transmission media. It uses clear glass or plastic fibre strands, each about the thickness of a human hair, to transfer digital data represented by light pulses. The light pulses are sent through the cable by a laser device at speeds of billions of bits per second. Each strand has the capacity to carry data for several television stations, or thousands of voice conversations. Fiber Optic connectors are less standardised than connectors for other types of wired media, so it is important to use cables with the connectors that match the hardware with which the cable will be used.

Fiber Optic cable is commonly used for the high speed backbone lines of a network, such as to connect networks housed in separate buildings or for the Internet infrastructure. It is used for telephone backbone lines and is increasingly being installed by telephone companies all the way to the home or business to provide super-fast connections directly to the end user. The biggest advantage of fiber optic cabling is speed. The main disadvantage of fiber optic cabling is the initial expense of both the cable and the installation.



Fiber Optic Cable

b) Wireless Network

The most common types of wireless transmission media used in computer and communications networks are microwave, satellite and infrared. Most wireless transmissions use transmitters to send signals through the air; a receiver (usually

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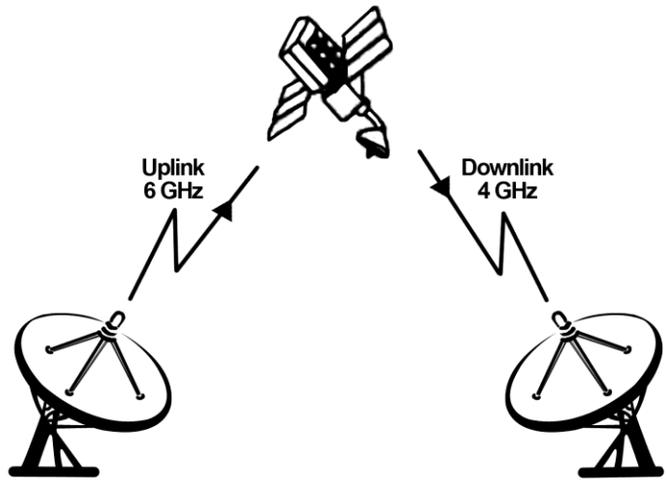
containing some type of antenna) accepts the data at the other end. Sometimes, a single piece of hardware functions as both the receiver and transmitter; if so, it is commonly called a transmitter or transceiver.

Microwave and Satellite Transmission

Microwaves are high frequency radio signals. Microwave signals can be sent or received using microwave stations or satellites. Both methods can send large quantities of data speeds over long distances. Microwave stations (sometimes referred to as terrestrial microwave stations) are earth-based stations that can transmit microwave signals directly to each other over distances of up to about 30 miles. Microwave signals sent via microwave station transmission are line of sight, which means that the microwaves must travel in a straight line from one station to another without encountering any obstacles. To avoid building mountains and the curvature of the earth obstructing the signals, microwave stations are usually placed on tall buildings, towers and mountain tops. Microwave stations typically contain both a dish shaped microwave antenna and a transceiver. When one station receives a transmission from another, it amplifies it and passes it to the next station. Microwave stations can also exchange data transmissions with satellites, discussed next. Microwave stations designed specifically to communication with satellites, such as for satellite TV and satellite Internet services are typically called satellite dishes. Satellite dishes are usually installed permanently where they are needed, but they can also be mounted on trucks, boats and other types of transportation devices when portable transmission capabilities are necessary or desirable, such as on military or recreation vehicles.

Communications satellites are space-based devices launched into orbit around the earth to receive and transmit microwave signals to and from earth. Originally used primarily to facilitate microwave transmission when transmission stations were not economically viable (such as over large, sparsely populated areas) or were physically impractical (such as over large bodies of water), satellites can now send and receive transmissions to and from a variety of other devices, such as personal satellite dishes used for satellite television and Internet services, GPS receivers, satellite radio receivers and satellite phones.



Satellites Communications

1.4.6 Communication Channel Configurations

The two main communication channel configurations are as follows:

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Point to Point

In this configuration, a device is connected directly to another device by a dedicated communication channel. This communication channel configuration can be inefficient and costly, if a terminal is not active enough to keep the line busy.

Multi Point

In this configuration, three or more devices, e.g. a terminal or computer are connected to the same line. Compared to point-to-point configuration, multipoint channel configuration is more efficient and less costly, because it reduces the amount of inter-cabling needed.

1.5 Networking

Network means interconnection of two or more devices. These devices may be computers, telephones or other communicating devices. In case of computer, it is the connection between two or more autonomous computers. These computers are connected with each other for information interchange. For connecting two computers are available different media like copper wires, microwaves, optical fibers and satellite.

1.5.1 Types of Networking

These interconnected computers could spread either over a single geographic site such as a single or multi storey building or a complex, or within several geographical sites which themselves could be located in different towns, cities or even countries. So, a network can spread over an area which could be as small as a room, or as wide as the entire world. Depending on the span of the computer network, any network can be placed in either of the following three categories:

1. LAN
2. WAN
3. MAN

Local Area Network

A local area network (LAN) is two or more computers directly within a small well defined area such as a room, building or group of closely placed buildings.

A LAN usually consists of the following:

- Two or more computers
- Peripheral devices such as printers and hard disk drives
- Software to control the operation of the computers or other devices connected to the LAN
- Special cables, usually coaxial or fiber optic, to connect the computers and other devices.
- A plug-in board to handle the data transmissions.

Some computers require that all the computers be of a certain brand, while others allow a variety of brands to be connected. The number of computers in a LAN varies from smaller LANs, that typically connect 2 to 25 computers, to large LANs that can connect as many as 10,000 computers.

The length of the cable connecting a computer to a LAN also varies, depending on the LAN. Most LANs allow cables of about 1,000 feet, but some allow cables of several miles to be used.

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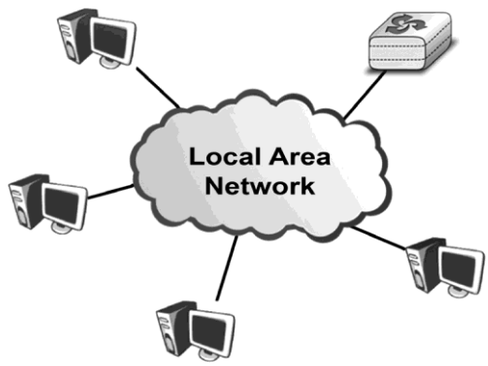
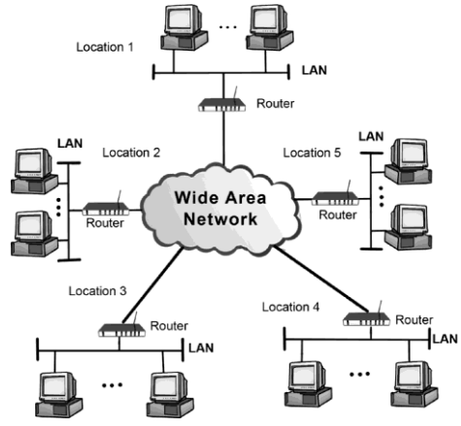


Local Area Network

Wide Area Networking or WAN

A wide area network is two or more computers that are geographically dispersed, linked by communication facilities such as telephone system or microwave relays. This type of network is usually limited to use by large corporations and government agencies because of the high cost involved in installing and maintaining these. A WAN is a network that links separate geographical locations and this network can be a public system or any of the various packet switched services provided by the public telecommunication agencies.

