

BASICS OF INFORMATION TECHNOLOGY

B.L.I.Sc., Semester – II, Paper- I

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FOREWORD

Since its establishment in 1976, Acharya Nagarjuna University has been forging ahead in the path of progress and dynamism, offering a variety of courses and research contributions. I am extremely happy that by gaining 'A' grade from the NAAC in the year 2016, Acharya Nagarjuna University is offering educational opportunities at the UG, PG levels apart from research degrees to students from over 443 affiliated colleges spread over the two districts of Guntur and Prakasam.

The University has also started the Centre for Distance Education in 2003-04 with the aim of taking higher education to the door step of all the sectors of the society. The centre will be a great help to those who cannot join in colleges, those who cannot afford the exorbitant fees as regular students, and even to housewives desirous of pursuing higher studies. Acharya Nagarjuna University has started offering B.A., and B.Com courses at the Degree level and M.A., M.Com., M.Sc., M.B.A., and L.L.M., courses at the PG level from the academic year 2003-2004 onwards.

To facilitate easier understanding by students studying through the distance mode, these self-instruction materials have been prepared by eminent and experienced teachers. The lessons have been drafted with great care and expertise in the stipulated time by these teachers. Constructive ideas and scholarly suggestions are welcome from students and teachers involved respectively. Such ideas will be incorporated for the greater efficacy of this distance mode of education. For clarification of doubts and feedback, weekly classes and contact classes will be arranged at the UG and PG levels respectively.

It is my aim that students getting higher education through the Centre for Distance Education should improve their qualification, have better employment opportunities and in turn be part of country's progress. It is my fond desire that in the years to come, the Centre for Distance Education will go from strength to strength in the form of new courses and by catering to larger number of people. My congratulations to all the Directors, Academic Coordinators, Editors and Lesson- writers of the Centre who have helped in these endeavors.

Prof. P. Raja Sekhar

**Vice-Chancellor (FAC)
Acharya Nagarjuna University**

SEMESTER - II

201BL21- *BASICS OF INFORMATION TECHNOLOGY*

Unit-I

Basic of Information Technology: Information Technology in Daily Life – What Comprises Information Technology? – How Computers Work – The Software

Unit-II

Application Areas of Information Technology: Information Technology in Office and Workplace– Information Technology and Multimedia –Information Technology and New Applications –Information Technology and Career Opportunities

Unit-III

Internet and World Wide Web: Internet Basics – Browsing and Internet – Websites and Search Engines – Internet Applications

Unit-IV

Library Automation: Introduction to Library Automation – Software for Library Automation – Network – Digital Libraries

Text and Reference books:

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BASICS OF INFORMATION TECHNOLOGY

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LESSON-1

INFORMATION TECHNOLOGY

IN

DAILY LIFE

Structure

- 1.1 Aims and Objectives**
- 1.2 Introduction**
- 1.3 Computer-the Multipurpose Tool**
- 1.4 Characteristics of Computer**
- 1.5 Need for Computer Literacy**
- 1.6 Information Technology in Daily Life**
- 1.7 Limitations**
- 1.8 Self-Assessment Questions**

1.1 AIMS AND OBJECTIVES

This lesson aims at describing the important computer in daily life.

After going through this lesson the student is able to understand:

- the characteristics of Computer,
- the need and purpose of Computer,
- the information technology in daily life etc.,

1.2 INTRODUCTION

The world is undergoing a major social and economic change, a second Industrial Revolution, through the new information processing technology of communications and computers. Computer, intern, has given birth to a new industry broadly as Information Technology. It is changing all aspects of our life and life styles.

1.3 COMPUTER-THE MULTIPURPOSE TOOL

The word “computer” from the ‘compute’ which means to calculate. Computer is an electronic data processing machine, which receives and stores large volume of data in the form of symbols and digits and processes them at a high speed as per the instructions and outputs the results with great speed and accuracy.

1.4 CHARACTERISTICS OF COMPUTER

Speed: A computer works one step at a time. It can add and subtract numbers, compare letters to determine alphabetic sequence and move and copy numbers and

letters. The time required for computers to execute basic operations as adding and subtracting varies from a few microseconds to nanoseconds.

Accuracy: In addition to being very fast, computers are very accurate. If the input data entering the computer are correct and if the program of instructions is reliable, then we can expect the computer generally to produce accurate output.

Memory: Every piece of information that is stored within the computer's memory is encoded as some unique combination of zeros and ones. These zeros and ones are called bits. Each bit is represented by an electronic device.

Versatility: The ability to communicate with other systems and adapt to several modes like audio visual, user's friendly etc.

Network capability: A group of computers can be interconnected through some wires to communicate one with the other, to transfer data from one computer to another is called networking of computers. We can connect computers located at away places – perhaps several hundred miles away through telephone lines.

Diligence (Tirelessness): Unlike human beings, a computer is free from monotony, tiredness, lack of concentration, etc., and hence can work for hours together without creating any error and without grumbling.

1.5 NEED FOR COMPUTER LITERACY

Computer education has become a buzzword due to the rapid advancements in technologies worldwide. It was essential to have science education, technical education and professional education to survive in employment market in industrial era. Today, it is continuous and lifelong education that has become essential to survive in the employment market in the knowledge era. Information will provide us with an extra edge that is required to compete effectively against other competitors and succeed. Computers in today's world are playing continuous increasing role in every facet of human existence. The information processing power of a computer has been harnessed for diverse applications from probing the inner structure of human brain to probing the very limits of outer space. Computer controlled robots are being used for manning complete production lines in industrial complexes.

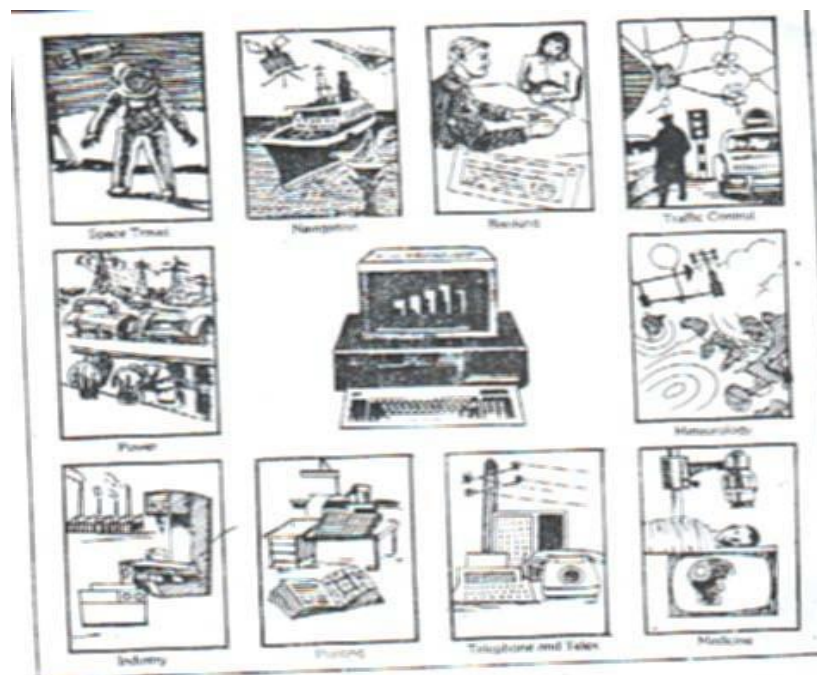
Even today there is a misconception that computer literacy requires high education and should have engineering skill and mathematical background for operating the keyboard of a computer to perform tedious and complex arithmetical operations. But, this is not entirely true. Every one of us has been using a bicycle or a motorcycle or cell phone in our day-to-day life. But most of us do not know or never cared to know the parts of machines, or how the machine work or why the gadget fails or malfunctions at times. However, complete ignorance, many a time, make us victims of exploitation by some unscrupulous repair persons. A little bit of literacy to read the manual that is given

to us when we purchased the gadget helps us to check the urge of running to a familiarize ourselves with the technical words and communicate intelligently with the mechanic dealing with the repairs. Thus literacy helps us know about the electrical gadgets even if we don't own them we intend buying them in future. Computer literacy, is a similar way need not be for those who own computer. This course is intended to make you computer literate.

1.6 INFORMATION TECHNOLOGY IN DAILY LIFE

Today Information Technology has pervaded nearly every sphere of our lives. Stop for minute and think of the areas where you encounter Information Technology in your daily chores.

- The news you watch on TV is brought to you because of computers through satellite communication networks using IT
- The newspapers you read early in the morning is formatted and edited by computers using IT
- The airlines and trains you travel are scheduled and monitored by communication networks and computers using IT
- The clothes you wear are designed and textured by computers using IT
- Your transactions are controlled in your computerised bank branch by using IT
- Your telephone bills, electricity bills are generated using IT
- Your reservations in RTC buses, Railways, Airlines are carried out by computers
- You appeared for an examination and universities and board are keeping their results as their own web pages which you can access any time and from any where



Indeed there seems to be no limit to the capacities and capabilities of computers in placing information at your fingertips. Mere touch of a button or a few buttons and the following the directions given through a voice or displayed on a monitor will get you the latest and reliable information instantly.

Other than the direct users of a personal computer or IT in your daily life there do exist areas, which indirectly make you feel the power and influences of Information Technology. Let us see some examples.

OFFICE AUTOMATION: Computer in offices performs multifarious functions. Computers and communication technologies have revolutionized office atmospheres. Computer-based word processing software can efficiently create, edit and print documents and electronic mail system accept messages from a setting station, store these messages in electronic form and transmit them on demand over communication channel to the stations of recipients.

COMPUTERISED FINANCIAL ACCOUNTING: Based on the manual procedure the computerised financial accounting system adopts a similar procedure. The vouchers are first allotted the code of expenditure head by the accountant and entered in to the computer for further processing and generating output reports. These records are stored in a database file in the secondary memory. During and after the entry in computed, the system validates the correctness of each transaction through in built controls. Today the companies are used several financial accounting and payroll packages.



Home based work courtesy of International Business Machines.

EDUCATION: Computers are used in teaching-learning process. Computer Aided Learning (CAL) and Computer Aided Instruction (CAI) make the teaching learning process a pleasure to the student and the teacher. From the teacher's point of view, the

advantage of computer technology is that the material can be customized to meet the needs of the class. Computer generated question papers to take an examination as and when the student is ready and declaring instantaneous result by along with the marks scored has helped many learners to cope with the fear of examination syndrome.

COMPUTER GRAPHICS: Graphics is a branch of science that deals with pictures. A pixel stands for a picture element, which is the smallest entry in a drawing. Computer Aided Design (CAD), deals with manipulation of designs on the screen and Computer Aided Manufacturing (CAM) deals with manufacturing process. The design is manipulated on the screen to satisfy the demands of the clientele and to incorporate their optional demands.



Image processing courtesy of International Business Machines



Desktop publishing courtesy of Hewlett-Packard

DESK TOP PUBLISHING: Word Processing have many limitations as far as their use in publishing cycle is concerned. Desk Top Publishing (DTP) overcomes many problems of word processing and is a great boon to people like copy editors, compositors, proof readers, artist, designers and others. DTP combines both creativity and commercial activity using skills oriented Information technology.

MEDICINE: Computers are used monitoring patients, raising the alarm if heart stops beating or if breathing falls beyond a certain level. Computers controlled electronic scanners can build up a picture of a patient 'Slice by Slice' by measuring the strength of rays, which have been sent through the body. Computers could also be useful as medical experts, helping to diagnose and treat to diagnose illness much more easily if they consult the data bank having the details of thousands of diseases and their symptoms.

LEGAL PROFESSION: Lawyers use online databanks to locate precedent cases in order to serve client better. They can also use computers for following up court cases. Many have started using sophisticated dictating systems to record their data by speaking into audiotapes or directly into computer systems.

COMPUTER AT HOME: Self-study and Entertainment

Millions of people use home computers for education and information. The

children and adults in home use many of the educational software programs. Encyclopedias, dictionaries, atlases, almanacs, telephone directories, medical references and other specialized references now come in low cost CD-ROM versions-often with multimedia capability. People use home computers mostly to play games. Computer games can simulate board games, card games, sporting events, intergalactic battles and street fights. Digital Video cameras captures images on silicon chips rather than on the 16- or 15 millimeter film that spools through a traditional film camera. Such digital data can be transmitted to cinemas via satellite or fibre optic cables when digital projectors become wide spread.

E-COMMERCE: By logging on to appropriate websites of commercial firms and vendors you can buy books, CDs, Music cassettes, gifts, travel tickets, hotel accomodation etc., using computers. The convenience of shopping from home using credit cards brings shops to the house. Payments to utilities, Drivers license, various types of certificates from government offices can be and through computers.

GEOGRAPHICAL INFORMATION SYSTEM (GIS): A Geographical Information System (GIS) relates data to maps. National sales shown by country, state, or region using colors for various ranges of sales, making it easy to spot where sales are high and low. Management then has knowledge of where sales are lower than expected. With out GIS system this kind of analysis is so time consuming that is not done on a regular basis. Problem areas remain undiscovered, and actions delayed, for months or even years.

1.7 LIMITATIONS

In additions to the too many benefits we driven from computers applications, we also have negative effects and problems. Data secrecy and data integrity are the major issues. This is more strategic areas like defense, space, banking etc. The privacy issue is another major problem like data secrecy and it is difficult to maintain privacy. Personal data available on network of computers may be put to unauthorized use or misuse government, commercial organizations or black mailers. Computers may causedamage to personal health and hygiene persons sitting before the terminals continuously for hours together are vulnerable to ultra violet radiation emitted by the displays from video display unit. Virus may attach computers, especially if they are inter-connected by a network. Viruses may destroy data, re-written make programs to malfunction, make computers slow down etc.

1.8 SELF-ASSESSMENT QUESTIONS

- What are the important characteristics of Computer
- Explain the importance of being computer literacy
- Explain the applications of Information Technology
- What are the limitations of the use computers

LESSON-2

WHAT COMPRISES OF INFORMATIONTECHNOLOGY

Structure

- 2.1 Aims and Objectives**
- 2.2 Introduction**
- 2.3 The History of Computers**
- 2.4 Data and Information**
- 2.5 Characteristics of Information:**
 - 2.5.1 Information transfer chain**
 - 2.5.2 Economics of Information**
- 2.6 Information Systems**
- 2.7 What is Information Technology**
- 2.8 Self-Assessment Questions**

2.1 AIMS AND OBJECTIVES

In this unit the lesson “What Comprises of Information Technology” describes about the History Computer and what is information technology. After going through this lesson the student is able to understand :

- history of computers,
- characteristics of computers and
- what is information technology

2.2 INTRODUCTION

After decades of slowly expanding behind the scenes, Information Technology has suddenly exploded into public news and seems to be everywhere in the popular media. The evolution of computers has passed through a number of stages before it reached the present state of development. From the Abacus to the microcomputer the counting systems have under gone tremendous stage.

2.3 THE HISTORY OF COMPUTERS

Necessity is the mother of invention. The saying holds true for computers also because computers were invented as a result of man’s search for fast and accurate calculating device. The earliest device that qualifies as a digital computer is the ‘Abacus’ also known as ‘Soraban’. This device permits the users to represent numbers by the position of beads on rack. Simple addition and subtraction can be carried out rapidly and efficiently by positioning the beads appropriately.

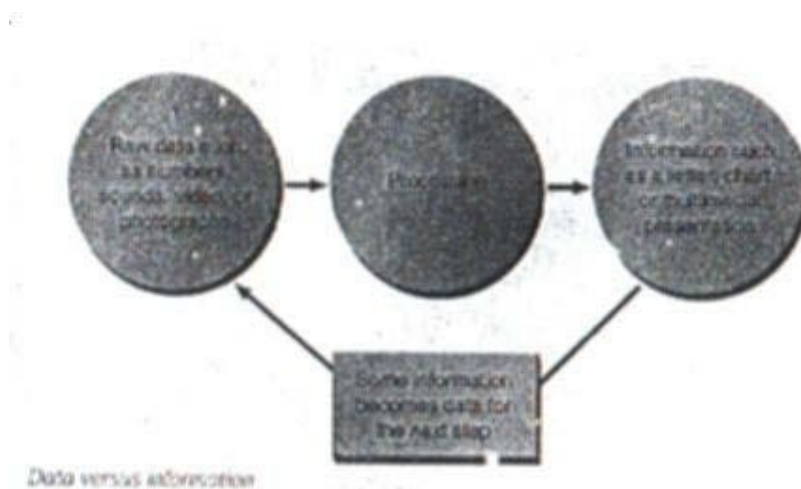
Although, the abacus was invented around 6000B.C., it is interesting to note that it is still used in Russia, Japan, Far East and even in India for primary education.

Another manual calculating device was John Napier's bone or Card board multiplication calculator. It was designed in the early 17th. century and its upgraded version were in use even around 1890. The first mechanical adding machine was invented by Blaise Pascal in 1642. Later, in the year 1671, Baron Gottfried Wilhelm VonLeibnitz invented the first calculator for multiplication. Keyboard machines originates inthe United States around 1880 and are extensively used even today. Around this periodonly Herman Hollerith came up with the concept of punched cards, which are extensively used as input media in modern digital computers. Business machines and calculators made their apperance in Europe and America towards the end of the 19th century.

Charles Babbage, a nineteenth century Professor of Cambridge University, is considered to the father of modern digital computers. Babbage designed a 'Differential Engine' which could evaluate accurately algebraic expressions and mathematical tables correct up to 20 decimal places (20 digit accuracy). In 1842, Babbage came out with his new idea of 'Analytical Engine' that was intended to be completely automatic. It was to be capable of performing the basic arithmetic functions for any mathematical problem and it was to do so at an average speed of 60 additions per minute. Unfortunately, he was unable to produce a working model of this machine mainly because the precision engineering required to manufacture the machine was not available during the period. However, his efforts established a number of principles, which have shown to be fundamental to the design of any digital computer. At first, computers were the experimental toys of university researchers and then they become the tools of government establishments and giant corporations. They were huge, expensive, individually designed and manufactured, and beyond the reach of any but the wealthiestorganizations. Computers have proliferated, becoming increasingly fast, powerful, smalland cheap.

2.4 DATA AND INFORMATION

The term data is used to describe basic facts about the activities of a business. Data is generally in the form of names and numbers, times, dates, weights, prices, costs, employee names, product names, names of books, schools, students, teachers, roll numbers etc. Data is gathered either from primary sources or secondary sources. Primary sources refer to the exercise of going to the field and collecting or gathering the data through interviews or by administering questions or by conducting surveys. Secondary sources refers to sources like census reports which are published or surveys conducted earlier or material available through earlier research studies.



Information is the set of data, which has been converted or organized into a more useful or intelligible form. Thus the assembling items of data into a meaningful form obtain information. Where as marks obtained by students and their roll numbers from the data, the report card/sheet is the information. Other forms of information are pay slips, schedules, reports, worksheets, bar charts, invoices, and account returns. It may be remembered that information may be processed and manipulated further to form knowledge.

Knowledge refers to the ability of a person who acquires the power of discrimination by his observation, experience and maturity. These are personal traits and cannot be quantified by a person's analytical skills. We can only say that data are building blocks for generation of information and information works as the building blocks for generation of knowledge.

2.5 CHARACTERISTICS OF INFORMATION

Information may characterized in different ways:

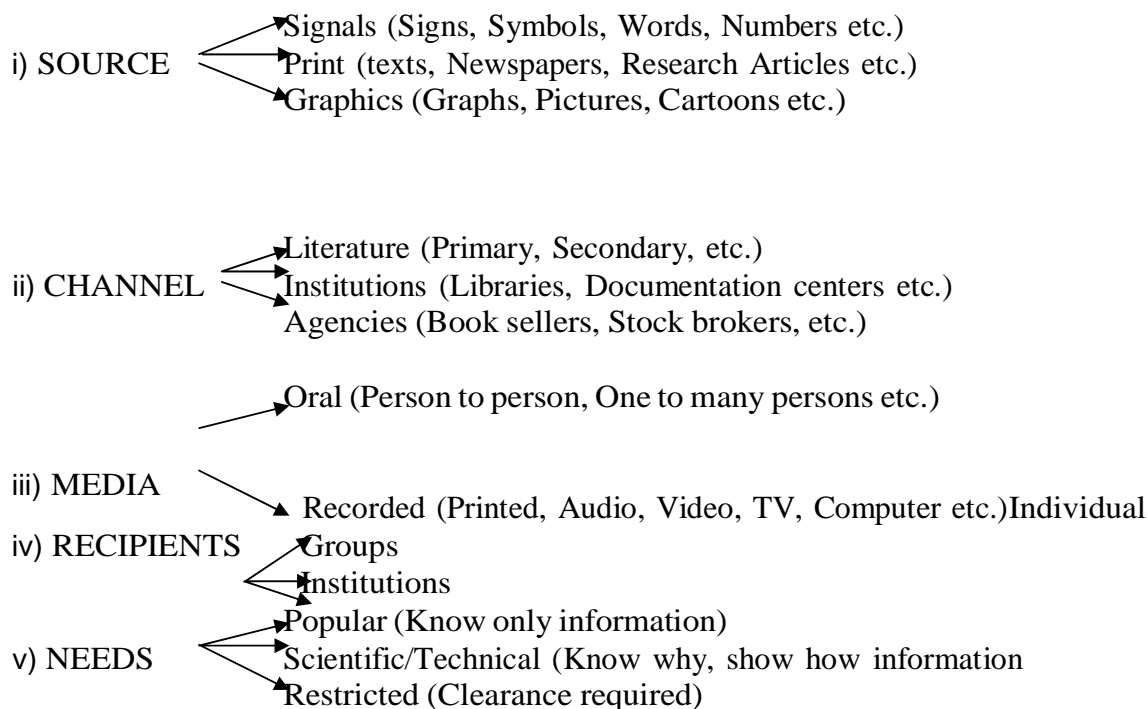
Properties of information: Information may be divided into three categories General information can be shared by any one and can be used simultaneously without any loss to any one. The information on arrival and departure of RTC buses, Seminars, Cinemas, airplanes, examination notifications, job notifications and other examples falls under general information Scientific and technical information is usually available in printed form in scientific journals, technical manuals and reviews of printed articles. This information is universal and is prone to be obsolete over long periods of time.

Restricted information is not accessible to every one unless they are cleared by the agency who disseminates such information. Information of defense capabilities of a country or the economic standing of a business or the research findings of a country of

the effect of a new drug to be kept away from competitors, are some examples of restricted access to information.

2.5.1 Information transfer chain

Based on the purpose for which the information is generated and the need of end users, the types of information can be grouped using the following characterization.



2.5.2 Economics of Information

Information is a valuable resource to any organization. Just like other resource, information should be used to obtain optimal results. The costs of acquired data, converting data into information and dissemination of information involve

- i) Hardware costs
- ii) Software costs
- iii) Updating costs
- iv) Inventory costs
- v) Operational costs

2.6 INFORMATION SYSTEMS

An information is the system that allows perfect interaction between the man and computer or group of interconnected computers and man is the professional who uses the computers. The various subsystems are

- i) Office automation systems (OAS)
- ii) Transaction Processing systems (TPS)
- iii) Management Information systems (MIS)
- iv) Decision Support systems (DSS)
- v) Knowledge Based systems (KBS)

2.7 WHAT IS INFORMATION TECHNOLOGY

The phrase in Information Technology (IT) refers to the creation gathering, processing, storage, and delivery of information and the processes and devices that make all this possible. Think of these processes and devices as tools that make your life and career better or more efficient. The tasks that are handled using information technology continue to increase almost on a daily basis. No matter what field of study you major in, or where you are employed, you will be sure to find information technology at work.

Information is the act of informing or the condition of being informed, the communication of knowledge, and knowledge derived from the study experience, or instruction. Technology is the application of science especially to industrial or commercial objectives. Thus information technology refers to process of generation, processing, retrieving, presentation and dissemination of information. Information Technology can do at least three things.

Information Technology can process raw data into useful information. Information Technology can recycle processed information and use it as data in another processing step. Information Technology can package information in a new form so it's easier to understand, more attractive or useful.

2.8 SELF-ASSESSMENT QUESTIONS

- Discuss the difference between Data and Information
- Explain the characteristics of Information
- What is Information Technology

LESSON 3

HOW COMPUTERS WORK

Structure

- 3.1 Aims and Objectives
- 3.2 Introduction
- 3.3 Binary Code
- 3.4 Structure of a Computer
- 3.5 Generations of Computers
- 3.6 Classification of Computers
- 3.7 Memory and Storage
- 3.8 Input/Output Devices
 - 3.8.1 Input Devices
 - 3.8.2 Output Devices
- 3.9 Self-Assessment Questions

3.1 AIMS AND OBJECTIVES

The main aim of this lesson is to explain “How Computers Work”. The various aspects explain the functioning of computers, after going through this lesson the student is able to understand :

- binary code and structure of computers
- the generation of computers
- classification of computers and
- the input, output and storage devices of computers

3.2 INTRODUCTION

The computer is at the very heart of modern Information Technology. The Internet, the most powerful information media, which connects other networks of computers around the globe, is essentially depending on computers. The hardware is applied to any of the physical equipment in a system, usually containing electronic components and performing some kind of function is information processing. Hardware includes not only the computer and devices such as screens and printers, but also all the elements used to information system together.

Modern computer can work at very high speeds and at the same time are very reliable. All computer systems perform the following five basic operations.

Inputting: The process of entering data and instructions into the computer system

Storing: Saving data and instructions so that they are available for initial or for additional processing as when required.

Processing: Performing arithmetic operations or logical operations (comparisons like equal to, less than, greater than, etc.) on data in order to convert them into useful information

Outputting: The process of producing useful information or results for the user, such as a printed report or visual display.

Controlling: Directing the manner and sequence in which all of the above operations are performed.

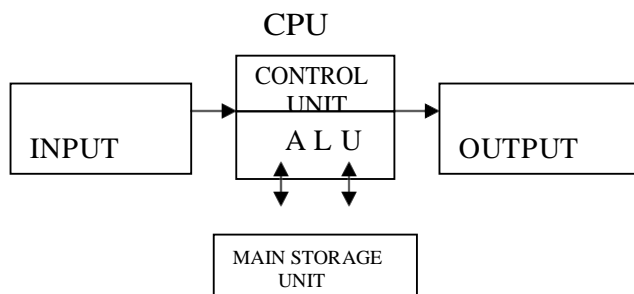
3.3 BINARY CODE

We use the digits 0 through 9 for representing any number. This numbering system uses 10 digits, 0 to 9, and is called decimal system, which we use, in our day-to-day life. In modern digital computers data is represented in binary form by using the two digits 0 and 1, called Binary digits or Bits. To represent a symbol or a number, the digital computers use a combination of digits 0 and 1. The major advantage of the binary system is that information represented by the bits can be processed in several ways with a variety of devices. For example, on or off, high or low, light or dark, up or down, states or other polarities can stand for the 1 and the 0 combinations. All these techniques of paired states are used in microcomputers to store, process and display of information.

Most of the first generation computers are of eight-bit type. This is to say, eight bits are used to represent a character 'internally' in the computer. That means, to represent a character, a combination of eight digits filled in by zeros and ones is used. Advanced computers use two bytes or 4 bytes to represent numbers internally. Another unit of information, which a computer can process, or transfer at a time is called word. A word must be equal to number of bits transferred for the central processing unit and the main memory in a single step or it can be defined as the basic unit of storage of integer data in a computer. Normally, a word may be of 8, 16, 32 or 64-bit length. The items like 32 bit computers, 64 bit computers etc., refers to the word size of the computer.

3.4 STRUCTURE OF A COMPUTER

The structure of computer consists of three elements Input Device, Central Processing Unit (CPU), and Output device.



Input Device: It is a device through which we can send data into the computer for processing and storage. Keyboard is one such famous input device, which can be used to send data directly into the computer system. Other input devices are Mouse, Touchscreen, Microphone, Scanner etc.

Central Processing Unit (CPU): The CPU consists of the Control Unit (CU), the Arithmetic Logic Unit (ALU), and the Main Storage (Primary memory).

- i) **Control Unit:** The control unit consists of electronic circuits. It acts as a supervisor in a computer system. It obtains instruction from the main memory, interprets them, decides the action to be taken and directs the other units to execute them. It keeps check of correct information from the computer system. Normally the instructions are executed sequentially (i.e. one after the other) in the machine.
- ii) **Arithmetic Logic Unit:** The ALU takes care of mathematical operations such as addition, subtraction, multiplication and division. It also takes care of logical decisions (Comparison $>$, $<$, $=$ etc.).
- iii) **Main Storage:** It is also called primary memory. It holds information that comes from the input device and makes it available to the ALU when actual calculations are to be performed. It also retains the results returned by the ALU until they can be displayed on the output device. This memory also holds the program instructions.

Output Devices: The results of any computer processing have to be communicated to the users. Output devices translate the computer's output into a form understandable by human beings. Similar to input devices, these also involve the presentation of information in a variety of forms. Output devices are video display unit (VDU), printers, magnetic tape, magnetic disk, floppy disk, plotter etc.

Since a computer is made up of integrated components (input and output devices, storage and CPU) that work together to perform the steps called for in the program being executed, it is a system. The input or output devices cannot function until they receive signals from the CPU. Similarly, the storage unit or the CPU alone is of no use. So, the usefulness of each unit depends on other units and can be realized only when all units are put together (integrated) to form a system.

3.5 GENERATIONS OF COMPUTERS

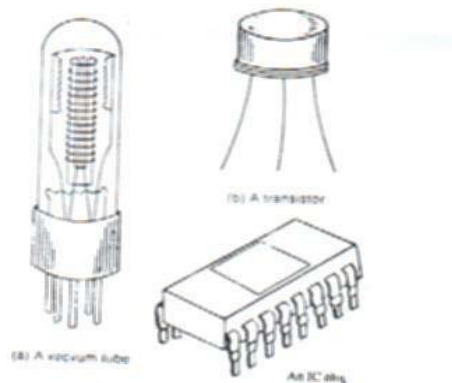
Generation in computer talk is step in technology. It provides a framework for the growth of the computer industry. Originally, the term generation was used to distinguish between varying hardware technology. But now a days, it has been extended to include both the hardware and the software, which together make up an entire computer system.

First Generation (1942-1955): The ENIAC (The Electronic Numerical Integrator and Calculator) was designed in 1845, which can be treated as the origin for first generation computer. The first generation computers are those in which vacuum tubes are used. Magnetic tape drives and magnetic core memories were developed during this period. All the first generation computers possessed the following characteristics as compared to the latter models.

- Large in size
- Slow operating speeds
- Restricted computing capacity
- Limited programming capabilities
- Short life span
- Complex maintenance schedules

Second Generation (1956-1965): Computers were marked by the use of a solid-state device called the transistor machines, which were much faster and more reliable than their counter parts. All the second generation computers possessed the following characteristics.

- Smaller in size as compared to first generation computers
- More reliability
- Less heat generated
- These computers were able to reduce computational times from milliseconds to microseconds
- Less prone to hardware failures
- Better portability
- Wider commercial use



Electronics devices used for manufacturing computers of different generations.

Third Generation (1966-1975): Advances in electronic technology continued and the advent of 'micro electronics' technology made it possible to integrate large number of circuit elements into very small (less than 5 mm square) surface of silicon known as chips. This new technology was called integrated circuits (IC's). The third generation was based on IC technology and the computers that were designed with the use of integrated circuits were called third generation computers. The main advantages are

- Smaller in size as compared to previous generation
- Even more reliable than second generation
- Even lower heat generated than previous generation
- These computers were able to reduce computational times from microseconds to nanoseconds
- Maintenance cost is low because hardware failures are rare
- Easily portable
- Less power requirement than previous generations
- Commercial production was easier and cheaper

Fourth Generation (!976 to present): Initially, the integrated circuits contained only about ten to twenty components. This technology was named small Scale Integration (SSI). Later, with advancement in technology for manufacturing ICs, it became possible to integrate upto a hundred components on a single chip. This technology came to be known as Medium Scale Integration (MSI). Then came the era of Large Scale Integration (LSI) when it was possible to integrate over 30,000 components on to a single chip. Effort is still on far further miniturization and it is expected that more than one million components will be integrated on a single chip known as Very Large Scale Integration (VLSI). The main advantages are

- Smallest in size because of high component density
- Very reliable
- Heat generated is negligible
- Much faster in computation than previous generations
- No air conditioning required in most cases
- Hardware failure is negligible
- Easily portable because of their small size
- Totally general purpose
- Cheapest among all generations

Development in Recent Years: During 1980's the emphasis on networking on computer systems through several types of networks like Local Area Networks, wide Area Networks etc. Initially networking was used to access Mainframe computers from users terminals and share the computing power and resources of the mainframe. Internet, a power tool network of networks, was thrown open to public in 1992. Internet on TV, Internet on Cell phone, Telephone conversation via internet, Video conferencing over Internet are some recent happenings.

3.6 CLASSIFICATION OF COMPUTERS

Computers may be categorized as Microcomputers, Minicomputers, Mainframe computers and Super computers.

Microcomputers: A microcomputer is the smallest general purpose processing system. Functionally it is similar to any other large system. Microcomputers are self-contained units and usually designed for use by one person at a time. Since microcomputers can be easily linked to large computers, they form a very important segment of the integrated information systems. Ex: Personal Computers (PC)

Minicomputers: A minicomputer is a medium sized computer that is more costly and powerful than a microcomputer. A system that supports multiple users is called multiterminal, time sharing system. Minicomputers are the popular data processing systems among the business organizations today.

Mainframe computers: Computers with large storage capacities and very high speed of processing (compared to micro or mini computers) are known use by a variety of users simultaneously. They are also used as the central host computer in distributed data processing system.

Super Computers: These have extremely large storage capacities and computing speeds, which are at least 10 times faster than other computers. While the speed of traditional computer is measured in terms of millions of instructions per seconds (nips), a super computer is rated in tens of millions of operations per second (mops), an operation is made up of numerous instructions. Typically, the super computer is used for large scale numerical problems in scientific and engineering, weather forecasting, structural analysis, chemistry, medicine and physics.

3.7 MEMORY AND STORAGE

For computer work, it must contain memory where it can store data and programs until they are needed. In the computer, the storage is on memory chips of many kinds, which basically, however, fall into two categories: Read Only Memory (ROM) and Random Access memory (RAM).

Read Only Memory (ROM): ROM is static and unchanging, as a result it is called nonvolatile memory. The data in ROM is permanently recorded on memory chips by the computer's manufacturer prior to their being sold or shipped and you can't change it. ROM is generally used to store programs and instructions that computer frequently needs, sometimes called firmware.

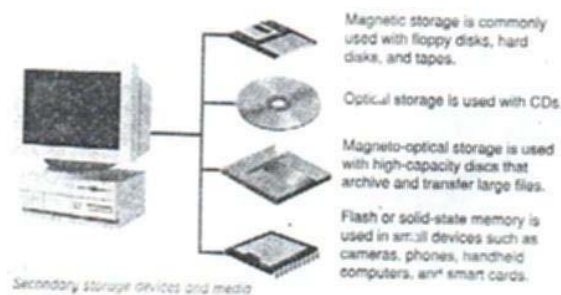
Random Access Memory (RAM): RAM is used to store on ever-changing parade of programs and data you enter using the keyboard is stored in random access memory (RAM) also called main, primary or user memory. Usually, if you turn off the computer,

any programs or data stored in this memory are lost, thus RAM is said to be volatile memory.



The term random comes from the way the data in memory can be located or accessed by the computer. One way to understand random is to think of the differences between a tape cassette and an audio CD disc. To play third song on a tape cassette, you must first advance the tape past the first two songs. This is called sequential access because you access each song in sequence with an audio CD disc you can go directly to the track where the third song begins. This is called random access because you can randomly access songs without first advancing through the songs that precede them.

Caches: Earlier computers used magnetic core memory. Modern computers use semiconductor memory as RAM. Semiconductor memory is faster and cheaper than magnetic core memory. Magnetic materials are used in tapes and discussed for the external/auxiliary memory.

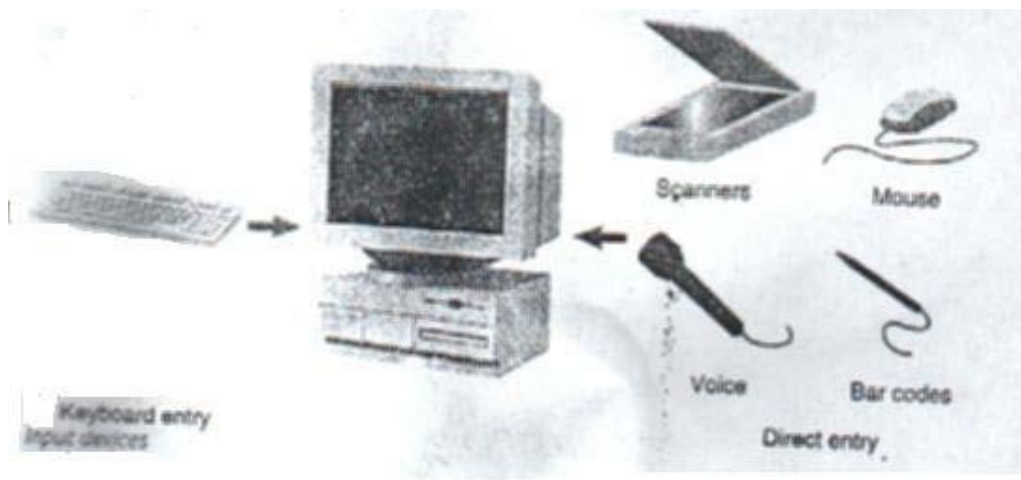


3.8 Input/Output Devices

The Input/Output devices provide the means of communication between the computer and the outer world. Input devices are used to enter data into primary storage and output devices accept result from the primary storage to supply them to users or to store them on a secondary storage device for future processing.

3.8.1 Input Devices

Keyboard: The computer keyboard is probably the most used input device. The keyboard resembled a type writer. The alignment of the alphabetical keys are similar those in the type writer. The computer has three categories of keys. Alphanumeric keys, Function keys and special keys. The alphanumeric keys comprise alphabets, numbers and special characters like !, @, #, \$, %, etc. The function keys perform a set of operations by a single key stroke. The function keys can be used for various functions. They can be configured as needed, Ex: F1, F2,F12. Special keys perform specific tasks. Some of the special keys are Del, Ctrl, etc.



Mouse: The most popular pointing device is the mouse, which can accounts for about 80 percent of all pointing device sold. One type of mouse houses a rolling ball and one or more buttons that you press to execute commands. As you move the mouse around on a flat, smooth surface, the ball rolls and feeds electrical signals to the computer to move a mouse pointer on the screen.

Scanners: A scanner enables the user to make a copy of the picture or script on a paper and transfer it into the computer instantaneously. Photographs can also be scanned.

Voice Recognizers: These are able to hear the spoken words and then either execute them as commands or enter them as texts.

Optical Mark Recognition (OMR): These devices can sense marks on computer readable paper. This device is used by the institutions conducting competitive exams to large numbers and for grading of students based on the answers they write in the exams.