The main difference between a LAN and WAN is that former is under the complete control of the owner, whereas the latter needs the involvement of another authority like the telecom department. LANs are successful and capable of handling very high data transfer rates at low cost, because of the small area covered and have a lower error rate than WAN's.



Wide Area Network

Metropolitan Area Networks (MAN)

A metropolitan area network (MAN) is a network designed to service a metropolitan area, typically a city or country. MAN's fall between LAN's and WAN's on the size continuum and typically consist of multiple LANs, or by a network provider, who provides individuals in that location with access to the MAN. Increasingly, wireless MANs are being created by cities or large organisations (including Microsoft and Google) to provide free, or low cost, Internet access to area residents.

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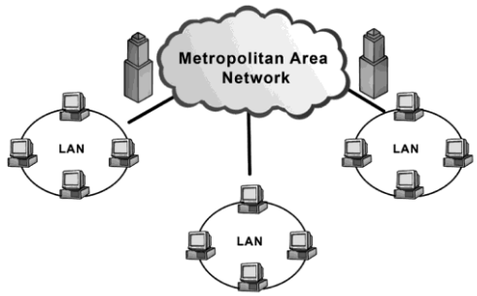


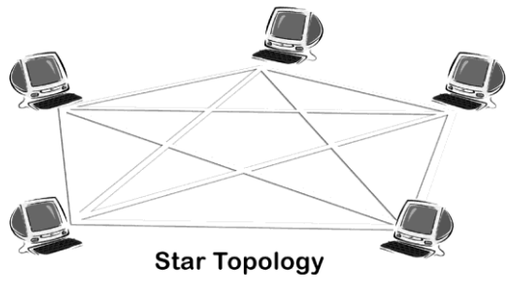
Metropolitan Area Network

1.5.2 Network Topologies

Computer networks vary in their physical topologies or how the devices in the network (called nodes) are arranged. Four of the most common physical topologies are: star, bus, ring and mesh.

Star Networks

With a star network – one of the most common network topology - there is a device to which all the computers and other devices in the network connect, forming a star shape. The central device contains multiple ports that are used to connect the various nodes on the network (such as computers and printers) and all network transmissions are sent through the central device. If an individual computer or other node on the network fails, the other nodes and the network itself are not affected. If the central device fails, however, the network can not function, although the individual nodes on the network can still work independently. Star networks are common in traditional mainframe environments, as well as in small office, home and wireless networks.



Star topology

Bus Networks

A bus network has no central hub. Instead, it consists of a central cable to which all network nodes are attached. In a bus network, all data is transmitted down the bus line from one node to another and only oneline can transmit at a time. Similarly, in a star network, if an individual computer or other node on the network fails, the other nodes and the network itself are not affected. It is only if the bus line fails that the network itself would not function.

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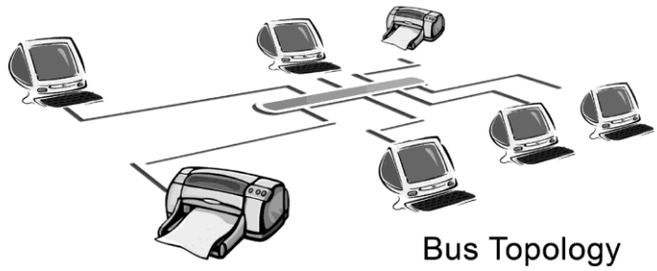
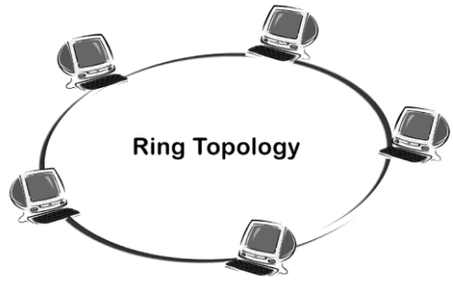


Bus topology

Ring Network

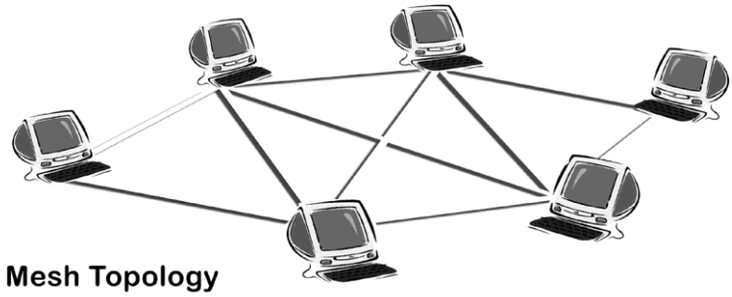
A less common topology is the ring network. Like a bus networks, this network does not have a central hub but the computers and other network devices are connected in a ring formation from one node to the next, without the use of a central cable. In a ring network, data typically travels from one node to another around the ring in one direction only. Consequently, if one device fails, it does affect other devices on the network.



Ring Topology

Mesh Network

In a mesh network, there are a number of different connections between the devices on the network so that messages can take any of several possible paths from source to destination, instead of having to follow one specific path, as in star, bus and ring networks. Consequently, if one device fails, it does not affect other devices on the network, assuming is an alternate path is available.



Mesh Topology

1.6 Internet

1.6.1 Introduction

The internet is a conglomeration of computer networks and other connected

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machines all over the world. In other words, the Internet is a global network of computer networks. The machines and the computer networks are interconnected. Therefore the intercommunication information accessibility and exchange is possible. The Internet is a cooperative effort of many organisations and the people participate as the information users as well as the information providers, through their computer machines connected within the Internet. The people can use their stand-alone computers, or their local area network workstations to send messages or exchange files with the people using computers in another region be it in another company, another state, another country or anywhere-provided all the machines involved in the communication are connected within the Internet.

Internet is suitable for all types of computers. Any type of computer from palmtop, PC to a super computer loaded with TCP/IP protocol becomes automatically a member of the internet. It uses a wide range of communications media. The “wires” that interconnects millions of computers on the internet include local area networks, private data lines, local telephone lines, national telephone networks carrying signals via wire, microwave and satellite and international telephone couriers. The internet is a single network which exchanges information from ‘anywhere to anywhere’ because it is platform independent due to TCP/IP and is communication technology independent.

Internet is a network of clients and servers. The servers may be, dedicated or general, performing dedicated functions or serving general requirements.

The information, which you need, is stored on the server computer and the computer and the programme, which accesses the information, site on client. A number of tools are available to perform standard jobs of accessing, fetching and displaying information.

Internet

1.6.2 Hardware and Software of Internet

A variety of hardware and software is used to make the Internet functional and effective. A number of people and agencies are involved in Internet working.

Modem

A modem is a device that enables two computers to communicate with one another through phone lines. When you open an internet account and use it, you are using the modem installed at your location to communicate through the modem installed at the internet service provider (ISP). VSNL, MTNL, MSN and many more are the ISPs.

A modem has a speed, which is measured in bits per second (Bps). Higher the Bps value,the faster the modem. Modems are available in the range of 9.6 Kbps to 56 Kbps. Since you are on the internet and using modems to get a connection, the speed of exchange of information will be dedicated by the rate of modem.

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Computer

In addition to a fast modem, you need a computer (client) capable of handling number of multiple data types. The best PC would be a multimedia PC of 32 MB RAM with very powerful CPU and 4 GB onwards disk capacity. For normal E-mail applications, standard PC of good speed is adequate. If your application requires multimedia capability, the PC should have all multimedia features, such as sound card, speakers and PC video camera, etc.

Web TV

Web TV is a terminal to be attached to your TV. The terminal uses your TV as a display and you navigate the internet through the terminal's wireless remote control, or an optical wireless key board.

Web TV cannot access all the Internet activities, which a computer can. You cannot use it to get software online, to run Java programs or to chat.9999

1.6.3 World Wide Web (WWW)

World Wide Web (www), popularly known as Web is quite distinct from internet. In simple terms, internet is a network spread over the globe not knowing precisely the number of servers and number of clients located in the network. Internet is a carrier of data and information across the network. But web is a global information sharing architecture that integrates information stored on servers. Web offers software foundation as a standard for navigating, publishing information in the particular format, known as web pages. Internet holds and delivers the webpages and content stored on the pages.

An Internet runs on TCP/IP protocol which helps to find two computers, introduce themselves and then conduct conversation. In simple terms, TCP/IP helps to establishthe connection between two computers and ensures that data sent from one end is delivered intact at the other intended destination. TCP/IP protocol is a low level protocol dealing with communication. The web protocol (HTML, HTTP,CGI) deals with format and contents of data. Internet handles connectivity and web handles information across the internet. The web serves the following three functions:

- As a part of the operating system Windows/Unix/NT.
- As a distribution channel for downloading applications on the operating platform.
- As a middleware between database servers and clients.

The web is a client / server architecture. The information is stored in files on the web servers. The information is organised into distributed a pages. The pages are stored in HTML format. A page stored in HTML format is called web page. A web page could be a text, mixed with multimedia content, that is graphics, audio and video attached with links. The links attached to pages helps users to browse from the internet. When you jump between pages, you are web surfing for quick information access. In the normal course, a web page is a static page. It becomes dynamic when a portion of the page changes dynamically. The web technology provides a mechanism for fetching dynamic information from other sources and make it part of the webpage.

1.6.4 Working of Internet

It is quite evident that in a computer network, sharing of resources is allowed. One such most shared resource is information, which exits in the computer in the form of

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files. Thus, one of the key functions in network of many computers is to move the files between two specific computers. For such a communication, we require:

- The address of the destination
- A safe method of moving data in the form of electronic signals

This is done by TCP/IP for sending a large block of text/data to another machine. TCP divides the data into little data packets. The role of IP here is not put destination – address information on such packets. It is not necessary that all the packets follow the same path from source to destination when sent on the internet. They could be sent via different paths to load balance various paths that exits on the network. This is handled by a special machines called “router”.

Gateway is another special hardware/software which allows different electronic networks to communicate on the internet which uses TCP/IP. As an internet user, one must know how addresses are to be given.

Domain Names System (DNS)

To send anything anywhere, the address of destination is must important. Unless and until the address is correct and unique, the item will not reach there. Same is the importance of address in virtually everything we do on the internet. The IP in TCP/IP is the mechanism for providing address for computers on the internet. Internet addresses have two forms:

- Person understandable form ,in which the address is expressed as words.
- Machine understandable form, where the address is expressed as numbers, also called IP address.

Word Address

A typical word address of person understandable address on the internet is of the form: username@ host.sundomain.domain

It has many address parts - username, host, sub-domain and domain.

Hosts are, in general, machines at a particular location. These are the machines whose resources are normally shared and can be utilised by many users on the Internet. A user is given an account by the system administrator, which allows him to use the resources of that machine. This machine is also known as the server.

The username is the name of your Internet account for loading into the host machine. Logging in is the process of gaining access to your account on the server, which is shared by several users. Host and local networks are clubbed together into domains, which are, in turn, grouped into one or more larger domains. As an analogy Domain can be considered as a apartment complex, a town, or even a country a host computer can be considered are an apartment building in a complex and your account is just an apartment in it.

Domains are usually classified as non-geographic and geographic. Given below is a list of various common domain names.

Geographic Domains

Country Domain name

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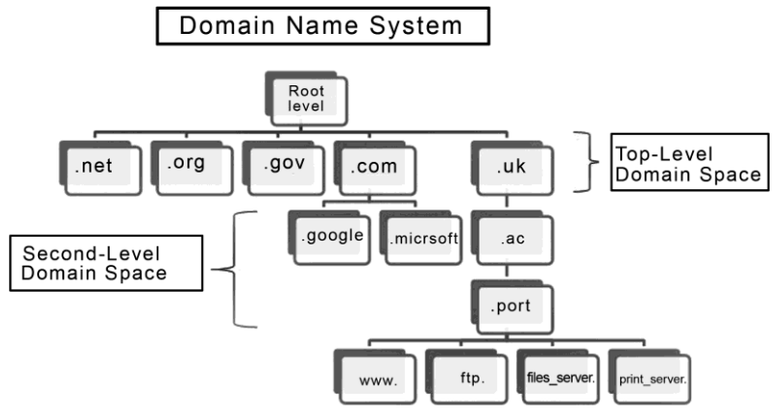
Australia .au
China .cn
India .in

Non-Geographic Domain

.com commercial organisations
.gob parts of government
.edu organisations of higher education



Domain name System

IP Address

IP addresses are machine understandable addresses. The IP address of any host computer is termed as the host address. Significance of IP addresses of computers is the same as that of telephone numbers to us.

An IP address consists of four sets of numbers that are separated by dots. These addresses are organised from left to right. The server of www. Go4i.com/classified has an IP address 167.216.192.97. A portion of a number separated by the dot is known as an Octet, that is 8 bits of information. Just like our telephones number which includes country code, city code exchange code and the user, each octet has significance in an IP address. They consist of a sequence of domain code and sub-domain code from left to right.

Computer termed as servers contain the databases of the internet host addresses. They translate each word address or person understandable addressed into numeric equivalents and fetches the contents for you.