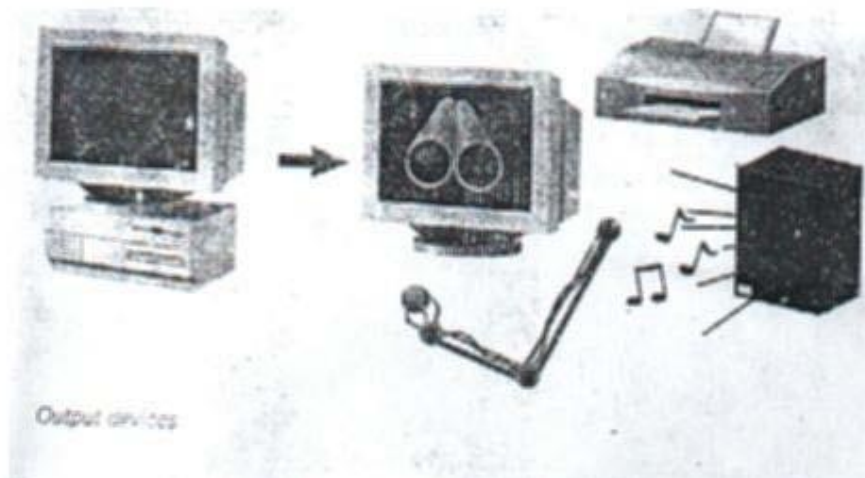
Barcode Reader: Data can be encoded in the form of light and dark vertical bars with coded spacing and varying thickness. These are called barcodes, which are commonly used to identify the items.

Magnetic Ink Character Recognition (MICR): MICR is widely used by banks in processing cheques. The cheque number, the bank branch code and the account number are printed on a cheque. At the time of processing, the amount of transactions is also written using magnetic ink. It is to save time in data entry and also ensures accuracy in data, due to elimination of manual process.

Joysticks: This device is similar to the mouse and also a pointing device. Joysticks are like the controller in an airplane and are most often used with games.

3.8.2 Output Devices

Video Display Unit (VDU): Video display screens are the popular input cum output devices. The screens are similar to Television screen with 12 to 15 inch viewing screen. Normally 24 or 25 lines with 80 characters in each line are displayed on the screen at a time. A Cathode Ray Tube (CRT) operates much like those in television sets on screen. CRT screens are relatively heavy and bulky. So Liquid Crystal Display (LCD) screens are used in personal computers. Visual display screens are used to receive alphanumeric and graphic output information. Graphic output can be copied using printers, plotters and film recorders.



Printers and Plotters: The result of output of the processed data from the computer is delivered to the output devices namely printers and plotters. Printers produce text information whereas plotters draw directly figures and graphs.

Dot Matrix Printer: Mostly used with a personal computer relatively cheaper compared to other technologies. This uses impact technology; characters are produced in matrix format. The speed ranges from 40 characters per second to almost 1000 characters per second.

Ink Jet Printers: It shoots out small dots of ink on to the paper. Droplets of ink are guided to the proper positions on the paper by electrically charged deflection plates. Combination of several of these ink dots form the desired character text and graphics of high quality are produced. This printer has two toner sections. One is black and white toner and the other is color toner. The selection of toner is optional.

Laser Printers: These are non-impact printers that use laser beam. A page of text or pictures is composed at a time. In these printers, an electronically controlled laser beam traces the desired characters to be printed on a photoconductive drum. The drum attracts an ink toner on the exposed areas. That image is transferred to the paper, which comes in contact with the drum. Laser printers are quiet and they produce high quality output. They print 4 to 8 pages per minute.

3.9 SELF-ASSESSMENT QUESTIONS

- What are the basic units of computer
- Discuss the classification of computers
- What is the difference between ROM and RAM
- Explain the Input and Output devices

LESSON 4

INFORMATION TECHNOLOGY IN OFFICE AND WORK PLACE

Structure

4.1 Introduction

4.2 Virtual Work Place

4.2.1 I.T. and Small Business

4.3 Information Systems

4.4 Office Automation

4.5 Assistive Technology

4.6 Intranet

4.7 Virtual Private Networks (vpns)

4.8 Computers and Health Hazards

4.9 Privacy and Security

4.10 Self-Assessment Questions

4.1 INTRODUCTION

Generally in any office, there are three categories of people.

Secretarial and Clerical- they type out letters, file them, retrieve them, make phone calls, buy petty things and carryout mechanical things they offer indispensable support services

Executives and Management staff- These people plan what is to be done, set goals as to what is to be achieved, supervise and guide other people in work, authorize budgets and monitor expenses etc.

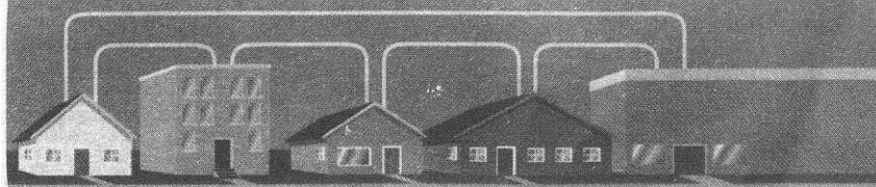
Professionals- who are experts in various disciplines like accounting, purchase, taxation etc who carryout their work towards common goals of the organization.

4.2 VIRTUAL WORK PLACE

Virtual workplace is defined, as an omnipotent workplace that encapsulates is aspects of the social and culture form of the logical as well as physical facets of working life. Information and communication technologies have enabled the transformation towards a virtual work. More interestingly, telecommunication is the glue that makes virtual societies possible. It is interesting to note that are no longer talking about 'work at home' programs, rather, they are speaking about 'working in any where, any time, and with any one'. The concept is quickly becoming a reality where connectivity, collaborations, communications are easy using laptops, facsimiles, cellular telephones, networks, electronic mail and voice mail. The Virtual workplace may well be the Standard mode of conducting commerce in 21st century. Elaborate videoconferencing rooms fast giving way to desktop conferencing power.

With the growth of networks and easy connections, a new virtual work office is possible. It is a dream of many planners who envision businesses operating cyberspace to coordinate employees and provide services on-line. The virtual office can be anywhere, the

den, the kitchen table, the car, a customer's conference room, or wherever people's jobs take them. It can mean office sharing or 'hoteling', having two or more people assigned to an office normally used by one person, the people there on different days, or in the case of hoteling, people reserving space ahead of time. The virtual office set up can be at low cost. It will allow managers and others to spend more time with customers, improve employee satisfaction and productivity working with fewer interruptions, alleviate traffic congestion, improve air quality, and greatly reduce real estate costs. It will reduce or eliminate



commuting so there is more time after hours for family and friends.

4.2.1 IT and Small Business:

Small business can use telecommuting and other flexible schedules to compete and succeed. It's estimated that over 11 million Americans are employed in part or full time telecommuting programs. Millions more work from home informally or operate home-based business. This is seen by many as being more productive and also better for the environment. In certain circumstances, telecommuting may even be required. A survey of Silicon Valley companies that have established telecommuting projects to meet the air-quality regulations shows that there are still many technological hurdles to overcome before workers can have the same functionality at home that they do in the office.



- Desktop videoconferencing is at this point harder to do with people not at central locations; it adds so much to interpersonal business communications that it has become almost a necessity.
- Telephone to PC integration technology needs to be simplified and improved.
- ISDN services are sometimes not available and are always too complex and too costly.
- Telecommuters must have access to the proper tools.
- Security must be improved perhaps with dial-back services to ensure it's really an employee logging in and not just someone who stole or guessed a password.

4.3 INFORMATION SYSTEMS

Information overload is a common problem today's companies are facing. This is stress-induced incapacitation that is a threat to organizations and the people who work in them. Information systems manage the organization's computerized information systems, including planning and purchasing new systems, providing user training and support, and dealing with day-to-day operational problems. To meet the information needs of an organization's employees, many different systems have been developed.

Transaction Processing System (TPS) handles day-to-day accounting needs of an organization. In business which sell products. TPS is often linked with an inventory control system.

Management Information System (MIS) is a computer-based system that supports the information needs of different levels of management. This type of system is designed to help management make informed decisions.

Decision Support Systems (DSS) addresses the deficiencies of management information systems by enabling managers to ask questions that can't be asked by fixed, predefined MIS reports.

Online Analytical Processing (OLAP) provides decision by enabling managers to import rich, up-to-the-minute data from transaction databases.

4.4 OFFICE AUTOMATION

Automation is the process of replacing human work with work done by a machine or system designed to perform a specific combination of actions automatically or repeatedly. The computer is an integral part of today's business office. Rapidly replacing the typewriter as a means of recording information and conveying business data to other organizations are the computer and associated terminals. By using computer equipment, office employees are able to accomplish their work with greater speed and accuracy.

Many offices use word processing and Desktop publishing (DTP). These are a form of database management. The content of database is, of course, primarily textual and purpose of maintaining such a database is to produce reports and letters without rekeying the material every time a new format is needed.

Computers have brought about important changes in the techniques of management by putting executives into closer contact with activities under their control. Facts are now immediately available to help them make decisions and give instructions to their subordinates.

Management usually is divided into three categories: lower, middle and top management. Each level is interested in different types of information.

Lower management must be provided with all facts essential to its activities; awareness of employee activities, availability of materials, workflow, and like details.

Middle management is more interested in the progress of work under its control.

Top management is interested in summarized reports and analyses free of the details needed by the middle management.

Most computer systems in business offices process payroll, routine statistics, accounting, and do word processing or DTP. Such systems have essentially automated routine clerical work. Several businesses have gone another step further and implemented systems that provide centralized control over stocks, business forecasts, and financial reports.

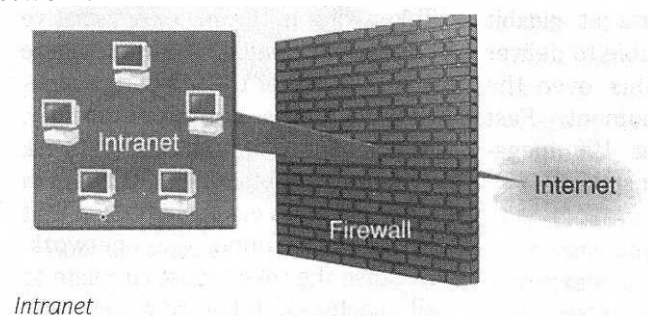
4.5 ASSISTIVE TECHNOLOGY

Rapidly changing IT, together with the ever increasing requirement for information access, is posing some major job performance obstacles for persons with disabilities. Even with the variety of assistive hardware and software that is currently available from commercial vendors, an extensive effort is still required on the part of many employers to make their IT infrastructures accessible via assistive equipment. That is especially occurring in government agencies and private sector employees who develop their own software applications for information access. The interoperability of assistive hardware and software with software applications is a very nontrivial problem that requires a good deal of attention on the part of software developers. Platform independence will allow employees to access the new applications from alternative platforms equipped with assistive hardware and software.

4.6 INTRANET

The Internet is the world's biggest collections of inter-connected networks. Through the Internet organization are receiving and sending information all over the world. It seems that the Internet's open protocols and applications have proven to be universally useful over a mixture of networks, server platforms and workstations.

Using Internet technology, corporations are building company wide intranets accessible only to their employees and other invited users. Intranets are used not only for posting for documents within an organization, but also for linking software, databases, and hardware into a universal network.



The private intranets share the same software and hardware as the Internet and speak the same language, but are fenced off from others on the Internet by defensive barriers called firewalls. Company employees use their intranet for e-mail, expense reports, benefit changes, travel authorizations, and as an information resource for marketing, product and corporate information.

Intranets are popular for variety of reasons.

- The resources on the intranet are accessible to any one, anywhere as long as they have a computer, a modem, and a password.
- Complex data and applications can be used over the intranet with ease.
- Learning to use an intranet is simple. If you know how to use the web, you know how to use an intranet.
- Costs are lower because so much software and so many connections are available from so many sources.

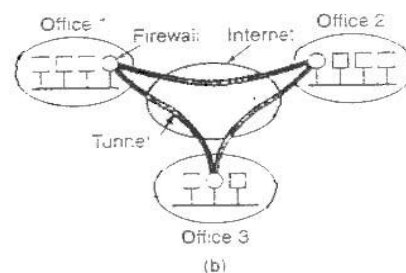
Groupware: Many computer activities involve more than one person. Application programs, commonly called groupware, have been developed to make team or group activity easier. A document can be made available on the network to all members of the group so they can add suggestions or make modifications instead of using the interoffice mail. A typical groupware application is a common calendar on which anyone can make entries that others can see. Another is a document anyone can add to or change while others can see who is making the changes.

Extranets: An extranet is a mechanism based on Internet and web technology for communicating both privately and selectively with your customers and business partners. Extranets provide a safe way to allow transactional business-to-business activities and can save company's serious time and money. An extranet has restricted (password protected) access, so it may be connected directly to each party's internal systems. Costs security, web servers and development, legacy systems integration, ongoing support and maintenance may outweigh the benefits of extranets, such as reduced time to market and cost of doing business, and faster access to partner information.

4.7 VIRTUAL PRIVATE NET WORKS (VPNS)

Many Companies have office and plants scattered over many cities, sometimes over multiple countries. In the olden days, before public data networks, it was common for such companies lease lines from the telephone company between some or all pairs of locations. A networks built up from company computerized leased telephone lines is called a Private Networks. When the public data networks and later the Internet appeared, many companies wanted to move their data traffic to the public network, but without giving up the security or the private networks.

This demand soon led to the invention of Virtual Private Networks, which are overlay



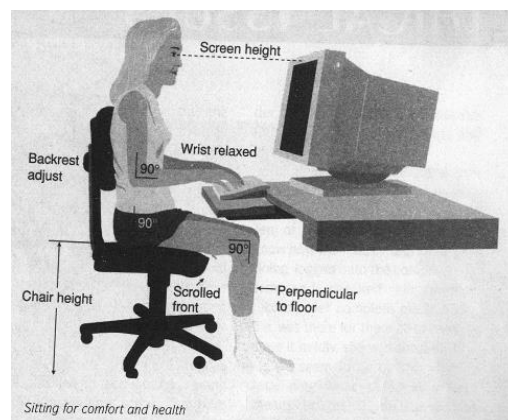
(b) A virtual private network.

networks on top of public networks but with most of the properties of private networks. They are called virtual because they are merely an illusion, just as virtual circuits are not real circuits and virtual memory is not real memory. Although VPNs can be implemented on top of ATM (or frame relay), an increasingly popular approach is to build VPNs directly over the Internet. A common design is to equip each office with a firewall and create tunnels through the Internet between all pairs of offices. To a router within the Internet, a packet traveling along a VPN tunnel is just an ordinary packet. A key advantage of organizing a VPN this way is that it is completely transparent to all user software. The only person who is even aware of this setup is the system administrator who has to configure and manage the firewalls. To everyone else, it is like having a leased line private network again.

4.8 COMPUTERS AND HEALTH HAZARDS

The medical and physical effects of working hours on computers are not fully known. Some problems, however, have become commonplace. Complaints generally concern vision problems and muscle strain.

Ergonomics: Ergonomics is the study of the interaction between people and machines. As a user, you should be aware of some of the things that researchers in this field recommend to avoid problems that arise from working on computers. Your eyes were made for most efficient seeing at a far distance. Working at a computer calls for intense concentration on a task close at hand, usually no more than a couple of feet away. A muscle inside the eye changes the shape of the eye's lens to focus sharply and clearly on the display screen.



There are signs of problems that should warn you to take the time to think through your working environment. These symptoms include headaches, blurred vision at both near and far viewing distances, itching and burning eyes, eye fatigue, flickering sensations and double vision. The following recommendations are designed to maximize comfort, accuracy, and productivity and to minimize eye fatigue and other complaints.

- Although lighting needs vary from person to person, check that overall illumination for computer equipment is less than the customary office lighting level. Display screen brightness should be three or four times greater than room light.
- Adjust the characters on the display screen to contrast well with the screen background.

- Minimize reflected glare on display screens so that windows and other sources of light are behind you.
- Use localized lighting like flexible lamps for other desk work as required. These lamps should be shielded and must be placed to avoid glare on the display screen.
- Avoid white or light-colored clothing if it causes a reflection on the screen.
- Take rest breaks and you can often alleviate many symptoms.
- Use an adjustable chair, which can be a vision aid by enabling you to sit at a proper angle to the display screen.
- Place your reference material as close as possible to the display close as possible to the display screen to avoid frequent large eyes and head movements.

4.9 PRIVACY AND SECURITY

Computer security is the process of preventing and detecting unauthorized use of your computer. Prevention measures help you to stop unauthorized users (also known as intruders).

Data in database systems must be kept secure and private. This information stored in sometimes of great value to corporation. It must be lost or stolen. The more vital information in databases becomes, the more important, it is protect it from hardware or software failures from catastrophes, and from criminals, vandals, incompetents and people who would misuse it.

Privacy refers to the rights of individuals and organizations to determine for themselves when, how, and to what extent information about them is to be transmitted to others. A system analyst responsible for the design of security needs to be familiar with all features of the system because the system can be attacked or security breached in highly diverse ways. Security designers sometimes because so involved with one aspects of security design that he fails see all the possible ways.

Security-Digital signatures: To ensure that the message you get is really from the person you expect, he can sign it with his private key. This creates an encrypted file that can't be duplicated by any other means. Any one can use your public key to read that signature and verify that it's from your correspondent and that it hasn't been altered since his signed. A signed document can't be forged so the sender cannot later deny having sent it. This ability to authenticate a message's source and accuracy is the key to widespread electronic commerce. Encryption and digital signatures have made credit-card charges over the Internet feasible.

Electronic security (e-Security) involves any and all areas of protecting computers, information systems and online transactions. Security considerations include protection against attacks from the Internet and Intranet enabling trust and privacy protection for e-transactions, controlling access to systems and performing security management.

Firewalls: The metal between an automobile's passengers and engine compartment is called a firewall because it's designed to prevent an engine fire from spreading into the passenger compartment. The same idea is used in networking to prevent unauthorized users on the Internet from reaching the files and programs on the local area network. When a computer connected to the outside Internet is also connected to an inside local area

network, a firewall is installed between the Internet and local area network. E-mail, mailing lists and news services are store-and-forward services where the outsider does not have interactive access to computers inside the firewall.

4.10 Self-Assessment Questions

1. What are the importance of virtual work place
2. Explain the importance of office automation
3. What are the advantages of Intranets
4. Explain the computer security and privacy

LESSON 5

INFORMATION TECHNOLOGY AND MULTIMEDIA

Structure

- 5.1 Aims and Objectives**
- 5.2 Introduction**
- 5.3 Multimedia Hardware**
- 5.4 Multimedia Applications**
- 5.5 Organization of Elements**
- 5.6 Animation**
- 5.7 Audio and Video**
- 5.8 Multimedia on The Web**
- 5.9 Multimedia Authoring**
- 5.10 Virtual Reality**
- 5.11 Self-Assessment Questions**

5.1 AIMS AND OBJECTIVES

After going through this lesson, the student is able to understand and distinguish the following:

1. What is Multimedia
2. The Applications of Multimedia Hardware and Software
3. Multimedia: Animation, Audio, Video and Authoring etc.,

5.2 INTRODUCTION

Multimedia is one of the fastest growing and most existing areas in the Information Technology. Multimedia can be used for entertainment, corporate presentations, sales presentations, education, training, simulations, kiosks, digital publications, electronic reference materials, museum exhibits and more. Multimedia applications are stored on compact discs (CD-ROMs).

5.3 MULTIMEDIA HARDWARE

Multimedia applications require a sound card, a graphics card, a CD-ROM drive and speakers. The computer also needs a high capacity hard disk to store and retrieve multimedia information.

Sound card: The sounds that you hear in the world around you are in the form of analog signals, but can easily be digitized and stored on disks just like other data. Various software programs record and edit sound files. It will add echoes, insert, delete and soften sounds. WAVE and MIDI files are the most common file formats for Windows sounds.

CD and DVD: CD ROM and DVD ROM discs have changed the way information is stored, distributed and accessed.

CD-ROM discs are similar concept to audio discs (CDs) so popular in the music recording industry. These discs can store up to 660 megabytes of data. Like other media, they are rated by their access times and transfer rates. Most CD-ROM discs can only be read but there are other versions that you can write to. CD-R (CD-Recordable) discs can be written on once. These disks have a thin layer of gold with layer of green dye below. To record data, the laser forms bumps in the dye layer when played back, the computer reads a bump as 1 and the absence of a bump as a 0. CD-RW (CD- Rewritable) can be recorded, erased and reused, just like a hard disk.

DVD is new medium to replace music CDs, Videotapes, 12-inch video laser discs and CD-ROMs. These discs will initially store 4.7 gigabytes of digital information on a single sided, single layer disk the same size as today's CD-ROM. Future plans include 9.4 gigabytes double sided or double layer discs as well as double-layer discs that will store 17 gigabytes.

Graphics card: Most graphics cards have been translators, taking the fully developed image created by the computer's CPU and translating it into the electrical impulses required to drive the computer's monitor. Graphic programs are a format widely used by computer aided design programs to create detailed engineering and design drawings and have become popular in multimedia for 3D animation.

Speakers: In any sound system, ultimate quality depends on the speakers. The best recording encoded on the most advanced storage device and played by a top of the line deck and amplifier. A system's speaker is the component that takes the electronic signal stored on things like CDs, tapes and DVDs and turns it back into actual sound that we can hear.

5.4 MULTIMEDIA APPLICATIONS

Multimedia is extensively used for education and training in schools, business and the home. Multimedia education allows you to proceed at your pace. It brings presentations alive with sounds, movies, animations and interactivity. Multimedia is used in computer-based training (CBT), which helps the individual to learn.

One of the earliest applications of multimedia was for games, and many people thought that was what multimedia was really used for. There is no question that multimedia can improve the quality of games and it is that very game like quality that can enhance a learning experience.

Multimedia is also used in commercial applications. Architects use multimedia presentations to give clients tours of houses that have yet to be built. Mail order business provide multimedia catalogues that allow prospective buyers to browse virtual showrooms, Corporations today use exciting, informative multimedia presentations to promote their consumer products, and to educate the public.

5.5 ORGANIZATION OF ELEMENTS

Multimedia is the combination of text, sound, pictures, animation and video. There are two types of multimedia presentations non-interactive and interactive. Non-interactive presentations are also called linear presentations. They are like movies and run automatically. These types are used in sales marketing and conferences. Interactive presentations require the user to click on hyperlinks. Hyperlinks creatively connect the different elements of a multimedia presentation using coloured or underlined text or a small picture called an icon, on which the user points the cursor and clicks on a mouse.

Graphics: A multimedia presentation may involve bitmapped graphics, vector graphics and 3D images.

Bitmapped graphics store, manipulate and represent images as rows and columns of tiny dots. Bitmap images are formed from a matrix of pixels with different colors. These are defined by their dimensions in pixel as well as by the number of colors they represent, For example, a 640X480 pixels horizontally and vertically. Bitmap images have large file sizes that are determined by the image's dimensions in pixels and color depth. To reduce this problem, some graphic formats such as GIF and JPEG stores the images in compressed format.

Graphical Interchange Format (GIF): GIF (pronounced jif) supports up to 256 colors (8 bits per pixel). It is a compressed format that keeps file sizes smaller. This format is widely used on the web since files can be sent faster than many other formats. Files in this format have the extension .gif.

Joint Photographic Exports Group (JPEG): JPEG (pronounced 'jay-peg') format supports 16.7 million colors (24 bits per pixel). The images are compressed so file sizes are even smaller than GIF files. Files in this format have extension .jpg.

Windows Bitmap (BMP): BMP is a standard uncompressed format for Microsoft windows and IBM OS/2. It has a maximum of 16.7 million colors (24 bits per pixel).

Vector graphics: Vector graphics are really just a set of graphical objects such as lines, rectangles, ellipses, arcs or curves, called primitives that the program stores as numerical coordinates and mathematical formulas specifying their shape and position in the image. Draw programs also called vector programs, are a format widely used by computer aided design programs to create detailed engineering and have become popular in multimedia for 3D animations.

5.6 ANIMATION

Computer animation is done by projecting a series of still images called frames. Animate is literally 'to give life to'. Animating is moving something, which can't move itself. Animation is creation of the illusion of motion by viewing a succession of computer generated still images. Computer animation can also produce images from scientific data, and it has been used to visualize large quantities of data in the study of interactions in complex system such as fluid dynamics, particle collisions and the development of severe storms.

In computer animation, the art is created using computer programs, frame by frame, and then recorded, edited and played back. Shading, autialiasing and morphing are some of the techniques used in animation.

5.7 AUDIO AND VIDEO

Audio files: Commonly known audio file formats are MP3, WAV, and MIDI.

MP3 is audio format, short for MPEG layer 3, has become very popular in the recent few years. You can store 12 hours of music on a single CD. MP# music files can be played by MP3 players. FreeAmp, WinAmp and Jet. Audio are some well-known MP3 players.

WAV (Wave form) files, most commonly used in PCs, runs under windows easily. It allows both compressed as well as uncompressed data.

MIDI: This file is based on Musical Instrument Digital Interface standard for Audio control in Multimedia. MIDI files do not store actual sounds, but rather instructions that enable devices called synthesizers to reproduce the sounds or music.

Video files: Commonly video compression formats and audio video Interface (AVI), QuickTime and Motion Pictures Exports Group (MPEG or MPEGN).

AVI: AVI files have both compression and non-compressed data. DeVised by Microsoft, they contain nested data chunks. AVI files can be edited using Adobe Premier and a hast of freeware programs.

QuickTime: QuickTime or QT files are rather specific for Apple computers. QT has a series of software. The browser or the client is available for PC and MAC. The professional edition allows you to edit and create movies, graphics and 3D panoramas and streaming videos. Qtu the latest allows previews and supports all kinds of audio and file formats.

MPEG: Motion Picture Experts Group MPEG) came up with MPEG1. This is a compressed version resulting in loss of quality. It supports transfer rates up to 1.5 MBPsand are therefore best suited for multimedia production in co-format as against multimedia for web server. Later version MPEG2 is meant for broadcast video, with a transfer rate of above 4 MBPs.**MULTIMEDIA ON THE WEB**

When the web first started, it displayed just text and a few images. Pages were informational, but not much more. With improvements in browsers and HTML (Hypertext Markup Language), and with the addition of plug-inns, multimedia has gradually crept onto the web. First came movies and sounds that you could download to your system and play from there. Then came animations and interactivity that worked much thesame way. We are still in the very early stages of this dramatic change in what's available on the web. Major problems have to be solved to make real web multimedia convenient and widespread. As you might expect, the biggest problem is bandwidth. Once this problem is solved you will be able to take interactive courses at home, try out product simulations from your home, interacting with television programming, and even making videophone calls.

Plug-Ins: To make all the latest technologies, browsers make provision for improvements and enhancements. After a browser is developed computer companies create plug-ins that enhance the browser's capabilities. Eventually, the functions of some of these become popular enough to be absorbed into the main browser and new types of browsers are introduced. Typical plug-in applications are virtual reality displays and animations.

Acrobat: HTML has its limits, especially when you want to view or print a full-color document. Acrobat is a program that allows you to create visually rich documents in a Portable Document Format (PDF) that can be viewed and printed on all kinds of computers. To create a PDF file, you just print a document to a PDF file on the disk rather than to the printer. PDF is a universal electronic file format so virtually anyone can view and print a PDF file using the free Acrobat Reader.

Shockwave: Until recently, the entire web was based on a single standard, HTML. Any information presented in HTML format is available to everyone, regardless of which browser they are using. Adding multimedia to pages was beyond the ability of HTML. Using technologies such as Shockwave, presentations can be transferred to your computer and played there. You can play the movie backward and forward at different speeds, play frame-by-frame or jump to any marked section with a slider control.

Real Player: Real player lets you play streaming audio, video, animations and multimedia presentations on the web. You can watch the best audio and video content including Internet radio stations from all over the world.

Streaming Technology: Both audio and video have a major bandwidth problem. Since the computer can often play back audio and video faster than it can be sent over the network, the streaming process is a way to give the playback a head start. The computer quietly receives and stores enough of a broadcast so it can keep up, and then begins playing that part back while the rest of the data is received in the background.

5.8 MULTIMEDIA AUTHORING

Professional multimedia development programs called authoring software give you total control over an interactive presentation. In addition to allowing you to give the viewer interactive control over the sequence and timing of sounds, videos, graphics, and animations, they provide a scripting language in which you write programs to control the actions. Macromedia Author, Macromedia Flash and Macromedia Dream Weaver are the key to designing and delivering animations, presentations and websites. MS Power Point is also providing similar ways to put multimedia into presentations.

5.9 VIRTUAL REALITY

Virtual reality is just in its infancy but when developed it will allow you to visit other worlds and feel as if you were really there. Virtual reality gives you the feeling that you are experiencing a different space than the one you actually occupy. At the high end of this field are flight simulators used to train pilots. At the lower end are systems that feed images and sounds into a headset combining goggles and speakers. When

combining with special gloves, you are able to see, hear, and feel another space. The train pilots putting them into a cockpit where they can experience the sensations associated with various maneuvers as they learn to handle them.

5.10 SELF-ASSESSMENT QUESTIONS

1. What is multimedia? Discuss the multimedia hardware.
2. What are different audio and video file formats in multimedia
3. Explaining the applications of multimedia
4. Explain the multimedia on the Web

LESSON 6

INFORMATION TECHNOLOGY AND NEW APPLICATION

Structure

- 6.1 Introduction**
- 6.2 Artificial Intelligence**
- 6.3 Devices**
- 6.4 Data Management**
- 6.5 Data Warehousing**
- 6.6 Data Mining**
- 6.7 Emerging Technologies**
- 6.8 Wap**
- 6.9 Blue Tooth**
- 6.10 It Applications**
- 6.11 Self-Assessment Questions**

6.1 INTRODUCTION

A computer become faster, cheaper and more valuable, this will encourage the trend towards digitization of all universal information and knowledge. As digitization proceeds, the result will be increasing convergence among all media, communication, and networking technologies.

6.2 ARTIFICIAL INTELLIGENCE

AI is the study of how to make computers do things, which, at the moment, people do better. This definition is, of course, somewhat ephemeral because of its reference to the current state of computer science. AI problems span a very broad spectrum. They appear to have very little in common except that they are hard. One of the few hard and fast results to come out of the first three decades of AI research is that intelligence requires knowledge. To compensate for its one overpowering asset, indispensability, knowledge possesses some less desirable properties, including:

- It is voluminous
- It is hard to characterize accurately
- It is constantly changing
- It differs from data by being organised in a way that corresponds to the ways it will be used

AI techniques must be designed in keeping with these constraints imposed by AI problems there is some independence between problems and problem-solving techniques. It is possible to solve AI problems using AI techniques. And it is possible to apply AI techniques to the solution of non-AI problems. This is likely to be a good thing to do for problems that possess many of the same characteristics, as do AI problems. In order to try to characterize AI techniques in as problem-independent a way as possible and series of approaches for solving each of them.

Expert systems: An expert system is an intelligent computer programme that uses knowledge and inference procedures to solve problems that are difficult enough to require human expertise for their solution. The knowledge necessary to perform at such a level plus the inference procedures used can be thought as a model of the expertise of the best practitioners in the field. An expert system is based on an extensive body of knowledge about a specific problem area. Characteristically this knowledge is organized as a collection of rule, which allow the system to draw conclusions from given data or premises.

Mobile agents: Mobile agents are agents that can physically travel across a network, and perform tasks on machines that provide agent-hosting capability. This allows processes to migrate from computer to computer, for processes to split into multiple instances that execute on different machines, and to return to their point of origin. Unlike remote procedure calls, where a process invokes procedures of a remote host, process migration allows executable code to travel and interact with databases, file systems, information services and other agents.

6.3 DEVICES

Personal Digital Assistants (PDA): PDA are among the smallest computers. These devices are designed without keyboard so they are very small and easy to carry. They range from simple organizers with address books, calculators, and calendars through more powerful units that can send and receive e-mail and even browse the web. The use of PDA's has opened a number of possibilities and opportunities to enhance the educational experience and concept of distributed learning. The number of Internet sites devoted to PDA use in general and to health care in particular is overwhelming.

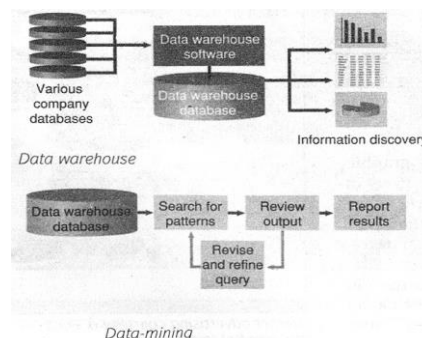
6.4 DATA MANAGEMENT

The amount of information stored in the corporate database is often so was as to be meaningless to managers. Just imagine the amount of data entered into computers each day by a major airline, information on hundreds of aircraft, thousands of employees, and tens of thousands passengers. To make this information useful, it must be digested or summarized so it can be used by managers and employees to analyse, direct, and plan their activities.

6.5 DATA WAREHOUSING

Online transaction processing involves real time transactions, data that is 6,12 or 24 months old combined with current data, contains enormous amount of information from which one can discover trends that would never be seen on a day-to-day or month-to-month basis. To make this data more useful, it is now being stored in a separate database called a data warehouse.

The database in a data warehouse is not the same as the database used for transaction processing. Data warehouse databases are designed to analyse terabytes of data and billions of records. They are organized to better allow analysis using special techniques.



6.6 DATA MINING

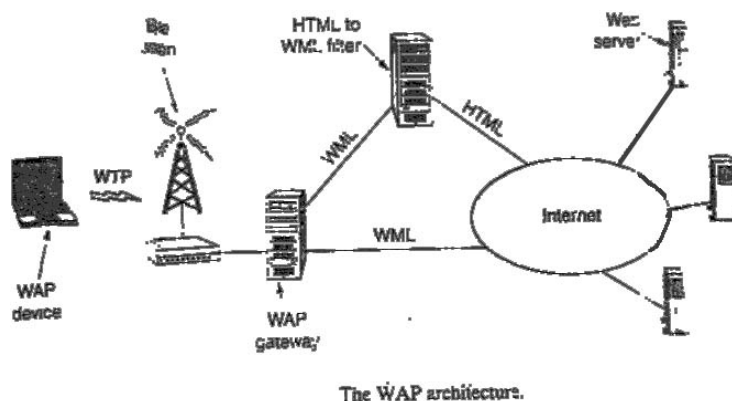
Once data warehouses are created, the data stored there is 'mined'. When you are data mining (also called 'Information discovery'), you don't pose questions. Instead, you have the system look for past patterns that may predict future behavior. This approach can result in valuable previously unknown facts. By contrast, On-line analytical processing (OLAP) and decision support system (DSS) both depend on your asking specific questions, which limits what you may find to what you think it's worthwhile looking for. The lines between the OLAP and DSS, and data-mining categories are blurring, however, as attractive data-mining features are being incorporated across the board.

6.7 EMERGING TECHNOLOGIES

We know that people now deliver content or, for instance, sell products, via the Internet channel. We are also aware that the number of people using mobile access to the Internet is increasing rapidly. Now, the number of mobile phone users is growing much more rapidly than the number of Internet users, which has ignited the development of wireless applications.

6.8 WAP

Once the Internet and mobile phones had become commonplace, it did not take long before somebody got the idea to combine them into a mobile phone with built-in screen for wireless access to e-mail and the web. The somebody in this case was a consortium initially led by Nokia, Ericsson, Motorola and Phone.com (formerly Unwired Planet) and now boasting hundreds of members. The system is called Wireless Application Protocol (WAP).



The WAP device may be an enhanced mobile phone, PDA, or notebook computer without any voice capability. The specifications allows all of them and more. The basic idea is to use the existing digital wireless infrastructure. Users can literally call up a WAP gateway over the wireless link and send Web page requests to it. The gateway then checks its cache for the page requested. If present, it sends it; if absent, it fetches it over the wired Internet.

6.9 BLUE TOOTH

Blue tooth has a considerably shorter range than 802.11, so it cannot be attacked from the parking lot, but security is still an issue here. Blue tooth has three security modes ranging from nothing at all to full data encryption and integrity control. Blue tooth provides security in multiple layers.

6.10 I.T. APPLICATIONS

Business and Industry: Computers are everywhere and business and industry are using them in new ways unthought of even a decade ago. Computers have become so deeply embedded in information processing and communication systems that almost no activity would be possible without them. Most business activities involve transactions with suppliers, employees, or customers. Using Desktop publishing programs, people can create sales letters, brochures, price lists, newsletters, and even book length manuals.

Online Banking: Banks are central in the establishment and maintenance of all industry and commerce. The computer has enabled banks to process the flood of paper rapidly and at a reasonable cost, checks are automatically processed and credited to or drawn against individual banks or accounts all over country. Banks use a variety of names for online banking services such as PC banking, home banking, electronic banking or Internet banking.

Supply Chain Management: Increase in productivity in product of variety and customization in the fast few years have posed challenges to firms in terms of delivering products to customers faster and more efficiently. Managers feel the need to employ new technologies and quantitative tools to devise an integrated approach to managing their business including procurement, inventory, manufacturing, logistics, distribution and sales. This broad comprehensive approach is known as Supply Chain Management. Supply Chain Management focuses on data flows and processes as they occur in the context of manufacturing processes.

People and groups involved in this matter and distribution. Business networking is becoming a management necessity as strategies such as core competence concentration; outsourcing and team management gain more widespread adoption. Information Technology, is acting as an enabler and as an additional driver in this dynamic environment, networking relationships as much as E-Commerce or Supply Chain Management are not feasible without Information Technology.

Application Service Provider (ASP): ASP providing business software to small and medium sized enterprises through a subscription model. For a monthly fee, a customer simply rents the software suite, which is hosted and administered on ASP's server; effectively avoiding the high cost of ownership of traditional Information Technology services. ASP capitalizes on new technology and economies of scale to offer software, e-mail, Internet, security, backups, remote access, hardware and administration in one package.

E-Commerce: E-Commerce is the paperless exchange of business information using Electronic Data Interchange (EDI), E-mail, electronic bulletin boards, electronic fund transfer (EFT), and similar technologies. E-Commerce must seek to automate the generation processing, coordination, distribution, and reconsideration of business. As Internet empowers citizens and democratizes societies; it is also changing classic business and economic paradigms. Internet Technology having a profound effect on the global trade in services. World trade involving computer software, entertainment products (motion pictures, videos, games, sound recordings), information services (databases, online news papers), technical information, product licenses, financial services, and professional services (business and technical consulting) accounting architectural design, legal advice, travel services) has grown rapidly in the past two decades.

Simulation: Simulation generally involves some kind of model or simplified representation. A simulation model may be a physical model, a mental conception, a mathematical model, a computer model or some combination of all of these. Computer simulation is currently used in a wide range of applications in the physical sciences, as well as social sciences, and economics. Computer simulation has recently been applied in the analysis of a number of interesting and important social and economic problems.

E-learning: E-learning covers a wide set of application and processes. It involves delivery of content of resources for learning via different communication protocols. It is a continuous process where the learner deprived to attend formal mode of education. E-learning mechanisms involves a variety of professionals such as instructional designers, course writers/ content creator, reviewers, graphic designers and knowledge organizers/library and information professionals.

E-Books: A text or monograph, which is available in an electronic format. E-Books are simply digital versions of books that can be obtained electronically and stored and read on either a traditional personal computer, a common handheld device or a dedicated E- Book reader. In many ways, E-Books seem perfect: they are easy to obtain and they offer advantages over hard copy books (such as searching, built-in dictionaries and linking).