1.6.5 Charactristic of Web Components

Web Clients

A client node on the internet has a software, called web browser, which provides graphical user interface (GUI) for accessing and displaying the web page. Most widely used browsers are Microsoft's Internet explorer and Netscape's Navigator.

Web Server

Web server stores documents and other content accessible from web client, using

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the web browser. The most widely used web servers are Microsoft's Internet information server and Netscape's communication server / enterprise server and apache server.

HTTP (Hypertext transport Protocol)

HTTP is a language enabling communication between web browser and server. The communication happens in the following way.

- Web browser establishes connection to the server.
- Web browser then issues instructions to the server to fetch a web page.
- Web server processes the instructions and sends the web page to web page.
- On receipt and display of the web page, browser / server connectivity ends and communication transaction is completed.

URL (Uniform Resource Locator)

URL is a address of the page which is used to find the web page. URLs are used to jump from page to page. URL contains three parts mentioned in the following sequence:

1.	Access method	http,
2.	Computer location,	www.domainname.com
3.	File location (the last part of URL)	Directory path and (or) a file name.

An example of URL is

http://www.abc.org/careers/industry.html

URLs change with protocols.

Universal Resource Locator

HTML

HTML is a hypertext markup language used to display the webpage, containing text, graphics, audio, video. HTML contains several categories of tags, known as mark-up tags.

1.6.6 Importance of Internet in Business Applications

Electronic Mail (E-mail)

E-mail is the service which allows the user to use his computer for sending a message to another computer without requiring the recepient to be present at that turm. This type of service which does not require the communicating persons to be logged on simultaneously is called asynchronous communication. Thus, e-mail is analogous to an answering or voice mail system of a telephone. E-mail is the most commonly used service on the internet. E-mail is a cost effective, reliable and efficient mode of communication in comparison to most other means of communications such as faxing, courier or other postal services. E-mail system obviates the need of the clerical functioning in typing the document on a paper and avoids waste of time incurred in

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making necessary amendments before sending it via fax, courier or the postal services. One of the salient features of the email technology is that a system can be built to send an automated response back to the users who send messages to a company. A prompt acknowledgment of the e-mail satisfies the sender that his message has been received and is in the pipeline to be appropriately dealt with in due course.

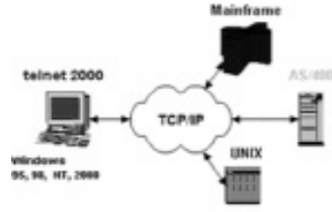
Electronic mail

Usenet

USENET is an international meeting place where the people gather to meet other people with common interests and discuss about about mutual interests. The building block of USENET is the newsgroup. On non-Internet sites, these are known as conferences, forums or bulletin boards. USENET is an asynchronous, one to many communications, which implies that someone prepares the information and anyone who is interested can read it whenever he feels like. USENET newsgroups are organised into hierarchies either by subject or geographically and the part of the name of a newsgroup is the top level hierarchy and the following parts to more specific topics. For example, a user can opt for a newsgroup title rec.sports.soccer, which signifies that the user is interested in a newsgroup which is recreational and related to a sport called soccer.

Telnet

TELNET is a service on the internet which allows the user to log on to a remote system and use various services available on that host. The user should have the necessary user id and the password to access the TELNET utility. The user can use this utility to access huge databases catalogues or libraries on various servers and use the information for commercial or research purposes.



Telnet

FTP (File Transfer Protocol)

FTP is a utility to copy files from the remote hosts to the user host, and vice versa. These are two methods of using FTP. In the first approach, the user signs on the remote host with ID (identity) and is allowed to transfer files. In the other approach, the user signs on a remote host as an anonymous user and is allowed to transfer files in

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a very restricted way. Restrictions to the privileges on the remote host in case of an anonymous FTP are due to security reasons. There are various programmes available to use FTP. WS-FTP and NCFTP are two of the popular available programmes. The user may use FTP protocol to download files of his interest from FTP, using FTP protocol. A FTP server is the server which allows the files transfer from its resources to the users. The process of files transfer from the remote host to the users machine is popularly known as downloading files. Converse of this process is known as uploading files to the server or the remote host.

Archie

Tjis is a collection of servers. Each of these servers is responsible for keeping track of file locations in several different FTP sites. All the Archie servers communicate and pool their information into a huge database. This database is updated periodically. The user can search this database for a file location simply by giving an Archie client or server a keyword to search for.

Gopher

Gopher is a menu-driven system, which enables the user to navigate within the internet resources of information. Unlike Archie, which just locates the information on the internet, gopher goes for the information of interest and puts it on the display screen of the user's computer. A group of large number of specialised libraries which are interconnected for Gopher application is referred to as Gopherspace.

1.6.7 Search Engine

A search engine, or search tool, is a computer programme that will search its database to find items whose text contains all or at least one of the words given to it. The home page for each search tool contains a dialog box or frame where you type in a keyword or phrase. Click on a button labeled search or submit and then the search begins. The search engine then examines a database for items that contains the key word(s). the database consists of a large collection of information the search programme has gathered from the WWW. The search engine then brings back the search results – a list of hyperlinks and in some cases, a summary of the information found by clicking on each hyperlink. The search results are used in the same way as any other web page.

Around the world wide web, people have amassed collections of web sites to help steer them in the right direction for their needs. Some of the popular search engines are: google, altavista, excite, lycos and askjeeves.

Search Engine

1.6.8 Internet / Intranet

Internet is a global network that connects computers the world over. The connected computers have a unique address assigned by a central authority. To get connected, you need a computer, a modem and an access provider, known as Internet Service provider (ISP). Most users use internet through E-mail on world wide web (www).

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Intranet is an internal company network that uses the internet standards of communication and technology. It uses HTML (Hyper Text Markup Language) for programming and HTTP (Hyper Text Transfer Protocol) and TCP/IP (Transmission Control Protocol/Internet Protocol) for communications protocol, along with the bowser for companywide communication solutions. Intranet could be open to other outside parties such as customers, vendors or individuals. Intranet, just like internet, can use multimedia, sound and text forms for making use of internet beyond E-mail.

The major difference between Internet and intranet is in terms of focus. An internet focuses outside the organisation, while the intra. The net focus is inside the organisation. However, both use almost the same technology. You can establish Internet, without the other being available.

Like in any other system, hardware required for intranet is dependent on the design. It largely depends on the number of clients and data types the server is going to handle. A small organisation with limited application usage, would require a server with minimum 16 MB RAM and Pentium CPU and 2 GB hard disk. The client machine on this intranet could be any desktop low and machine with network interface card fitted to it.

Use of intranet / internet reduces the cost of printing, paper and communication. Further, the overall process cycle becomes shorter as communication is faster. Use of internet/intranet enhances productivity of the work force and reduces the space requirement for storage.