Computer conference: A computer conference combines computers and telephone transmission lines into a telecommunication system with a number of potential office applications in a computer conference two or more participants exchange messages using

personal computers, at home or in the workplace, that are connected by telephone to a central computer. The computer conference can serve a number of educational purposes in an effective manner viz. structural seminars, free flow discussions, teacher tutorials and topical database formation etc.

Global Positioning System (GPS): Knowing where you are has always been important. For most of us today delayed shipments, lost money, higher costs, and frustration. However, with emergence of GPS, every one can now locate their position anywhere on the face of the earth for the price of a GPS receiver, which costs as low. The applications of GPS are almost unlimited; even though the system is only a few years old. GPS is widely used in ground transportation, to control airline flights, to measure very small shifts in the earth's surface and to determine locations and positions.

6.11 SELF-ASSESSMENT QUESTIONS

1. Briefly explain the Artificial Intelligence
2. What is data management? Discuss the data warehousing and data mining
3. Explain the IT applications

LESSON 7

INFORMATION TECHNOLOGY AND CAREER OPPORTUNITIES

Structure

- 7.1 Introduction
- 7.2 Careers in I.T.
- 7.3 Physical and Psychological requirements
- 7.4 Study and Training
- 7.5 Employment Prospectus
- 7.6 Career Progression
- 7.7 Self-Assessment Questions

7.1 INTRODUCTION

Information Technology describes the convergence of office automation, telecommunications and computing. An information system is the name given to a combination of hardware and software and people. Hardware and software sectors of the IT industry offer technical work options which require professionals with a range of skills creative, problem solving, technical, organizing, communicating and programming.

Nature of Work: Although present day computers seem capable of doing just about anything, they cannot thank themselves. This requires qualified computer personnel: computer programmers, who will understand computer language well enough to give them instructions on what to do computer sales representatives who will sell hardware, software and peripheral computer equipments to customers, service technicians to install, maintain, and service these machines, analysts who will help companies to make the best use of the systems for their computing needs, database specialists to manage the increasingly large and complex databases that exist today, and the most advanced of all software engineering which creates programmers that can use the highly advanced computer software to do almost anything.

Computing and IT professionals, therefore, comprise a range of professionals who have to acquire varied levels of expertise just as other professionals do. Computer careers can be divided into two major groups: hardware and software.

Work Environment: Most computer professionals generally work in offices in comfortable surroundings. Although most of them work regular hours, high-end professionals may work longer hours or weekends in order to meet deadlines or fix critical problems that occur during off hours. Like other workers who spend long periods of time in front of a computer terminal typing at a keyboard, they are acceptable to eyestrain, back discomfort, and hand and wrist problems such as carpal tunnel syndrome or cumulative trauma disorder.

7.2 CAREERS IN I.T.

The exponential growth of the Internet and World Wide Web has created lot of new jobs and demand for IT professionals. As it has become easy to connect from anywhere, more and more people are working from home. The ability to communicate makes home-based business easier to start and operate. Major areas of careers in information technology are described below.

Information Technologists: Information Technology span an enormous range of jobs from software designing to consultancy. It is basically about how a computer can be exploited in different fields.

Software engineers/systems engineers: Software designing involves writing set of a instructions for the operating systems, which control the operations of the entire computer system. The job involves research, development and adaptation of application programmers for use with computer systems.

System Analysts: Computerisation with in any organization involves analyzing its international needs and the problems related to it and designing patterns for the flow of information from the data sources to computer users. The job also involves planning the distribution of information within the organization, which requires discussion with departmental heads to determine their information needs and problems.

Information systems Managers: Information systems Managers provide ready to access to decision-making information. This is used by the organizational decision makers. Information managers can be from diverse background such as Computer science, Physical or social sciences, business, finance, management, engineering etc. Information systems jobs are with IT end users.

Business and Industry: Large and medium sized business have computer networks information systems professional the responsibility of the smooth flow of data through the computer networks.

Banking and Finance: IT specialists maintain, update financial data and manage the transfer of accounts.

Office and PC: Processing, storing, and retrieval of data and reference information, and business communications requires IT skills. Information systems professionals oversee these tasks.

Factories: Computerisation has influenced production, processes, and inventory control and quality management. The operations in high tech sectors is almost completely computerized, Ex: Medical sector, Aviation and space sciences, communications, weather labs while robotic has greatly influenced production in high precision based industries manufacturing chemical and other products which pose health hazards.

Travel Sector: E-ticketing, electronic traffic control, marketing, planning are in things in travel. The latest digitization for preparing travels maps.

Medical-related: Medical documentation, diagnostic procedures and electronically controlled therapy have been used in medical practice. The backend support professional are new on the scene particularly in India. These are medicaltranscriptionists.

Architecture planning and design: CAD (Computer Aided Design) has been in use long time and is used for designers and architects. The specification and data is fed into the computer and visual modifications, designs and models are created through graphical images.

Scientific Research: Storing, computing, analysis and interpretation of data for scientific work as well as its use in exploration, remote sensing and managing electronically operated equipments, computer technology and IT skills are required. In exploration on land and water computers are used for locating minerals, studying effects of natural phenomena, studying weather phenomena.

Education: Huge databases accessible over the net, online education are facts of today. The virtual classroom is a reality. Online education very much an established phenomena.

Defence: Equipments for communication, combat and signals are today electronically operated. Infect the warfare today is a test of a nations hitch electronic capabilities.

Call centers: A call centre is a place that has adequate telecom facilities, trained consultants access to wide database, Internet and other on-line support infrastructure in order to provide information and support to customers on real time basis.

Multimedia: Multimedia involves computing and audiovisual technologies to fuse video, audio, text, graphics, animation etc. in a meaningful way. All these are used to create a real life experience. Web designing and content has a lot to do with multimedia. There animators, sound technicians, graphic artists, video technicians are multimedia professionals.

Internet: Internet connects computers across the globe through modem, which is used for communicating using the telephone line. When many networks are connected across the globe millions of computers can be accessed from any single computer. Most PC users are using Internet facility.

7.3 PHYSICAL AND PSYCHOLOGICAL REQUIREMENTS

General requirements for all computer/IT professionals: communication skills (written and spoken) power of logical reasoning, numerical ability, curiosity, imagination and interest in high technology and constant updating and above average intelligence are attributes necessary for high growth careers in computer.

Specialist requirements: Data entry operators should have typing skills, good comprehension patience to carryout monotonous, repetitive tasks. Accuracy is an essential element of all data entry work. The work of programmer requires a high degree of reasoning ability, skills, patience and persistence, an aptitude for mathematics, ingenuity and imagination with the ability for teamwork.

Computer maintenance/servicing technicians require technical and mechanical skills, logical ability, and aptitude for learning about new technologies, good communication skills and superior manual dexterity. Service technicians must demonstrate the intellectual agility to learn how to handle problems that might arise.

Computer network specialists must be well organized and patient. They should enjoy challenges and problem solving, think logically, and be able to communicate complex ideas in simple terms, be able to work well under pressure and deadlines.

The work of **software engineer** is extremely detail-oriented so one needs to be well organized and precise. Communications skills are important since one has to find out the needs of the client and work accordingly. Defining client's problems and analyzing their needs requires an analytical approach. Excellent mathematical skills indicate potential for the analytical work of the software engineers.

System analysts require local reasoning skills; imagination, creativity to visualize how old, established methods might be changed; ability to take an overall view of a situation and yet see it in detail, business acumen; numerical and analytical skills. They have to be observant, objective and problem solving.

Database specialists/administrators/managers require mathematics, science and communication skills (verbal and written) while knowledge of accounting and administration is desirable.

7.4 STUDY AND TRAINING

After Class 10 with science one can enroll for:

- Certificate from the ITI's one year data processing and computer software
- Diploma from Polytechnics 3-year computer engineering

After Plus two, training routes are:

- 3 years BSc computer science
- 3 years Bachelor of Computer Applications (BCA)
- 4 years BE/BTECH Computer science/ Information Technology
- 4 years Bachelor of Information Technology/ Bachelor of Information science

After graduation, training can be through:

- MSc Computer Science after BSc
- MCA- 3 years for any graduate preferably with Maths at 12th
- ME Computer science/Information Technology/Electronics- 4 semester after BE
- PhD Computer science/allied disciplines after Masters in related disciplines

Advanced level courses are aimed at producing professionals who can handle more sophisticated software jobs. These are usually targeted at engineering graduates, MCAs or who work experience in the field.

High-end courses include software engineering, Java programming, window NT, Advanced UNIX programming, Visual C, Visual C++ with MFC, OOP & GUI design, RDBMS concepts. Oracle 8.0 Developer 2000, power builder, Internet technologies, etc.

7.5 EMPLOYMENT PROSPECTUS

The best jobs in IT and computers go to the graduates/postgraduates in computer science and Engineering, Information technology or Electronics as also meritorious students from other disciplines of engineering from NITs in different states, the premier Indian Institutes of Technology (IITs), BITS, IIITs, to name a few.

The computer industry as a whole will remain very strong so employment opportunities will remain. Programmers work for manufacturing companies, data-processing service firms, hardware and software companies, banks, insurance companies, credit companies, publishing houses, government agencies, college and universities throughout the country.

Database specialists work for investment companies, telecommunication firms, banks, insurance companies, publishing houses, and a host of other large and medium sized business or organizations. Teaching or consulting is another option.

7.6 CAREER PROGRESSION

Advancement options are good for those who keep up with technology and can be flexible.

Skilled database specialists have excellent advancement opportunities. As long as there are computers and new computer applications, there will be need for programmers. Those with knowledge of several programming languages, especially newer ones used for computing networking and database management, enjoy better advancement prospects. As more and more companies discover the economic and convenience advantages linked to using computer networks at all levels of operations, the demand for well-trained network specialists will increase. Network specialists have to keep up with the emerging technologies.

While ground rules of the right degree of technical skills remain important for all computers, IT specialists, non-technical skills need to be developed. Skills in presentation, teamwork creativity, learning attitude, business acumen and communication are vital to forge ahead of the competition.

7.7 SELF-ASSESSMENT QUESTIONS

7.7.1.1 Discuss the careers in IT.

7.7.1.2 Discuss the physical and psychological requirements for IT careers.

LESSON 8

INTERNET BASICS

Structure

- 8.1 Aims and objectives**
- 8.2 What is internet**
- 8.3 History of Internet**
- 8.4 Computer system requirements to access internet**
 - 8.4.1 Hardware**
 - 8.4.2 Software**
- 8.5 How data is transfer through internet**
- 8.6 Internet tools & services**
- 8.7 World Wide Web**
- 8.8 Internet based chat**
- 8.9 List of Important Internet (TCP/IP) Protocols**
- 8.10 Summary**
- 8.11 Self Assessment Questions**
- 8.12 Further Readings**
- 8.13 Glossary**

8.1 AIMS AND OBJECTIVES

After reading this unit student will be able to understand:

- ❖ The definition and History
- ❖ How to access the Internet
- ❖ How the data is transferred through internet
- ❖ The services available on Internet
- ❖ What is World Wide Web?
- ❖ Different Internet Protocols.

8.2 WHAT IS THE INTERNET

The Internet is revolutionizing and enhancing the way we communicate, live and work - both locally and around the globe. Simply put, the Internet is a network of linked computers allowing participants to share information on those computers. Literally speaking, Internet is an information super highway and a potential to Worldwide audience at your fingertips. The internet is buzzing with The information superhighway is literally buzzing with activity including Internet pipelines pump out all manner of files, movies, sounds, programs, video, e-mail and live chat among others.

8.3 HISTORY OF THE INTERNET

In 1962, Paul Baran, of the RAND Corporation (a government agency), was commissioned by the U.S. Air Force to do a study on how it could maintain its command and control over its missiles and bombers, after a nuclear attack. This was to be a military research network that could survive a nuclear strike, decentralized so that if any locations (cities) in the U.S. were attacked, the military could still have control of nuclear arms for a counter-attack. Baran's finished document described several ways to accomplish this. His final proposal was a packet switched network.

In 1968 ARPA (Advanced Research Projects Agency a part of the US Department of Defense) awarded the ARPANET contract to a company, BBN. The physical network was constructed in 1969, linking four nodes: University of California at Los Angeles, SRI (in Stanford), University of California at Santa Barbara, and University of Utah. The network was wired together via 50 Kbps circuits.

The first e-mail program was created by Ray Tomlinson of BBN. The Advanced Research Projects Agency (ARPA) was renamed The Defense Advanced Research Projects Agency (or DARPA)

8.4 COMPUTER SYSTEM REQUIREMENTS TO ACCESS INTERNET

8.4.1 Hardware

To access the Internet, you need the following minimum configuration. You can sometimes work on a system with a lower configuration but you'll notice shortcomings.

8.4.1.1 A computer with at least 16 megabytes (32 or more is more useful) of RAM.

8.4.1.2 A colour monitor that displays at least 16-bit or thousands of colours. Better: 24-bit or millions of colours.

8.4.1.3 A modem with a speed of at least 28.8 bps (although 56k technology is now standard).

8.4.1.4 A hard disk with plenty of storage space for the software you will use and all those files you'll be downloading.

8.4.1.5 Sound capabilities, stereo speakers. Since the World Wide Web is also a multimedia medium.

8.4.1.6 A Telephone line

8.4.2 Software

- Operating System based on Windows, Linux or Unix
- Internet Browser such as Internet Explorer, Mozilla Firefox, Netscape Navigator among others.

8.5 HOW DATA IS TRANSFERRED THROUGH INTERNET

Once you are connected to the internet, you can receive information from other computers on the Net (download) or you can send information from your site. Sending and receiving information through the Net requires a special kind of communication program called *Transfer Protocol*.

A Protocol is nothing but a set of rules that govern the electronic communication process. TCP / IP (Transmission Control Protocol / Internet Protocol) is widely used for transmission of data through Internet. For sending a large block of text or data to another part of the network, TCP / IP divides the data into small data packets. TCP / IP has programs to check whether the data is transferred to the correct destinations without any damage.

As we have discussed earlier, the Internet is a network of networks. Different networks on the Internet may have different protocols; different computers on the network may be using different operating systems. In order to maintain compatibility, while transferring data between different kinds of networks, special devices like Routers and Gateways are used.

Uses of Internet

The internet is the fastest growing communications medium in the modern day. It has revolutionized the way we live, communicate and conduct our business. Internet enables people to transcend geography. Using the internet one can:

- 8.5.1.1 Communicate with people far away (even on the other side of the world) by using e-mail, chat, VoIP, Internet telephony, Video Conferencing, etc.
- 8.5.1.2 Search for information, news, etc.
- 8.5.1.3 Online teaching / learning;
- 8.5.1.4 Find and publish research;
- 8.5.1.5 Trade in a variety of markets including stocks, mutual funds, etc;
- 8.5.1.6 Multimedia applications like films, music, etc.
- 8.5.1.7 Business Communication and various business applications.

Accessing the Internet

The Hardware requirements have been given in previous pages. There are a variety of services that one may use to connect to the web. There is the normal internet dial up service, the faster broadband access, using a specially laid cable and the leased line among others. However for all these services, one needs to be enrolled with an Internet Service Provider (ISP) by purchasing their services.

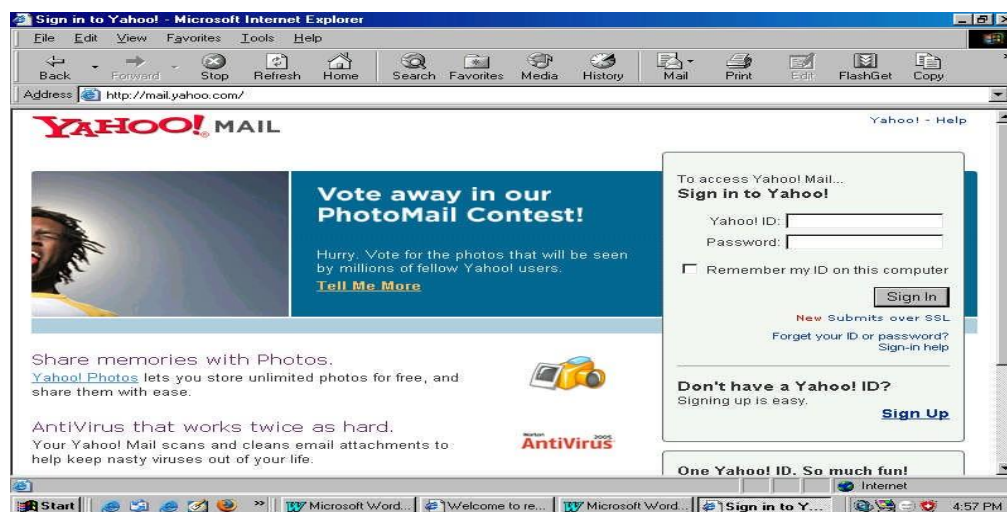
Among the service providers available in India include Sancharnet (Internet Service of Bharat Sanchar Nigam Limited), Videsh Sanchar Nigam Limited (VSNL), Mantra online (Bharati Service Provider), Sify (Satyam Infoway) among others. There are a total more than twenty six Internet Service Providers in different parts of India.

8.6 INTERNET TOOLS & SERVICES

Electronic Mail (or e-mail)

This is one of the most widely used internet based service in the world. The internet became famous largely because of the popularity of the Electronic Mail (or e-mail). Each service provider automatically enables a customer to open an e-mail account immediately on their joining the service. Apart from these, service provider mail services there are a number of Internet based free e-mail services. The more famous of these include (which is presently only a referral based free service), Yahoo, Hotmail, Rediffmail, Lycos among others.

A typical mail id is in the following
formatusername@domain



E.g. abc@xyz.com (where abc is the username of the person and xyz the domain name). In the case of free internet based mail service providers it may be abc@yahoo.com, abc@gmail.com or abc@hotmail.com. The username is more like the door number in an address. Only one person will be able to use that username in that service provider.

E-mail Programmes

To send and receive a mail one needs separate software programmes. There are many specialized software that exclusively enable e-mailing. One may note that the almost all browsers provide their own e-mail software. Internet Explorer, provided by Microsoft provides Outlook Express bundled with the browser. Apart from the bundled mail software, there are packages like Eudora and Pegauses among others. These programmes provide a number of ‘offline’ functions which most of the web-based free mail services donot provide.

All the major programmes will enable a person to

- Send and Receive mail using the account provided by the ISP
- Type mail and ‘queue’ so that all of them can be sent a one time
- Send bulk mail
- Reply to any message that one may receive
- Forward a message
- Sort messages that we may have received
- Filter and automatically delete unsolicited mails.
- Provides an address book so that we may save the e-mail id and other personal information of friends and contacts.

E-mail message

In a number of ways an e-mail may be considered to be similar to an office memo with some obvious differences. One important difference being that an e-mail message is near instantaneous. An e-mail message is short and usually written in an informal style. The advantage is that it enables an immediate reply and if necessary quoting the text of the sender. The advantage is that it may be sent to a single person or to innumerable number of people at one click. There is no upper limit to the number of people to whom a single message may be sent. To send a message to a number of people simultaneously only a comma (,) separator needs to be used. E.g. abc@xyz.com, ybp@xyz.com,

mnop@abc.com and so on.

Each e-mail message contains two parts, a message header and a message body. The message header will contain columns where one needs to specify field such as mail address of person, address of sender (automatically generated by programme), Subject of the Message (where we may give brief description). The two other important optional fields include Cc: (or Carbon copy) and BCC: (Blank Carbon Copy). The Carbon Copy field means that we may send a copy of the mail to others and the Blank Carbon Copy field indicates that the recipients will be able view only the sender and the carbon copy recipients but not those in the Blank Carbon Copy field. The message body area is the place where we may type the message. Mail programmes even have a facility where we may insert our signature on the mail (in case we have a digital version).