1.6.9 Internet Security

The internet can provide as many security risks as opportunities or a company. Security issues, hacking and viruses are frightening propositions for organisations with any level of internet information accessibility. Often companies address these issues by focusing only on the hardware and software needed to keep hackers and virus outside the internet systems.

Password Cracking

Password cracking is just another method used to illegally access someone's computer without his or her consent. To prevent password cracking, users should create and use passwords of eight or more characters that combine alphanumeric elements, apart from changing it frequently.

E-mail Spoofing

Spoofing results when a user receives an e-mail that appears to have originated from one person, but is actually sent by another person. The objective of spoofing is to trick the user into divulging confidential information.

Electronic signature, also known as digital signature helps to prevent spoofing. It ensures that messages have not been altered during transmission and that the messages are from the person listed as the sender.

Virus Intrusion

People generally use the word 'virus' to refer to anything undesirable that can happen to a computer but this is not accurate. Viruses are short programmes that are not engineered by accident. Someone somewhere has purposely designed these, usually with a malicious intent. Virus exposure results from receiving e-mail, sending

documents over the network and even from installing software, or copying files from another hard disk.

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Hacker Attacks

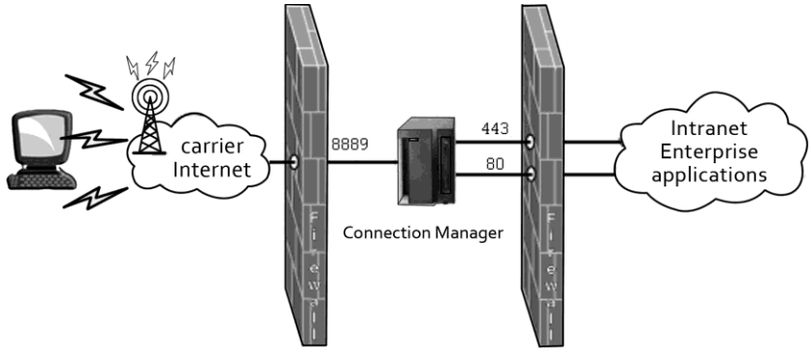
Hackers use a variety of tools to attack servers around using the world. Most of these are preventable by implementing sound security policies and is appropriate software and hardware. One of the most common tools used by hackers is the 'Ping' command. It used very effectively to exploit the target computer. There are several hacking tools available to the hackers that allow them to send their oversized or continuous packets to the target computer. This results in a system interruption, or even a system crash.

1.6.10 Firewall for Network Security

A firewall is defined as a software or hardware that allows only those external users with specific access characteristics to enter the network. The access will be allowed on the basic of user's name and password, internet IP address, or domain name.

A firewall acts as a barrier between Intranet and Internet which operates selectively and allows and disallows access after checking and verifying certain identity tags, such as passwords, IP address, and domain name.

Firewall can also be created through software sitting on Proxy server which controls the incoming and outgoing traffic of the network.



Firewall

Firewalls work like filtering routers, examining each packet of information by subjecting it to system check of authentication, verification of source and distinction and then allowing, or rejecting, the entry to the intranet or exit from internet.

Security on web is implemented through a layered system, each checking and protecting the flow of information. The layers are the following:

- Source and destination relation.
- Authorisation of individual – password.
- Authentication.
- Encryption of message for integrity.
- Using of public key / private key for checking unauthorised access.

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- Checking the access to intranet and access to other websites through internet.
- Finally, but not less important, is the physical security to intranet.

Encryption and Decryption

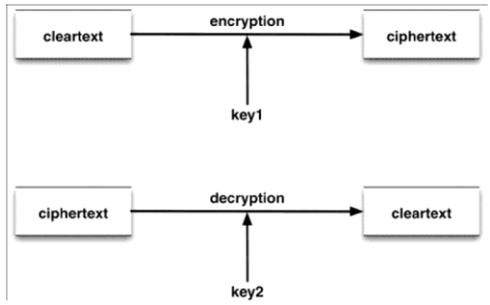
Encryption is an effective and practical method to ensure security of data. Encryption refers to encode data by converting the standard data code into a proprietary code. Just opposite to encryption, decryption is the process to convert encrypted data into its original form. Encryption and decryption are commonly used during transmission of data from one computer to another. The basic concept of encryption / decryption process is illustrated and explained below:

a. The plain text message, which has to be transmitted, is encrypted to produce a cipher text.

b. The cipher text is transmitted to other terminals over communication lines.

c. The cipher text is received at the authoried receiver and is decrypted back into plain text.

The general technique of encryption/decryption is based on algorithms given by National Bureau of Standards. This technique is known as Data Encryption Standard (DES). It is widely used in many network security systems. DES uses a binary number as the key for encryption. This key offers more than 72 quadrillion combinations. The binary number is used as a pattern to convert the bits at both ends of the transmission The key can be changed randomly.



Encryption and Decryption

1.7 Multimedia

Mass market appeal has made multimedia as important a breakthrough as the commercial availability of the affordable desktop computer.

Combining still and moving images, sound, audio, text and interactivity, multimedia has initially culminated in re-evaluation of the ways in which we communicate information. Unlike linear, no interactive media such as broadcast television, it provides users with a choice of numerous meaningful paths. Multimedia, therefore, is a combination of text, graphics, sound, animation and video delivered to users by computer or other electronic means.

Multimedia, through its dazzling pictures and animations, engaging sounds, compiling video clips and raw textual information, can electrify the thoughts and actions of users. The user can also be given the control of multimedia process. In other words user can be allowed to control what and when the elements are delivered. This type of multimedia is called interactive multimedia. When the user is provided a structure of linked elements to navigate, interactive multimedia becomes hypermedia.

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Although the definition of multimedia is a simple one, making it work can be complicated. The main focus area in any multimedia programme is the content of the programme or presentation that the user pays for or the audience comes to use.

Different types of Multimedia

Technically, multimedia represents the convergence between computers, digital video, and sound synthesis. Distribution media for such material include Compact Disc-Read Only Memory (CD-ROM) and Compact Disc –Interactive (CD-I) discs. A stand-alone multimedia system will almost always include the following components:

- Computer
- Appropriate display medium (television or monitor)
- Means of user interaction such as remote control device, mouse and keyboard
- CD drive – CD-ROM or CD-I
- Sound Synthesiser
- Speaker or a pair of headphones

1.7.1 Creating Multimedia

Development process

Defining the Audience

Since a multimedia presentation or programme can offer so much in the way of content, it is necessary to understand precisely who the audience is. In other words it is

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necessary to understand what the userd expect to gain from the programme, how much time he is going to spend on the content of the programme, what kind of interaction he wants with the programme etc. That is before starting with design of multimedia programme, it is necessary that the needs of users are understood properly.

Multimedia Design

Planning the overall design is the longest part of the development process. Designing involves preparing the outline of the sequences and blocks of information that will appear on the screen. Designing phase also involves deciding how much information – text, graphics and clicking objects – will be presented on each screen. It is in this phase that navigation methodology for the user is established. That is, how the user will navigate through various scenes established in this phase.