Attaching URLs and files in E-mail

You can send someone another Web page by providing its URL or a file or program on your local computer (especially nice for sending relatives a photo of the kids, etc., as long as the files are compressed and aren't too big. Long unannounced E-mail downloads are not welcome and some mail servers won't accept attachments above a certain size. To attach a file, you usually click on the paper clip icon (or click the command attach file), then you browse within your computer windows to select the file you want to send. That file is then uploaded to your e-mail server with your e-mail message and later downloaded by the message recipient. Text files from most any word processing program are usually always viewable if you save them first as plain ASCII text. Otherwise, your recipient may not have the appropriate program or file translator to view the file. When in doubt, cut and paste the text into your e-mail message or check to be sure your recipient can view the file type you send.

8.7 WORLD WIDE WEB

The vast network of the World Wide Web (www) can be traced essentially to the vision of one person, Tim Berners-Lee. In 1989, Berners-Lee proposed a communications model to transcend differences in computer platforms and thus more easily share information available via the Internet. Berners-Lee was then a researcher at CERN, a research laboratory for particle physics in Geneva, Switzerland. His motivation was to find a way for CERN members to share information worldwide.

The Web makes use of a standard communications protocol, Hypertext Transfer Protocol (http://), and a standard presentation language, Hypertext Markup Language (HTML). These standards allow users to view the same Web page whether they have a Windows machine, a Macintosh or UNIX-based system, or another platform. Although Web pages may have minor differences in the way they appear, the information contained within them is the same. Hypertext covers much more than text files, however, and can include images, audio, video, order forms, mini programs or voice e-mail, and a growing list of items.

8.8 INTERNET BASED CHAT

Internet based Chatting has become extremely popular among the users of Internet. Interestingly chatting services is now frequently being used by a number of businesses to provide real time customer services related to their products. This has helped increase efficiency.

Internet based chat is a practice where a group of people can chat within a group on a real time basis. It also enables people to send large files. Recent advances in technology has meant that we may even speak with others using head phones.

The conversations are instantaneous but to use this facility one needs to use special software. The most famous of the chat software include AOL messenger, MSN Messenger, Yahoo Messenger and Rediff messenger.

8.9 LIST OF IMPORTANT INTERNET (TCP/IP) PROTOCOLS

Name	Full Name	Purpose
DNS	Domain Name System	Translate domain names to IP numbers
FTP	File Transfer Protocol	Copy files between computers
HTTP	Hypertext Transfer Protocol	Distribute Web data (hypertext)
IMAP	Internet Message Access Protocol	Transport raw data packets
IP	Internet Protocol	Transport raw data packets
LDAP	Lightweight Directory Access Protocol	Search a directory of email addresses
MIME	Multipurpose Internet Mail Extensions	Encode different types of data
NNTP	Network News Transfer Protocol	Distribute Usenet news articles
POP	Post Office Protocol	Get Messages from a mail server
PPP	Point-to-Point Protocol	Connect a computer to the Internet
S/MIME	Secure MIME	Secure MIME
	Encode data securely	SMTP Simple Mail Transfer Protocol
	Send messages to a mail server	TCP Transmission Control Protocol
	Manage the flow of data packets	TELNET Telnet Log on to a remote computer

8.10 SUMMARY

From this unit you have learnt that :

- ❖ A World Wide Network of computers called the Internet
- ❖ Internet is a global collection of interconnected networks.
- ❖ A Computer with modern and telephone connection is required to use Internet
- ❖ An email address has two parts: the User's name and the domain name. An "at" Sign @ separates these two parts
- ❖ Internet Relay Chats are live conversations on the Internet.
- ❖ World Wide Web provides access to Website in which a series of web pages are hyper linked to each other.
- ❖ A protocol governs the electronic communication process. TCP / IP is widely used.
- ❖ Internet Service Provider (ISP) control access to computers on the Net.

8.11 SELF ASSESSMENT QUESTIONS

1. What is Internet and how it is developed?
2. What are the requirements to access Internet?
3. List out the Internet services
4. What is e-mail and how it works?
5. What is World Wide Web.

8.12 FURTHER READINGS

- (a) Halam, Harley. Teacher the internet. New Delhi, Prentice – Hall of India, 1999.
- (b) Caderlead, Rogers. How to Use Internet Net. New Delhi, Techmedia, 2002. B P B publications, 1996
- (c) World Wide Web
- (d) Falk, Beunet. The Internet-Basic reference from A to Z, Second Edition, New Delhi, BPB Publications

8.13 GLOSSARY

ADSL: (Asymmetric Digital Subscriber Line) A technology that allows high-speed Internet connections over a telephone line. See also DSL.

AOL : A large ISP that offers extra content and services along with Internet access. In the U.S., the name AOL stands for America Online.

Bandwidth: The capacity to transmit data. On the Internet, bandwidth is measured in bits per second.

Electronic mail: Same as mail, email

A system for sending and receiving messages from one Internet address to another

Hardware: The physical parts of a computer.

ISDN : (Integrated Services Digital Network) A service, offered by a telephone

ISP : (Internet Service Provider) A company that provides Internet access to the public

LESSON 9

BROWSING AND INTERNET

Structure

- 9.1 Aims and objectives**
- 9.2 Introduction**
- 9.3 What is browsing**
 - 9.3.1 Opening A New Internet Browser Window**
 - 9.3.2 Choosing a Browser**
 - 9.3.3 Locating the Internet Browser**
- 9.4 U.R.L.**
- 9.5 Internet browsers**
- 9.6 Internet explorer**
- 9.7 Understanding netscape navigator**
- 9.8 Summary**
- 9.9 Self Assessment Questions**
- 9.10 Further Readings**
- 9.11 Glossary of Terms**

9.1 AIMS AND OBJECTIVES

In this unit you have learnt that the Internet is a network of thousands of computer scattered in the world that allows you free exchange of information. The present chapter aims to discuss how to browse the Net.

After studying the chapter, one should be in a position to

- ❖ understand and able to communicate what is Internet Browser and describe the browsers, such as Internet explorer Netscape and other browsers.
- ❖ understand the importance of Uniform Resource Location (URLs) in finding the Internet sites
- ❖ open and choose Internet browser
- ❖ explain the common information services available through Internet.

- ❖ Understand Netscape Navigator and Bookmarks

9.2 INTRODUCTION

In the recent years, the Web was become extremely popular, and the programs we use to access the Web (the browsers) have become the focus of an intense, sustained marketing war between Microsoft and Netscape. One consequence is that new browsers are planned, implemented, and rushed to market without long-term testing. Now every one would accept the Internet has revolutionized the human communications. Users know how quickly the Internet grows and are eager to use its resource and services. Millions of users send messages, listen to music, participate in discussion groups, engage themselves in chat, read magazines and newspapers from across the world, study the scholarly journals, and watch video. The Internet bridges the distance, time and cultures and brings all communities into its main fold.

The Web successfully combines Hypertext with client / server architecture. The communication standard format TCP/IP helps to send as small packets through Packet Switching mechanism. The Internet Service Providers (ISPs) like VSNL, NIC and ERNET and the private ISPs like Satyam Online, Netlinks Sigma Online, Veda Online Mantra Online and MTNL provide access to dial-up networking. The ISPs provide the users with either PPP or SLIP accounts. A user required to enter his ID (i.e name), password, local access phone numbers, etc after dialing to his ISP to get connected to the Internet. When you browse through a W³ document, the hyperlinks pointing to other documents all represent URLs. When you select a hyperlink, your W³ client will read the attached URL and send a request to the appropriate server for the linked document. Most of the time this happens behind your back, and you don't need to be particularly conscious of URLs to use the Web.

9.3 WHAT IS BROWSING

The word browsing means meandering through available electronic information or skimming on information resources or looking simply for interesting items. The metaphor corresponds with paying a desultory visit to favourite book shop or a library to peruse the books. In the context of Internet, browsing is moving through a large hypertext of hyper media to get required information.

9.3.1 Opening A New Internet Browser Window:

There will be times when you will want to look at more than one Web page at a time. You can do so by opening a new browser window. In fact, you can open as many browser windows as you want. You can then switch from window to window, using each one as you see it.

If you accumulate extra window you don't need, you can get rid of them by closing them. When you close the last browser window, it stops the browser program itself.

Opening a new window is easy. Within Internet Explorer, pull down the File menu and select "New", then "Window". Within Netscape, pull down the File menu and select "New", then "Navigator Window".

In either program, it is even easier to use the keyboard: Simply press **Ctrl-N**

9.3.2 Choosing a Browser:

The client software you use to look at hypertext is called a browser. Browsers give you a clear view of where the links are in a hypertext document and a way of following links from one document to another. W³ browsers are also client programs: they interact with a server to retrieve documents; and of course, the W³ server must work with browsers in all sorts of display environments. Among W³ clients, you'll find ASCII line-mode browsers, several full-screen browsers for use with ASCII terminals, and browsers for graphical user interfaces (GUIs) such as X windows, Microsoft Windows, and the Macintosh. If your Internet access is via a conventional dialup connection, you'll need either a full-screen browser like Lynx or the line-mode browser www.

If your computer has a graphical user interface and you access the Internet via a protocol dialup connection, there are a number of GUI browser, but GUI browsers can use your computer's audio and visual capabilities to make Web browsing more enjoyable. Cello is available from the Legal Information Institute at Cornell University. Another popular browser that is available for Windows, X Windows, and Macintosh is the Mosaic browser from the National Center for Super – computing Activity (NCSA) at the

University of Illinois, Urbana – Champaign. See the accompanying sidebar for instruction on locating W³ browsers you can download from the Internet.

9.3.3 Locating The Internet Browsers:

Browsers for W³ are available via anonymous ftp from various sites. You can obtain the line- mode browser and a number of GUI browsers for different platforms from CERN. Connect to info. Cern. Ch and move to the directory / pub/www. The README file in this directory has up to-date information concerning the software that is available. Already compiled software can be found under the bin directory. This directory has subdirectories holding browsers for different computers and operating systems. Choose the computer platform you're interested in, and cd to that directory. The Cello browser for Windows is available at CERN. We'll discuss below how to obtain it from the Legal Information Institute at Cornell University.

The Lynx full-screen browser is available from the University of Kansas at ukanaix.cc.ukans.edu. The directory that contains the software is /pub/WWW/lynx. In this directory you'll find the Lynx browser compiled for several platforms and a compressed tar archive of the source code. Compiled versions of the www full-screen browser can be found at www.njit.edu in the / dist directory.

The National Center for Super-computing Activities at the University of Illinois, Urbana-Champaign publishes the Mosaic browser for Windows, Macintosh, and X Windows. You can obtain any of these browsers at ftp.ncsa.uiuc.edu. This is an extremely busy ftp site, and you may have difficulty connecting. The Mosaic distribution is also available at sunsite.unc.edu. Whichever site choose will have a README file to direct you to the Mosaic releases.

9.4 U.R.L.

URL means Uniform Resource Locator. The name URL is pronounced as three separate letters, "U R L". A URL is the standard address indicates the location of a page or resource on the Internet universally. The location can be a computer of a company (ending with "com"), an organisation (.org), the government (.gov) or an educational institutions (edu), etc. A URL is often referred to as a Page Address.

Computer magazines (Eg: The Net. Guide. Internet World) and Internet newsgroups are good sources for finding interesting web addresses to visit. A typical URL may look like [http// www.ibm.com/](http://www.ibm.com/)

Web sites can consist of many separate Web pages, and,. Strictly speaking, a URL points only to a single page. A web site address usually begins with http protocol. The web page address has there parts:

Protocol, host name and file name. The syntax will be Protocol://hostname/filename. For example, <http://www.ibm.com/> means that the page is of IBM computer server on the Internet access tool/ service, namely web (www), which can be accessed through http (Hypertext Transfer Protocol), a standard format for publishing information on the Internet. In other words the World Wide Web (WWW) is a host computer, which contains hypertext based multimedia documents. The third part is the file name of the specific document to be located according to the query. All the web sites

follow the same pattern.

When browsing the web, most URLs will be embedded in other documents so you do not need to type the complete address every time. By just clicking the links you will be lead to the other web pages

URLs can be used to point to all types of resources, and not just Web pages. For this reason, URLs were designed to be as general as possible. As you use the Net, you will see two slightly different formats.

Scheme://hostname /

description

Scheme:description

<http://www.harley.com>

<http://www.harley.com/25-things/index.html>

<http://www.ibm.com>

9.5 INTERNET BROWSERS

Browsers are the programmes that acts as an interface between the user and the Internet. They enable the users to read hypertext on files of the Internet. Basically there two types of browsers – Text based Browsers and Graphic User Interface (GUI) Browsers. The most popular browsers, Netscape Navigator and Microsoft Internet Explorer, come under GUI category. Systems that lack graphics can use LYNX, a text –based browser.

You may start your Internet browser in the same way you start any other application. A click or double click its icon on the desktop, or select it from the menu. It automatically load a starting page (home page of the browsers) by default. Type the address the desired page into the Address or Locations textbox near the top of the browser window.

Web Browsers

The key to the Internet is the Browser. Browser is an Internet compatible programme that runs on any operating systems (like Window) on your computer. Your computer may be a simple PCs a workstation or a terminal of a network. The Browsers are used for getting information from the Internet. A browser does three things.:It used Internet to retrieve the documents from the computers (often called asServers);

- i) It display these documents on the screen of your computer using formatting specified in the documents; and
- ii) It makes the displayed documents active, so that pointing and clicking on a across referenced item in a document will take you to the reference.

The Browser you choose to surface the web is largely a matter of taste, need and budget. All browsers work to Internet standards and all web documents could be viewed by all browsers. However, some browsers started adding new features in recent versions, which do not work properly in other browsers. In fact, you may setup more than one browser on the desktop of your computer.

Let us examine the features, structure and use of the prominent Internet Browsers, such as Internet Explorer and Netscape Navigator in this section.

9.6 INTERNET EXPLORER

Some features of Internet Explorer

1. The ability to browse the web features your windows desktop:
2. Web channels on your computer
3. Subscriptions to your favourite sites
4. Customizable links Tool Bar, the Explorer Bar and the Contents Adviser and Security Zones for browsing the web safely.



Internet Explorer :

To see the Favorites list, just use your mouse to pull down the Favorites menu. You will see that the list has a number of folders. You can navigate in and out of the folders just by moving your mouse. (Try it.) When you see an item that looks interesting, click on it. The URL for that item will be sent to your browser, which will fetch the appropriate Web page and display it for you.

As an example of what an open Favorites list looks like, It shows a typical Favorites list with a number of folders open. Notice that I have used my mouse to navigate to a particular item (the one that contains the URL for Wendy Murdock's Web page). If I were to click on that item, my browser would fetch that web page for me.

- ❖ **Channels:** This is a collection of various channels to which you may want to subscribe. (A channel is a facility that allows a remote server to send information to your computer automatically)
- ❖ **Important bookmarks:** When you install Internet Explorer, it checks to see whether Netscape is already installed. If so, Internet Explorer creates a copy of your Bookmarks list and puts it in a folder named "Imported bookmarks". This allows you to switch from Netscape to Internet Explorer without losing the items in your Bookmarks list.
- ❖ **Links:** This folder contains the same items that are on the Links bar. In our example, the items are the ones that came with the browser – "Best of the Web", "Channel Guide", and so on – although you can change them if you want.
- ❖ **Software updates:** Here you will find items to help you keep your Internet Explorer software up to date.

To enter a web Address:

1. In the Address Bar, start typing the address you want to go. If you have visited a web site before, the new Auto Complete feature suggests a match as you type. The suggested match is highlighted in the Address Bar.
2. After you finish typing the web address, or when Auto Complete finds a match press Enter. To view other matches, press Down Arrow Key.
3. If you type a partial address and then press Control + Enter. IE attempts to go to the exact URL that you typed, filling in only the protocol such as http: and extension, if needed. For example, if you type micro and then press Control + Enter. IE attempts to open a web site name <http://www.microsoft.com/>
4. You can also turn off the Auto Complete feature, if you are not interested in it.

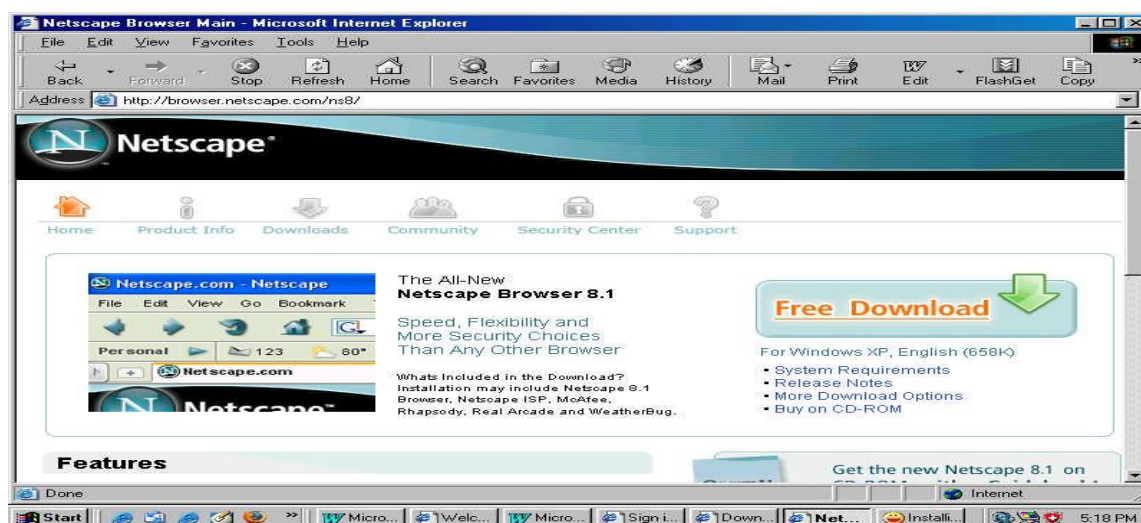
9.7 UNDERSTANDING NETSCAPE NAVIGATOR

Navigating

As you use the Web, a lot of your time will be spent changing from one Web page to another. We call this activity NAVIGATING. The metaphor is a convenient one, and I will use it myself, because it is handy to talk as if we are actually moving from one place to another. However, as you use the Web, don't lose track of the fact you are not really moving through some mysterious universe. What is really happening is that your browser is presenting one page after another for your perusal.

The standard Netscape Communicator components consists of Netcaster (for communicating news and information), Messenger (for e-mail), Collabra (for discussion

group and sharing work), Composer (for making web pages) and Conference



NETSCAPE:

To start work with your bookmarks list, you need to display it, and there are two ways to do so. You can either click on the Bookmarks button, or you can pull down the Communicator menu and select "Bookmarks". Try both methods and see which one you like better.

Once you display the Bookmarks list, you will see a number of folders. You can navigate in and out of the folder just by moving your mouse. (Try it.) When you see an item that looks interesting, click on it. The URL for that item will be sent to your browser, which will fetch the appropriate Web page and display it for you.

Creating a new item is easy. Whenever you find a Web page worth remembering, open your bookmarks list and select "File Bookmark". You will then be shown a display of the various folders in your list. All you have to do is choose a folder and click on it. Your browser will create a new item that points to the current Web page, and place that item in that folder.

Starting Netscape Navigator

It is akin to that of starting Internet Explorer. It is simple and easy use Navigator. Just follow these steps.

- 1) Start your Internet connection by clicking on the Icon. The Icon is generally shown as Connection to...(phone number of your ISP)" in dial-up networking.
- 2) Double click the Netscape Communicator icon on the desktop. The Navigator will launch by default.

If the Netscape Communicator icon is not present on the desktop, you can launch the Netscape Navigator from the windows through start menu, select Programs>Netscape Communicator >Netscape Navigator. Either way the web browser, Navigator will open.

When you start Navigator, you will first see its Home Page with sleek colourful graphics. The nifty “N” in a box in the window’s supper – right corner will become animated. The Homepage provides a lot of information it changes from time to time. You see different parts in the Navigator window. These include Title Toolbar, Navigator Toolbar, Location Toolbar and Personal Toolbar.