Choosing the Tools

Since the multimedia programme includes different kinds of content, creating it involves many types of software. For instance, creating text requires a word processor, working with digital images requires graphics software, using video requires a video capture programme and editing software and so on. The selection of the appropriate software or tool depends largely on the planned programme. For examples, for a simple text and graphics, slide show type of presentation software programme should suffice. So variety of tools to be used depends on the type of presentation or programme designed.

Multimedia Authoring

Once all the content has been created, it needs to be assembled. This process of putting together all the contents of the programme is called multimedia authoring. This process again requires a software that can understand all the different types of media, combine them, control the sequences in which they appear and create navigational tools and an interface for the user.

Testing

Before the final programme is released, it must go through several testing and revision cycles so that everyone is satisfied with the finished product. In the testing phase, the user of the product is allowed to use the programme in the presence of the author (the person who created the programme). By going through this testing, the programmer locate flaws or errors and repair these before the final product is released into the market.

1.7.2 Application Areas of Multimedia

The multimedia applications are used by a number of persons and organisations. Some of the application areas of multimedia are discussed below:

Multimedia in Education

Education is one of the first and best consumers of multimedia. In today's schools, multimedia computers are an integral part of many classrooms and bring a new level of interactivity to learning. Visual presentations, that include animation, video and sound, motivate students to become active participants in the learning process. Interactive multimedia programmes bring concepts to life and help students to integrate critical thinking and problem solving skills. This approach to education also builds strong social skills and allows students with a wide range of learning skills to be successful. One common and most popular interactive multimedia application for educations is the

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electronic encyclopedia contained on a CD-ROM. The students can get information about any topic from such an encyclopedia and at the click of the mouse button; they can also see video clips audio clips related to the chosen topic.

Multimedia in Business or Organisation

The multimedia equipped personal computer is the center piece of interactive multimedia applications in any organisation or business. For example, many companies have developed customised interactive training materials for training their employees about the latest technologies. These materials fall into a category of products, called compute-based training (CBT). Sales and marketing are also taking on new meaning in the age of multimedia. Information that used to be distributed only in printed catalogs are now available in an electronic catalog, mailed to customers in CD-ROM format or represented on a company's website. Companies are also beginning to allow customers to preview merchandise from an interactive catalog on the World Wide Web. Customers can place orders for merchandise by filling in an on screen order form. For many marketers, this is the ultimate in interactivity. The primary focus of multimedia in business is on communication both within the corporation and in getting the company's message out to the world. Multimedia is also helping employees to work together, even when their locations or schedules are different.

Multimedia in Home

Reference materials, self-help instructions and entertainment packages offer many opportunities for enhancement via multimedia products. Regardless of the content, the main aim of these packages in to keep the interest of the viewers. The largest application for commercial multimedia is in the entertainment field. Video games sold on CD-ROMs for dedicated game machines or for desktop computers are very popular. Besides games, multimedia packages for managing money are becoming popular. Other multimedia offerings range from gardening to household repairs. The combinations of textual material, colourful graphics, animation and videos of real people doing a job you are about to tackle gives you as much help as you need. Another interactive service is a technology called interactive television. In conjunction with a specifically made computer connected to television set, the remote control is used for more than just switching channels.

Multimedia in Public Place

In hotels, train stations, shopping malls, museums and grocery stores, multimedia has become available at stand-alone terminals or kiosks to provide information and help. Such installations have reduced the demand on traditional information booths and personnel, add value and they can work around the clock. For example, a supermarket kiosk will provide services, ranging from real planning to coupons. Hotel kiosk, list nearby restaurant,, map the city, airlines schedules and provide guest services. Printers are often attached so that user can have printed copy of the information.

Virtual Reality

At the convergence of technology and creative invention in multimedia is virtual reality, or VR. Virtual reality is the presentation of anything in 3 dimensional world. The user can enter this world using special devices such as head mounded displays, stereoscope glasses, data gloves and sensor seats. These devices with motion sensors are connected to the computer. When the user walks or moves a hand, the sensors detect the motion and send data to the virtual reality programme. This processes the user's movements and projects the action into the virtual space. Virtual reality is mostly

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used for entertainment software now a days. Virtual reality is also invading the online world. Virtual Reality Modeling (VRML) is an authoring language used to create 3 dimensional environments on the World Wide Web. This tool allows the user to navigate through 3-D world, create or edit – 3-D objects and links these to other Web projects.

1.7.3 Future of Multimedia

Interest in multimedia software is growing day by day and the day will come when multimedia software or programme will not be treated as a separate software categories. Rather, the elements of multimedia sound, video and interaction will be integrated into all kinds of documents and programmes.

Lot of work will be undertaken in improving the realistic experience of virtual reality in text few years. Beyond heightening the visual and aural accuracy of computer generated space, users may be asked to wear mechanical devices that not only respond to one's movement but will also provide one with a sense of touch.

Lot of advancements will also occur in the medium through which the content containing multiple media and interaction are delivered. Sophisticated cable TV networks will beckon some households to join their interactive services. The importance of CD_ROM will recede as more people will get connected to the Internet or other services offering Internet connectivity.

1.8 E-Commerce

Information Technology has transformed the way people work. Electronic Commerce (e-commerce) has triggered yet another revolution, which is changing the way businesses buy and sell products and services. Associated with buying and selling of information, products and services over computer communication networks, e-commerce helps conduct traditional commerce through new ways of transferring and processing information.

E-commerce refers to the paperless exchange of business information using electronic data interchange, electronic mail. Electronic bulletin boards, electronic funds transfer, World Wide Web and other network based technologies. E-commerce not only automates manual processes and paper transactions, but also helps an organisation move to a fully electronic environment and change the way it operates.

The internet gave yet another boost to e-commerce because it is a low cost alternative to proprietary networks. E-commerce standards are, however under development. The more well-known Electronic Data Interchange (EDI), the inter-organisational exchange of business documentation is structured, machine-processable from over computer communication networks is still the dominant part of e-commerce.

Organisations and countries worldwide are seized of the impact e-commerce will have on the world economy globalization of market. The world is on the threshold of a new industrial revolution that is being shaped by the Internet and e-commerce in particular. E-commerce implies not just using network based technologies to conduct business, it is about moving organisations to a fully electronic environment through a change in their work procedures, re-engineering their business processes and integrating them with their business partners beyond their traditional boundaries. E-commerce has brought about a revolution in the way business is conducted.

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E-Commerce

1.8.1 Concepts of E-Commerce

E-commerce essentially means carrying out the business using electronic methods for business processes. E-methods using tools and technologies enable every process to run with greater speed and precision in an automated manner where decision making is embedded in the process itself. The e-methods transform the business from human driven to information driven where people play the role of knowledge workers.

In e-business, discontinuity of process marked with delays on line waiting and storage is eliminated through online integration of customers, partners, suppliers and employees. It allows information sharing bringing transparency in business management processes. In e-business, you may be anywhere in the world, but you are close to your business location, as access to information is possible from anywhere. In e-business, you are like a mobile office available to anybody through electronic reach. In e-business, you can access information, view it, download it for processing and upload it again for sharing with others.

The biggest beneficiary of e-business is the customer, who has access to information about the products and services he requires and order from any supplier located in any country. He has a wide choice to select from. He is able to configure the requirement at least cost, forcing the supplier to deliver it at the doorstep. The customer has become knowledgeable, forcing the business to become customer centric.

The second beneficiary of e-business is the supplier or information on inventory, schedules, order status, etc., enabling him to manage his resources effectively to meet customer's most recent, real time needs of raw material or services. Trusted vendors can become business partners without investing in customer's business when business is transformed to e-business.

1.8.2 Characteristc of E-Commerce

- One global order management system.
- Global database, single or distributed.
- Paperless transactions.
- Customers select, configure the needs and enter their own orders.
- Suppliers manage your inventory.
- Dynamic order status – received, delivered and order balance.
- Collaborative working through Group-ware technology.
- Organisations work for 365 days, 24 hours a day.

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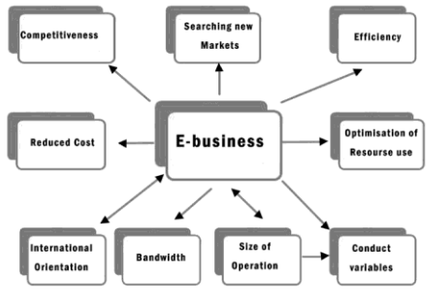
- Business relationships with customers, vendors and business partners get transformed to trust relationship.
- Employees become knowledge based intelligent workers.
- Management and operations overhead shows decline over a period of time.
- E-business initiatives are trigged through four factors.



E-Business

E-business uses different technologies to covert conventional business methods to e-enabled methods. It begins with intranet for in-company seamless integration of systems. It uses web enabled systems to deal with text based information. Along with supply chain management systems (ERP), customer relations management systems (CRM) are implemented. Intranet then is extended to trusted business partners with complete security measures to protect information from exposure to unauthorised people. When you extend intranet to trusted business partners, it is called Extranet. Once the systems are stabilised on intranet/extranet, internet connectivity is obtained for messaging and processing applications. The internet is now accessible on wireless devices such as palm top computers and cell phones. Internet is used to develop web applications. Internet is a universal network and web is an application running over it.

1.8.3 E-Commerce Types

A business organisation can organise itself to conduct e-commerce with its trading partners, which are businesses and/or with its customers. The resulting modes of doing business are referred to as Business-to-Business (B2B) and Business-to-Customer (B2C) e-commerce. There is Yet another category of e-commerce, referred as Consumer-to-Consumer (C2C). The auction or sale of goods by one person to another, through special auction sites run by business organisations, falls under this definition.

- **B2B:** This is e-commerce between businesses. The exchange of products, services or information between businesses on the internet is B2B e-commerce. Some examples of B2B websites include company websites, product supply and procurement exchanges, specialised or vertical industry portals, brokering sites, information sites and banking and financial sites that provide information for their business customers and employees. For example, Seekandsource.com is a very large Indian cross-industry market place that is ideal for businesses buying and selling to a wide cross –section of industries.

- **B2C:** This is business-to-customer e-commerce. It may be defined as any business selling its products or services to consumers over the internet for their own use. Amazon.com, the online bookseller that was launched in 1995 to sell books and other products directly to consumers, is a prime example of B2C e-commerce.

In addition to online retailers, B2C has grown to include services such as online banking, travel services, online auctions, real estate, health services.

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- **C2C:** This is consumer to consumer e-commerce. A virtual market place on the internet in the form of website enables sellers and buyers to meet and exchange goods, including used goods at a negotiated price in C2C. Such a site is known as an auction site and it started out like garage sale. The most famous site is eBay.com, which started the C2C revolution.

In all models, basic business and communication processes are executed through electronic documents. All transactions are paperless hence, confirmations, approvals signatures are electronically carried out and the party is informed through e-communication.

1.8.4 Advantage of E-Commerce

- The biggest advantage of e-commerce is that distance does not matter in carrying out trade. One can reach out to the world any time one wants. This helps the companies to have a cheap and effective way of communication with suppliers on one side, and customers, on the other.

- Any online store has the capability to stay open all the time of the year.

- Compared with a retail outlet or new office, the cost of setting up an e-commerce website is very low. It can be integrated straight into your infrastructure with very little overheads.

- There is more flexibility in a websites to add and remove a product or products than in catalogue or brochures.

- Another benefit is error reduction, because orders do not have to be re-keyed into order entry systems and increased efficiencies through the automation of the business processes.

- Other benefits include a wider choice and no wastage of time.

1.9 Electronic Data Interchange (EDI)

Electronic Data Interchange (EDI) refers to the structured transmission of data between organisations by electronic means. It is used to transfer electronic documents from one computer system to another, i.e., from one trading partner. It is more than e-mail. For instance, organisations might replace bills of lading and even checks with appropriate EDI messages.

The National Institute of Standards and Technology, in a 1996 publication, defined Electronic Data Interchange as “the computer-to-computer interchange of strictly formatted messages that represent documents other than monetary instruments. EDI implies a sequence of message between two parties, either of whom may serve as the originator or the recipient. The formatted data representing the documents may be transmitted from the originator to the recipient via telecommunications or physically transported on electronic storage media”. It goes on further to say that “in EDI, the usual processing of received messages is by computer only. Human intervention in the processing of a receiving message is typically intended only for error conditions, for quality review, and for special situations.

EDI can be formally defined as “the transfer of structured data by agreed message standards, from one computer system to another without human intervention”. Most other definitions used are variations on this theme. Even in this era of technologies such as XML web services, the Internet and the World wide Web, EDI is still the data format used for the vast majority of electronic commerce transactions in the world.

Notes

1.9.1 Standards

Generally speaking, EDI is considered to be a technical representation of a business conversation between two entities, either internal or external.

The EDI standards were designed to be independent of communication and software technologies. EDI can be transmitted using any methodology agreed to by the sender and recipient. This includes a variety of technologies, including modem, FTP, Email, HTTP.

EDI documents generally contain the same information that would normally be found in a paper document used for the same organisation function. For examples, an EDI 940 ship from warehouse order is used by a manufacturer to tell a warehouse to ship the product to a retailer. It typically has a ship to address, bill to address, a list of product numbers (usually a UPS code) and qualities. It may have other information if the parties agree to include it. However, EDI is not confined to just business data related to trade, but encompasses all fields such as medicine (e.g., patient records and laboratory results), transport (e.g., container and modal information), engineering and construction, etc. In some cases, EDI will be used to create a new business information flow (that was not a paper flow before). This is the case in the advanced shipment notification (856) which was designed to inform the receiver of a shipment, the goods to be received and flow how the goods are packaged.