Title Bar: In this, you can see the name of the page you are currently viewing (for ex: welcome to Netscape Navigator)

Menu Bar: It is similar to Menu Bars in other windows application. You find File, Edit, View, Go, Communicator and Help menus in this. It further provides you with drop – down menus.

Navigation Bar: This toolbar contains ten icons, which performs specified applications, such as Back Forward, Reload, Home, Search, Print, Images, Security and Stop.

Location Toolbar: In this toolbar, you find Bookmarks and Quick file icons in blue folder area on the left side. Address Area, showing the URL of site currently viewing. Bookmarks help you to have quick access to the pages you visited.

Personal Toolbar: It is located below the location bar. It is very handy and help you track the web sites that are of particular interest to you. You can drag and drop’ the interested URLs into this bar and they will appear there as buttons.

View Area: This is the main a portion of the screen. You will see the information content of the site here. Status Bar: It is located at the bottom of the screen. It shows the URLs for the cross links pointed by the cursor in the viewing area.

Scroll Bar: These are like windows scroll bars and help you t see the viewing area.

Component Bar: This helps you to open component of the Netscape Communicator, while you are in another component. For example, when you are using the Navigator (the browser) you can see the Component Bar to open Messenger (for e-mail), or Collabra (the discussion group reader).

Open a document Using its URL

You can open a web document using it URL directly. Follow the steps:

- 1) Select the file from the Menu Bar of the Netscape Navigator and then click open Page or Press CTRL+ O. A Dialog box will appear.
- 2) Type the URL of the interested documents in the Dialog Box of the open page.
- 3) Click Open (just press Enter). The Navigator will find the web document of the URL and displays its on your screen.

Viewing a Web document.

The web document is written in hypertext. Hypertext is nonlinear and it has links (called Hotlinks) to other sources of information. You have to follow the links through a

document, or from document to document, document to image and sometimes from a server to another server. While navigating, the Back and Forward icon on the Toolbar provide a convenient way to jump back and forth among the documents.

In some of the web sites, the Viewing Area of a page is organised as Frames. In a single page you find a navigation frame on the left and a larger frame in the right. Each individual frame has its own scroll bar, various background colours, images, text, etc. It has its own URL also.

You can save, copy (save as) and print the documents by using the options in the Menu Bar. You can quit the Navigator at any time. To close the browser, simply select the file in the Menu bar and click on "Close". You can also close it by double clicking the Control button in the upper – left corner of the screen.

9.8 SUMMARY

In this unit we understand that:

- ❑ Internet Browsing is skimming through electronic information choosing & locating the Internet Browser.
- ❑ For Searching the Internet, you need to know the web page address, called Uniform Resource Locator (URL).
- ❑ In India too several governmental and non-governmental organisations as well as commercial firm have been creating their own web sites and using them.
- ❑ Netscape Navigator is an activity to view different page on web.

9.9 SELF ASSESSMENT QUESTIONS

1. What is Web Browsing and U.R.L
2. Explain Internet Explorer?
3. What are the main components of Netscape Communicator

9.10 FURTHER READINGS

Falk, Beunet. The Internet-Basic reference from A to Z, Second Edition, New Delhi, BPB Publications, Caderlead, Rogers. How to Use Internet Net. New Delhi, Techmedia, 2002. B P B publications, 1996 Halam, Harley. Teacher the internet. New Delhi, Prentice – Hall of India, 1999. World Wide Web.

9.11 GLOSSARY

HTML: (Hypertext Markup Language)

- 1) The system of specifications used to define the appearance and structure of Web pages.
- 2) Informally, the contents of an HTML file for Example, "Don't get rid of that file. It contains the HTML for the main page of my Web site".

HTML EDITOR: A Web page editor designed to help people create Web pages by composing HTML. Compare to **wysiwyg editor**.

HTTP: (Hypertext Transport Protocol). The protocol used to resources. On the Web, hypertext is displayed on web pages.

Internet Explorer: A browser developed by Microsoft.

LESSON 10

WEBSITES AND SEARCH ENGINES

Structure

- 10.1 Aims and objectives**
- 10.2 Introduction**
- 10.3 Websites**
- 10.4 Hostnames and domains**
 - 10.4.1 Hostnames**
 - 10.4.2 Domain**
 - 10.4.3 Domains Name System.**
 - 10.4.4 The structure of a domain name**
- 10.5 Web Commands**
- 10.6 Search engines & gateways**
- 10.7 Information services**
- 10.8 Summary**
- 10.9 Self Assessment Questions**
- 10.10 Further Readings**
- 10.11 Glossary of Terms**

10.1 AIMS AND OBJECTIVES

After studying the unit one should be in a position to

1. Understand the structure of domain names
2. List out the prominent web sites
3. Know the major search engines
4. Explain the role of search engines in searching the web.

10.2 INTRODUCTION

- A WEB SITE is a collection of related Web pages. Many organizations and people have their own Web Sites.
- The WEB is an information delivery systems. You can use the Web to look at many different types of information and to access a variety of services. Like all Internet resources, the Web is based on a client / server systems.
- Web pages can contain all types of information including TEXT (characters), GRAPHICS (Pictures and photographs) and MULTIMEDIA (animation, video, and sounds). The defining characteristic of Web pages is that they can contain links to other pages or resources. This type of Information is called HYPERTEXT (for a reason I will explain in minute).

10.3 WEBSITES

Information on web is organised into files called web pages. Web pages contain not only data (Text, Graphics, Multimedia) also programmes. A collection of web pages is website. On a conservative estimate, there are more than 200 million websites in the world. Internet is a treasure trove of information. If we don't know the right method of searching for information, then it is akin to searching for a needle in the haystack. It is absolutely essential to search for information in the right kind of places using the right string.

10.4 Hostnames & Domains

There are two types of top-level domains: ORGANIZATIONAL DOMAINS and GEOGRAPHICAL DOMAINS. Organizational domains describe a category, while geographical domains indicate a particular country. For example, the organisational domain edu is for educational institutions, while the geographical domain au indicates the country of Australia.

Some Organizational Top-Level Domains

Domain	Description
com	Commercial
edu	U.S. universities (educational)
gov	U.S. federal government
int	International
mil	U.S. Military
net	Network providers
org	Miscellaneous organizations

Some Geographical Top-Level Domains

Domain	Description
at	Austria
au	Australia
be	Belgium
ca	Canada
ch	Switzerland (Confoederatio Helvetica)
cn	China
de	Germany (Deutschland)
es	Spain (Espana)
fr	France
ie	Republic of Ireland
it	Italy
jp	Japan
nz	New Zealand

uk	United Kingdom
us	United States
in	India

10.4.1 Hostnames:

Before we could understand the hostname one should understand the term IP address. IP address means the numbers used to identify Internet computers. Of course, when we tell a client program the name of a computer, we use a hostname. This means that before the client can carry out our request, it must translate that hostname into the corresponding IP address. The secret to understanding hostnames is to look at each part of the name, reading from right to left. In general, the rightmost two parts of the name will tell you which organisation manages that particular computer. If a name has more than two parts, the extra parts may provide even more information.

Now look at the name **architecture.mit.edu**. The **edu** tells us this is also a computer at a university ; the **mit** designation tells us that the university is MIT; and the third part, architecture, shows us that the computer is managed by the architecture department.

10.4.2 Domains:

A DOMAIN is a set of hostnames that have the rightmost part of their names in common. For instance, all the hostnames that end in edu belong to the edu domain. Some examples are:

Architecture.mit

.edu

www.ucsd.edu

www.med.harvard.edu

rd.edu

Similarly, all the hostnames that end uk belong to the uk domain. For example:

www.royal.gov.uk

ox.ac.uk

the – times.co.uk

Similarly, the hostnames www.royal.gov.uk belongs to the royal.gov.uk domain which is a sub-domain of gov.uk, which is itself a sub-domain of uk.

Thus, all the hostnames in the Internet are organized into one large hierarchical system based on domain names. This system is called DNS, the DOMAIN NAME SYSTEM.

10.4.3 Domain Name System

Every computer that hosts data on the Internet has a unique numerical address. For example, the numerical address for the White House is 198.137.240.100. But since few people want to remember long strings of numbers, the **Domain Name System** (DNS) was invented. DNS, a critical part of the Internet's technical infrastructure, correlates a numerical address to a word. To access the White House website, you could type its number into the address box of your web browser. But most people prefer to use "www.whitehouse.gov." In this case, the domain name is **whitehouse.gov**.

10.4.4 The Structure of a Domain Name

A domain name always has two or more parts separated by dots and typically consists of some form of an organization's name and a three letter or more suffix. For example, the domain name for IBM is "ibm.com"; the United Nations is "un.org." The domain name suffix is known as a **generic top-level domain** (gTLD) and it describes the type of organization. However in the last few years, the lines have blurred somewhat between these categories.

There are different **domain names** that we may identify a website and the content that it provides. There are different categories of domain names. They include

. gov	applicable to governments and governmental institutions
. com	generic top-level domain originally intended for commercial businesses around the world.
. biz	Applicable to businesses
. org	Applicable to non commercial organisations
. net	Usually used by companies and networks.
. mil	Applicable to United States military.
. info	is an unrestricted domain for websites containing information about you, your organization, your products or any other information you'dlike to make available to a global audience.
. name	is reserved exclusively for individuals
.pro	is restricted to certified professionals and related entities
.aero	is exclusively reserved for the aviation community
.coop	is restricted to use by bona fide cooperatives and cooperative service organizations that ascribe to the Cooperative Principles of the International Co-operative Association, such as member ownership and control.
.museum	was developed exclusively for the museum community.

There are also country specific domain names. These suffixes denote the geographic region where they exist. Two letter domains, such as .uk, .de and .jp (for example), are called country code top-level domains (ccTLDs) and correspond to a country, territory, or other geographic location. The rules and policies for registering ccTLDs vary significantly and a number of ccTLDs are reserved for use by citizens of the corresponding country.

They include

. in	For India
. uk	For United Kingdom
. jp	For Japan
. ch	For China
. ca	For Canada

Given below are some prominent websites (in category wise) that may be future reference

Search Engines

www.google.com / www.google.co.in - For General Searches

www.scholar.google.com - For Specialised Research

Information

www.yahoo.comwww.aj.com[\[es.com\]\(http://es.com\)](http://www.askjeev</div><div data-bbox=)[\[m\]\(http://m\)](http://www.msn.co</div><div data-bbox=)

News

www.news.google.comwww.expressindia.comwww.thehindu.com & www.hindu.inwww.nytimes.comwww.independent.co.ukwww.eenadu.net

- Indian Express

- The Hindu

- New York Times

- The Independent, UK

- Eenadu, Telugu

Government

www.whitehouse.govwww.

Education

www.ugc.ac.in

- University Grants

Commission www.nagarjunauniversity.ac.in - Acharya Nagarjuna

University, Guntur



10.4.4 Basic Web Commands

GUI browsers also implement most of these commands. The basic commands are:

Number	-	Display the next page of the current document. The line-mode browser identifies hypertext links with a number enclosed in square brackets. Typing the number of one of the hyperlinks by itself fetches the documents that the link points to and display it.
Back	-	Return to the parent of the current document.
Home	-	Return to the first document read in this session, usually a home page.
Recall	-	Display a numbered list of the documents you have visited. To return to one of these documents, type recall followed by the number.
List	-	Display a numbered list of the links from the current document. To follow a link, type the number by itself as above.
Next, Previous	-	Fetch the document pointed to by the next or previous hypertext link in the parent of the current document.
Go URL	-	Fetch the document represented by the URL (hypertext address).
Up, Down	-	Scroll up or down one page in the current document.
Top, Bottom	-	Go to the top or bottom of the current document.
Help	-	List available commands.
Manual	-	Jump to the online manual.
Quit	-	End the current Web session and exit the browser.
> <i>filename</i>	-	On UNIX systems only, saves or appends the current
>> <i>filename</i>	-	Document (without hyperlinks) to the named file.

10.4.5 Search Engines & Gateways

You can search the World wide Web in two ways : by exploring Web directories and by using search engines.

Directories such as Yahoo! and the Open Directory Project attempt to impose some order on the chaos of the Web, recruiting editors to prepare lists of related sites in a very structured manner. Sites are categorized in well – organized hierarchy, making it easier to find a bunch of different sites related to the same subject matter.

Search engines are massive databases that attempt to index the entire Web. These databases are prepared by machines instead of humans. You can use these search engines to search for text on millions of Web pages at once, relying on the search engine to find the most appropriate pages

If you want to conduct an effective search for information, you should use both methods.

Search Engine is a useful resource when looking for a company is Business.com, a directory, search engine, and news site for employers and employment-related information.

For Example: The Google search engine is useful for company searches because of the unusual way it ranks Web sites. Type [http:// www.google.com](http://www.google.com) in the Address bar and press Enter to go to the Google home page. When you're there, type the company name in the search box and click **Google Search** button.

The term "search engine" is often used generically to describe both crawler-based search engines and human-powered directories. These two types of search engines gather their listings in radically different ways.

Crawler-Based Search Engines

Crawler-based search engines, such as Google, create their listings automatically. They "crawl" or "spider" the web, then people search through what they have found.

If you change your web pages, crawler-based search engines eventually find these changes, and that can affect how you are listed. Page titles, body copy and other elements all play a role.

Human-Powered Directories

A human-powered directory, such as the Open Directory, depends on humans for its listings. You submit a short description to the directory for your entire site, or editors write one for sites they review. A search looks for matches only in the descriptions submitted.

Changing your web pages has no effect on your listing. Things that are useful for improving a listing with a search engine have nothing to do with improving a listing in a directory. The only exception is that a good site, with good content, might be more likely to get reviewed for free than a poor site.

"Hybrid Search Engines" Or Mixed Results

In the web's early days, it used to be that a search engine either presented crawler-based results or human-powered listings. Today, it is extremely common for both types of results to be presented. Usually, a hybrid search engine will favor one type of listings over another. For example, MSN Search is more likely to present human-powered listings from LookSmart. However, it does also present crawler-based results (as provided by Inktomi), especially for more obscure queries.



The Parts Of A Crawler-Based Search Engine

Crawler-based search engines have three major elements. First is the spider, also called the crawler. The spider visits a web page, reads it, and then follows links to other pages within the site. This is what it means when someone refers to a site being "spidered" or "crawled." The spider returns to the site on a regular basis, such as every month or two, to look for changes.

Everything the spider finds goes into the second part of the search engine, the index. The index, sometimes called the catalog, is like a giant book containing a copy of every web page that the spider finds. If a web page changes, then this book is updated with new information.

Sometimes it can take a while for new pages or changes that the spider finds to be added to the index. Thus, a web page may have been "spidered" but not yet "indexed." Until it is indexed -- added to the index -- it is not available to those searching with the search engine.

Search Engine Placement Tips

A query on a crawler-based search engine often turns up thousands or even millions of matching web pages. In many cases, only the 10 most "relevant" matches are displayed on the first page.

Naturally, anyone who runs a web site wants to be in the "top ten" results. This is because most users will find a result they like in the top ten. Being listed 11 or beyond means that many people may miss your web site.

The tips below will help you come closer to this goal, both for the keywords you think are important and for phrases you may not even be anticipating.

Pick Your Target Keywords

How do you think people will search for your web page? The words you imagine them typing into the search box are your target keywords.

For example, say you have a page devoted to stamp collecting. Anytime someone types "stamp collecting," you want your page to be in the top ten results. Then those are your target keywords for that page.

Each page in your web site will have different target keywords that reflect the page's content. For example, say you have another page about the history of stamps. Then "stamp history" might be your keywords for that page.

Your target keywords should always be at least two or more words long. Usually, too many sites will be relevant for a single word, such as "stamps." This "competition" means your odds of success are lower. Don't waste your time fighting the odds. Pick phrases of two or more words, and you'll have a better shot at success.

10.4.6 Information Services

With this background, let us now concentrate on the information services available through the Internet. If say, Internet is the one stop-shop for all information services – it is not an exaggeration. Governments, educational and research institutions, business firms, industries, banks, publishers, libraries, non-government organizations, and individuals are now offering a variety of information services through the Internet.

There are number of activities you can do on the Internet. Leon and Leon (1998) have listed the following.

- 1) Visit any web site available on Internet
- 2) Read and post articles in news groups
- 3) Download files to your PC
- 4) Send and receive e-mail
- 5) Do online Shopping
- 6) Chat with other users online
- 7) Play games with others online globally
- 8) Subscribe to electronic newsletters, e-mail, etc.
- 9) Join contests

- 10) Contribute articles and other materials
- 11) Access online multimedia including radio and video broadcast
- 12) Create your or your institution's / organisation's web site.
- 13) Post your web sites (including personal web pages)
- 14) Create an e-mail ID and account for you
- 15) Use the e-mail remainder service.
- 16) Find an institution or organisation's details
- 17) Find a person's details

10.4.7 Summary

Let us remember what we studied in this Unit:

- A web page contains all kinds of data
- Domains are of two types. They are Organizational and Geographical Domains
- For Searching the Internet, you need to know the web page address. There are search engines (such as altavista, hotbot, lycos, infoseek and yahoo), which help the users in finding the appropriate web sites for information.
- In India too, several governmental and non-governmental organisations as well as commercial firms have been creating their own web sites and using them.
- Web pages are stored commonly in files with an extension of html.

10.4.8 Self Assessment Questions

1. What do you understand about Hostname and Domains?
2. What is a search engines & gateways?
3. What are different web commands?

10.4.9 Further Readings

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World Wide Web.

10.4.10 Glossary of Terms

Domain : A set of hostnames that have the rightmost part of their names in common. For example, all the hostnames that end in edu belong to the edu domain.

LESSON 11

INTERNET APPLICATIONS

Structure

- 11.1 Aims and Objectives**
- 11.2 Introduction**
- 11.3 Internet Applications**
- 11.4 Internet in Daily Life**
- 11.5 Educational uses of Internet**
- 11.6 Future Development On The Internet**
- 11.7 Evil things on Internet**
- 11.8 Netiquette or Net Manners**
- 11.9 Summary**
- 11.10 Self Assessment Questions**
- 11.11 Further Reading**
- 11.12 Glossary of Terms**

11.1 AIMS AND OBJECTIVES

After reading this unit, you should be able to know:

1. How Internet is useful in every day lives of people;
2. How Internet can be used as a powerful business tool;
3. How it can be used effectively in Education, Libraries, Government and various Professions;
4. Ethics to be followed while using the Internet.

11.2 INTRODUCTION

Internet is the largest most complete (and complex) learning tool in the world. Through the internet you can find knowledge resources that allow you to study virtually and discipline imaginable. Not only that, but you can communicate quickly and effectively with others who are also interested in the same discipline. Teachers, students, other educators can share ideas instantly across vast distances.

A variety of programs have been installed on the internet to use these services, combine them, or make them easier to use. These include Archie, Gopher, WAIS and the World Wide Web (WWW).

Individuals, companies, and institutions use the Internet in many ways. Businesses use the Internet to provide access to complex databases, such as financial databases. Companies can carry out commerce online, including advertising, selling, buying, distributing products, and providing after – sales services. Businesses and

institutions can use the Internet for voice and video conferencing and other forms of communication that allow people to telecommute, or work from a distance.

The use of electronic mail over the Internet has greatly speeded communication between companies, among coworkers, and between other individuals. Media and entertainment companies use the Internet to broadcast audio and video, including live radio and television programs; to offer online chat, in which people carry on discussions using written text; and to offer online news and weather programs. Scientists and scholars use the Internet to communicate with colleagues, to perform research, to distribute lecture notes and course materials to students, and to publish papers and articles. Individuals use the Internet for communication, entertainment, finding information, and to buy and sell goods and services.

11.3 INTERNET APPLICATIONS

WWW – World Wide Web:

The World Wide Web is the multimedia experience on the Internet. The WWW consists of pages where you can find out just about anything you want, or don't want to know about. The best to start is to a search on one of the many search engines. Click on the Net Search button at the top of you browser and follow the instructions, or use Yahoo! to browse the Web by category.