1.9.2 Specifications

Organisations that send or receive documents between each other are referred to as “trading partners” in EDI terminology. The trading partners agree on the specific information to be transmitted and now how it should be used. This is done in human readable specifications (also called message Implementation Guidelines). While standards are analogous to building codes, the specifications are analogous to blue prints. The specifications may also be called a mapping but the term mapping is typically reversed for specific machine readable instructions given to the translation software. Larger trading “hubs” have existing messaged Implementation Guidelines, which mirror their business processes for processing EDI and they are usually unwilling to modify their EDI business practices to meet the needs of their trading partners. Often in a large company, these EDI guidelines will be written to be generic enough to be used by different branches or divisions and, therefore, will contain information not needed for a particular business document exchange. For other large companies, they may create separate EDI guidelines for each branch/division.

1.9.3 Advantages of EDI Over Paper System

- EDI and other similar technologies save company money by providing alternative to or replacing information flows that require a great deal of human interaction and materials such as paper documents, meetings, faxes, etc. Even when paper documents are maintained in parallel with EDI exchange, e.g., printed shipping manifests, electronic exchange and the use of data from that exchange reduces the handling costs of sorting, distributing organising and searching paper documents. EDI and similar technologies allow a company to take advantage of the benefits of storing and manipulating data electronically without the cost of manual entry.

- Another advantage of EDI is reduced errors, such as shipping and billing errors, because EDI eliminates the need to rekey documents on the destination side.

- One important advantage of EDI over paper documents is the speed in which the trading partner receives and incorporates the information into its system thus greatly reducing cycle times. For this reason, EDI can be important for just in time production systems.

Notes

1.9.4 Barriers to Implementation

- There are a few barriers to adopting electronic data interchange. One of the most significant barriers is the accompanying business process change. Business processes, built around slow paper handling, may not be suited for EDI and would require changes to accommodate automated processing of business documents. For example, a business may receive the bulk of their goods by 1 or 2 day shipping and all its invoices by mail. The existing process may therefore assume that goods are typically received before the invoice. With EDI, the invoice will typically be sent when the goods and will therefore require a process that can handle large numbers of invoices whose corresponding goods have not yet been received.

- Another significant barrier is the cost in terms of time and money in the initial set-up. The preliminary expenses and time that arises from the implementation, customisation and training can be costly and therefore may discourage some businesses. The key is to determine what method of integration is right for your company which will determine the cost of implementation. For a business that only receives one P.O. per year from a client, fully integrated EDI may not make economic sense. In this case, businesses may implement inexpensive “rip and read” solutions, or use outsourced EDI solutions provided by EDI “Service Bureaus”. For other businesses, the implementation of an integrated EDI solution may be necessary as increases in trading volumes brought on by EDI force them to re-implement their order processing business processes.

- Increased efficiency and cost saving drive the adoption of EDI for most trading partners. But even if a company would not choose to use EDI on its own, pressures from larger trading partners (called hubs) often force smaller trading partners to use EDI.

1.10 Summary

- Computer is an electronic device which accepts data and instructions as input and produce information as output.

- Though the first operational electronic computer was introduces to the world in 1946, but the historian assumes the starting of a computer age from 1951, when the first commercial computer UNIVAC was introduced.

- Computer Software system divides software system into two major classes – System Software and Application Software.

- High level language or Low level language is a programming language in which we write the instruction by using only 0s and 1s.

- Any collection of related information grouped together as a single item is a database. A Database uses the table format of rows and columns to store the information. Fields can contain any type of information, as long as each field always contains the same type of information. A database may be generated and maintained manually, or may be computerised.

- The hierarchical model has evolved from the file based system. The uses tree type data structure to represent relationship among records.

- Database designers are responsible for identifying the data to be stored in the database and for choosing appropriate structures to represent and store this data.

Notes

- PCs can be used for sharing of information with others having a similar type of equipment.
- When you send data from one location to another using any electronic means, it is called Data Communication.
- Networking is the concept where Two or more computers are joined to share information.
- The most important benefit of having networking in any organisation is to make the back-up process easier, allowing simultaneously access to critical programmes and data and last, but not least, streaming personal communication with e-mail.
- Domain name server gives each computer on the internet an internet address, or domain name, using letters and words, instead of numbers.
- The common uses of the internet include E-mail, USENET, TELNET, Gopher and Veronica.
- The www is the vast collection of online documents and information distributed over the internet.
- Some of the multimedia components include computer CD drive, monitor and speaker.
- E-commerce is a helpful innovation that allows business to cut cost, enabling it to provide better quality products in a quick time.
- EDI transmits documents to the trading partner's applications in a very short period of time with no human intervention.

1.11 Check your progress

1. The..... is a physical aspect of the computer which is governed by the program.
   a) Hardware
   b) Hardboard
   c) Hardcopy
   d) None of these.
2. ..... is a heart of the computer and this is where all the computing is done.
   a) Central processing Unit
   b) printer
   c) keyboard
   d) d) None of these
3. the computer keyboard in English uses:
   a) QWERTY base
   b) ASCII base
   c) Binary base
   d) None of these

4. …….. are the people whose jobs require access to the database:
   a) System Analysts
   b) End users
   c) Programmers
   d) None of the above
5. ……. Determine the requirements of end users:
   a) Programmers
   b) Users
   c) System Analysts
   d) None of the above
6. Which of the following communication modes support two ways traffic but in only one direction at a time?
   a) Simplex
   b) Half duplex
   c) Three quarter duplex
   d) None of the above
7. The device which performs modulation and demodulation is called:
   a) Modem
   b) Fiber optics
   c) Satellite
   d) None of the above
8. The host on computer finds another host by:
   a) Postal Address
   b) Electronic Address
   c) IP Address
   d) None of the above
9. The process of disguising a message, to hide its substance, is:
   a) Encryption
   b) Cryptography
   c) E-mail Spoofing
   d) Cryptanalysis
10. A standalone multimedia system includes computer, CD drive and:
   a) Floppy disk
   b) Display Unit
   c) Internet
   d) ERP
11. The use of Technology to automate business transaction and work flow is called:
   a) Multimedia
   b) E-commerce
   c) WAP
   d) None of the above

Notes

Notes

1.12 Questions and Exercises

1. What do you understood by the term computer?
2. Differentiate between low level language and high level language.
3. Write a short note on Database approach.
4. Who is a Database Administrator?
5. Write a note on different database users.
6. What are the important uses of Networks?
7. What applications are possible on internet using web technologies?
8. Discuss the importance of Firewall.
9. What is multimedia authoring?
10. Explain the working of electronic data interchange?

1.13 Further Reading

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5. Database System Concepts, McGraw Hill international Editions.
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7. E-commerce, Tata McGRAW Hill, Kamlesh Bajaj, Debjani Nag.