Electronic Mail:

The Internet is now the world's largest electronic mail system. More than 25 million people are directly connected to the Internet and can send and receive electronic mail. Through gateways to other electronic mail systems, million more can join in.

FTP:

FTP OR File Transfer Protocol is protocol used to transfer files to between computers on the Internet. There are two types of FTP connections, anonymous and non-anonymous. If you connect to an anonymous FTP server then you would use anonymous as your login name and your e-mail address as a password. Non- anonymous, you will need a private login name and password. There are also two types of file transfers, ASCII and binary. ASCII is for text transfers only. Binary transfers are for transferring anything else. I in doubt, use binary (bin).

Internet Relay Chat (IRC):

Internet Relay Chat is where to meet people on the net. There is a channel for just about anything! ! First a few words of warning: Do not give any information out about yourself over irc, and do not type in anything some stranger asks you to. And please, if you have children, closely monitor their activities on irc. Now after all this irc is a great place to visit. You meet people from all over the world and can talk about any subject you want. IRC provides real – time communication with others on the Internet.

News Groups:

News Groups are like an international bulletin board. Each group is a forum for a different subject, where you can post questions and answers. There are many

thousands of groups covering just about any area of interest. You can use Internet Explorer or Netscape Navigator to view these groups. Please note that any post that you make to a newsgroup will be sent all over the world to every news server on the planet, so never post anything personal to a newsgroup. Also, there are many newsgroups which may contain material that is not suitable for children. Because of the global nature of Internet, there isn't a way to control the viewing of inappropriate material. The best way to prevent children from viewing these groups is to be with them while they're surfing.

Usenet:

Usenet is a collection of more than 5,000 newsgroups, or discussion groups, on every conceivable subject. For example, some newsgroups are self-help groups for victims of cancer or sexual abuse, and others give the latest in gossip about show business personalities. Anyone can contribute a message, called an article, to a Usenet newsgroup or post a reply, known as a follow-up post, to an existing article. With the aid of a newsreader (a program designed to access Usenet newsgroups), you can read an entire thread—all the replies to an interesting article.

The system is intended for exchange of information in an informal way. Anyone can post new messages to the group and reply to other messages. News groups are arranged in a loose hierarchical order covering about 5,000 subjects. About half of these are related to computing, the rest are for recreational subjects, professional discussion and trivia. To use Usenet you need a news viewer and access to an NNTP server. Most Internet service providers have such a server, as do most large academic institutions.

Telnet:

Telnet is the service of the Internet that allows you to access remote computers outside your area. Many computers on the Internet are set up to allow Telnet access. Some require login names and passwords, but many do not have any restrictions. Through Telnet, you may access libraries, data-based and other public services all over the world. Hytelnet is a tool that helps you access the various sites through Telnet. The World Wide Web lets you access sites through Telnet and use FTP to retrieve documents you find.

Bulletin Boards:

Electronic bulletin board systems (BBSs) are a new means of causal communications for computer users. A BBS is a computer system often just a PC equipped with a modern special software that enables computer users to access the system, send and receive e-mail messages, and obtain computer files. If you have a personal computer communications software, a modem, a telephone line, and the telephone number of a BBS, you can explore the BBS world. According to one estimate, there are more than 45,000 BBSs in the U.S. alone. Some are free, but most charge a modest fee.

To use a bulletin board, you use see your communications program to call the bulletin board telephone number. When the BBS answers, you see a menu listing the available options, such as electronic mail, games and file libraries. Many BBS systems offer extensive libraries of public domain software (non-copyrighted software that anyone may copy), freeware (copyrighted software that can be freely copied but not sold). You can download this software for your use. (in downloading, you transfer a file from the remote computer to your own.) Users contribute to a BBS's richness when they upload software. (In uploading you transfer a file from your computer to the remote computer.)

Fax (facsimile)

Sometimes called "telecopying" a fax is the telephonic transmission of scanned-in printed material (text or images), usually to a telephone number associated with a printer or other output device. The original document is scanned with a fax machine, which treats the contents (text or images) as a single fixed graphic image, converting it into a bitmap. In this digital form, the information is transmitted as electrical signals through the telephone systems. The receiving fax machine reconverts the coded image and prints a paper copy of the document.

Almost all modems manufactured today are capable of sending and receiving fax data. Fax/modem software generates fax signals directly from disk files or the screen. Even if a document is text only, it is treated by the computer as a scanned image and is transmitted to the receiver as a bitmap. Faxing a message online works well if the receipt wants only to read the message. However, if the document required editing, it must be converted into ASCII text by an OCR (Optical character recognition) program, or it must be retyped manually into the computer. A more efficient method of sending documents that require modification is through the e-mail system. E-mail files are already ASCII text so they can be edited immediately in any text editor or word processing program.

The Internet now provides a new and cheaper way to send faxes in some cases. A number of free and commercial companies provide arrangements for using the Internet rather than the public telephone system for most or part of the path to the fax points. Some services also provide the ability to broadcast a fax to multiple addresses.

Telephony

Telephone is the technology associated with the electronic transmission of voice, fax, or other information between distant parties using systems historically associated with the telephone, a handheld device containing both a speaker or transmitter and a receiver. With the arrival of computers and the transmittal of digital information over telephone systems and the use of radio to transmit telephone signals, the distinction between telephony and telecommunication has become difficult to find. However, we believe that telephony does connote voice or spoken and heard information predominately and it usually assumes a point-to-point (rather than a broadcast) connection. It also tends to assume a temporarily dedicated connection.

Internet telephony is the use of the Internet rather than the traditional telephone company infrastructure and rate structure to exchange spoken or other telephone information. Since access to the Internet is available at local phone connection rates, an international or other long-distance call will be much less expensive than through the traditional call arrangement.

On the Internet, three services are available.

- ❖ The ability to make a normal voice phone call (where or not the person called is immediately available; that is, the phone will ring at the location of the person called).
- ❖ The ability to send fax transmissions at very low cost (at local call prices) through a gateway point on the internet in major cities.
- ❖ The ability to leave voice mail at a called number

Some companies that make products that provide or plan to provide these capabilities include: MS Net Meeting IDT Corporation (Net2Phone), Netspeak, NetXchange, Rockwell International, Vocal Tec, and Voxspeak. Among uses planned for Internet phone services are phone calls to customer service people while viewing a product catalog online at a Web site.

You can now add telephone capabilities to your computer by adding a telephony board, available for under \$300, that combines the functions of modem, sound board, speakerphone, and voicemail system. A telephony board is often integrated into new machines targeted for small business and home office users.

A Telephony API (application program interface) is available from Microsoft and Intel that allows Windows client applications to access voice services on a server and that interconnects PC and phone systems.

NetMeeting

Microsoft NetMeeting gives people around the world a whole new way of talking, meeting, working, and sharing over the Internet.

NetMeeting uses Internet phone voice communications and conferencing standards to provide multi-user applications and data sharing over intranets or the Internet. Two or more users can work together and collaborate in real time using application sharing, whiteboard, and chat functionality. NetMeeting is included in Microsoft's Internet Explorer.

NetMeeting can be used for common collaborative activities such as virtual meetings. It can also be used for customer service applications, telecommuting, distance learning, and technical support. The product is based on ITU (International Telecommunication Union) standards, so it is compatible with other products based on

the same standards. Some of NetMeeting's built in features are listed here.

Using NetMeeting, you can:

- ◆ Place calls to anyone using the Internet or an intranet
- ◆ Talk to someone over the Internet or an Intranet
- ◆ See the person you are calling
- ◆ Work with others in an application
- ◆ Use the Whiteboard to sketch in an online meeting
- ◆ Check your Speed Dial list to see which of your contacts are logged on
- ◆ Send typed messages in Chat
- ◆ Create a call link for other people to call you from your Web page
- ◆ Send files to everyone in a meeting

Teleconferencing

A teleconference is a meeting in which the participants do not meet physically but use telephones and computers to meet. Conference call capability has been available from telephone companies for many years. The computer conference is similar to a bulletin board system. When one computer sends a message, all the other participants can receive it at the same time. The next step in teleconferencing is videoconferencing.

Videoconferencing

Videoconferencing is one of the most exciting areas of development in telecommunications, with applications ranging from business to government to education to home and family. Videoconferencing involves sending video signals as well as telephone and computer data signals. Videoconferencing did require special hardware and special digital telephone lines, but recently, POTS videoconferencing has become available. The widespread use of videoconferencing could have a negative impact on the travel industry because videoconferences are much cheaper than transporting people to a meeting place.

NetShow

NetShow is basically a low-bandwidth alternative to videoconferencing. It provides live multicast audio, file transfer and on-demand streamed audio, illustrated audio and video. It is also a development platform on which software developers can create add-on products. According to Microsoft, NetShow takes advantage of important Internet and network communication technologies to minimize traffic while providing useful tools for multiuser collaboration.

NetShow also uses streaming technology, which allows users to see or hear information as it arrives, rather than wait for it to be completely transferred.

Collaborative Multimedia Computing

Collaborative Computing allows users to work together on documents and projects, usually in real time, by taking advantage of underlying network communication systems. Whole new categories of software have been developed for collaborative computing, and many existing applications now include features that let people work together over networks. Here are some examples

- ❑ Application suites such as Microsoft Office and Exchange, Lotus Notes, and Novell Group wise that provide messaging, scheduling, document coauthoring, rules-based message management, workflow routing, and discussion groups.
- ❑ Videoconferencing applications that allow users to collaborate over local networks, private WANs, or over the Internet. See “Videoconferencing and Desktop Video” for more information.
- ❑ Internet collaboration tools that provide virtual meetings, group discussions, chat rooms, whiteboards, document exchange, workflow routing, and many other features. Multicasting is an enabling technology for groupware and collaborative work on the Internet that reduces bandwidth requirements. A single packet can be addressed to a group, rather than having to send a packet to each member of the group.

A good example of collaborative applications designed for Internet use are Microsoft's NetMeeting and NetShow. NetMeeting allows intranet and Internet users to collaborate with applications over the Internet while NetShow lets users set up audio and graphic (nonvideo) conferences. These products are described below as examples of the type of collaborative applications available in the intranet/Internet environment.

Commercial use of Internet

Internet, the world's largest network of computers is today increasingly being commercialised. The use of internet is moving away from pure University network to network connecting millions of computers, many of which belong to companies using internet for commercial purpose.

The service providers on the internet are also undergoing a change from Government funded agencies to Private Operators such as PSI, USENET etc. as well as major telecommunications carriers such as Sprint, MCI, BT and others. These commercial operators have interconnected their backbones to form Commercial Internet Exchange (CIX).

Videsh Sanchar Nigam Limited, India's International Telecom Carrier, has contributed its might to the expansion of internet backbone to India. This backbone Network in India is known as VSNL's Gateway internet Access Services (GIAS) Network.

By now, you are familiar with the Internet, how it works; the tools and services available on Internet; the World Wide Web, Browsers, Search Engines etc. Let us see the various application of Internet in every day its uses to people who are in business, government, education and other professions. Finally we will also study the limitations of this powerful tool. Ethics are essential for any profession or service and Internet is no exception. Let us also review the ethics to be followed while using Internet.

11.4 INTERNET IN DAILY LIFE

Once you are connected to Internet, you can find answers to every question you have every had. You can send messages across the world instantly, transfer documents, do shopping, visit art galleries, read books, play games, chat, read the latest news in any language, meet people with similar interests, do business and so on. It is an easier and cheaper and cheaper medium of communication. Just like a fax machine and telephone, Internet has become an integral tool for business. Let us see some of the Internet Applications in this Unit. Internet can be used in many ways the Internet at your home and personal life. Using Internet one can

- a. A.T.M & Banking
- b. Manage personal finances, investments
- c. Read News
- d. Travel information & Reservations
- e. Play games
- f. Develops knowledge of culture and traditions of people.

Through Internet was created primarily as a research tool, it has grown very quickly to include many other activities that range from online shopping, entertainment to many other activities listed above.

The Internet offers access to most the major sources of news across globe. You can also filter the news and have access to only those topics that are of your choice

Many people are using Internet for planning their travel. Apart from the online Airlines and Hotel Reservations and other travel information, you can also get access to custom maps, driving directions and detailed information about your destinations through the Internet.

Shopping, movies charts and playing games are some of the Internet pastimes. You can spend your leisure to find out what movies are playing in your neighborhood or you can participate in more related chats. You can also shop in the major mail-order houses and place orders online. For this, you may have to register yourself in the shopping network giving your credit card details.

Business and the Internet

Until recent past, Net was the place for researchers and educators. Now Net has become the hotspot for doing business. World Wide Web is being used as a commercial tool where all kinds of companies from booksellers to coffee supplies advertise their product. The ease of communication, competitiveness, global marketing and collaboration are some of the reasons why the Internet has attracted the business dealings.

It is easy to place your advertisement on the Net but what matters is how best you can attract the attention of the users. Putting banner- ads in web pages, keeping

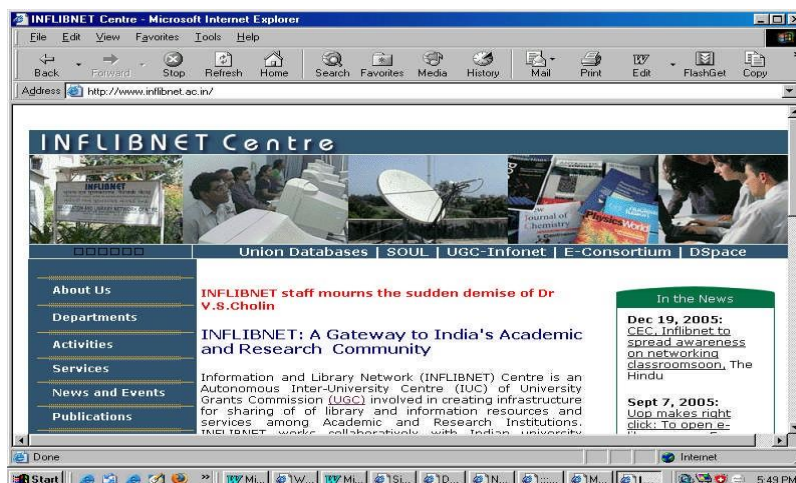
active through discussion lists and news groups, sponsorships are some of the techniques used on the web to get visibility of your presence on the Net.

Because the Internet is an open system, some customers are reluctant to give their personal information and credit card details online. To make purchasing easy and familiar to customers., may companies are creating methods to secure transactions. Purchase orders, creating accounts of customers before online purchase orders, creating accounts of customers before online purchase, using email orders, cyber credit cards or cheques-are some of the methods used to ensure secure transactions.

11.5 EDUCATIONAL USES OF INTERNET

The Internet started as a tool for research and now, it is turning out to be a good tool for education. It provides access to wide range of sources of information. With the advent of Internet, many universities are offering online courses. Students can select the programme of study, make online admissions. Net has revolutionized the entire educational process. Globalisation of education has been made possible through the Internet. The Internet Relay Chat provides two way communication between the learner and the teacher. The online learning provides greater flexibility to the learner to study at his/her convenient time and location.

Internet in libraries brought a great revolution. In good olden days people used to come to library for books but now due to Internet, the tendency of people are changed and they are coming for information. INFLIBNET, Delnet , etc, were developed and the concept of resource sharing is strengthened. The strengths of other libraries can be easily accessed . The concept of e-journals and e-books is gaining importance and people are using them very easily through Internet.



Professionals On Internet**A. Internet and Legal Matters**

In legal matters, very often you may need to decide when to approach a lawyer or whether it is necessary to do so. In many situations an intelligent individual with some guidance seeking advice by putting them in touch with legal professionals.

B. Internet for Health and Fitness

Through the Internet cannot substitute a doctor, you can find a comprehensive set of health related resources that help you keep fit and healthy. A lot of people's health interests revolve around dieting, weight and fitness. The diet and weight loss/Fitness page offers access to health related articles, Usenet groups and other website of interest.

Government Resources On Internet

The Government websites provide all the information related to the functioning of various department of the Government. The website www.whitehouse.gov provides upto-date information regarding the Whitehouse, the powers of the Supreme Court, federal district courts and provides links to other government bodies like Library of Congress. Similarly, the Andhra Pradesh Websites provided upto date information and events happening in the State. The tourism information can be of use to foreign visitors to India. Apart from the multiple uses of these government websites more importantly their presence is required to keep the citizens informed of the various activities and information about their Government.

11.6 EVIL THINGS ON INTERNET**Cyber Cafes**

Until recently not everyone have access to the Internet at home or at the workplace. Realising the great Potential of Internet, many Internet browsing Centres are offering Internet services at minimal charges. There are hundreds of coffee shops around the world offering Internet access along with a cup of coffee. These are popularly known as Cyber café.

Web Television

Very soon Web Television is going to be a commonplace item in the households. Television programs whether it is broadcast directly or with a cable network connection, are monitored by some people who will decide what you will see and when you will see those programs. On the Internet, any one who has the web address and opens the site can watch the broadcasts. Web TV is not only cheap, it requires no license and it can be accessed by anyone, anywhere in the world. However, video transmission requires high speed internal networks and high width connections. For the Internet connected through phone lines, video over the Internet has only limited use. Intel Corporation's InterCast technology is researching on bringing together broadcast TV and the Internet.

Developments in Browsing the Net

Today primarily to get connected to the Internet, what you need is a dial up connection, and a modem. However, with advances in technology, in future, you can browse the Internet just by using your television or cellular phone. Research is in progress to adopt remote techniques to browse the Net.

11.7 EVIL THINGS ON INTERNET

Since no one runs the Internet, there are no Net Police, and people can pretty much do what they want. Of course, you still have to follow the laws where you live. For example, if you make money on the Net, you do have to pay taxes, and if you break the law, you can be arrested.

Humans do not function well in anarchy, and through the years, a great many customs have developed to make the Net a tolerable place. The most important custom is that you are responsible for your own actions. You are not responsible for the action of other people. If you disagree with what someone is doing, ignore it; if you don't like certain people, avoid them; and if you are bothered by the information or picture that someone has put on their Web site, don't look at it.

This isn't as harsh as it sounds. The Net is used by millions of people from many different cultures, and here is no possible way to devise laws – or even guidelines – that would be acceptable to everyone. From the beginning, the custom has been to live and let live, and, as a result, the Net has become our primary vehicle for free speech and dissemination of information.

So what about all the pornography? The Internet has shown us that looking at pictures of naked men and women has an enormous universal appeal, and that's not going to change. Moreover, pornography isn't the only thing to worry about: The Net has its share of dishonest people, misleading information, harmful activities, and ways to waste your money. Should we be concerned?

Of course we should, but on the Net, censoring the activities of other people doesn't work. What does work is to spend some time and effort developing your judgement, tolerance and self-control.

Motivations for crime on the Net

1. Personal or financial gain
2. Entertainment
3. Challenge
4. Accident
5. Vandalism – are some of the factors that motivate the crime on the Internet.

Techniques used in computer crime and preventive measure

Some of the most common techniques noticed in committing computer crime include:

- ❖ Overriding internal controls
- ❖ Developing computer programs from causing damage or destruction to software or data
- ❖ Stealing Computer time, software, information or equipment
- ❖ In Order to prevent computer fraud there must be a constant watch on:
- ❖ Unauthorised use of computer time
- ❖ Unauthorised use of attempts to access data files
- ❖ Theft of computer supplies, software or hardware
- ❖ Damage to data, hardware or software
- ❖ Unauthorised possession of computer disks, tapes or printouts.

Cryptography

Cryptography is the method used to protect privacy and security on the Internet. E-mail messages are easy to intercept. If your computer is connected to a Local Area Network any technician using a LAN analyser can see and read everything that is sent or received on the network. Therefore, in order to protect the privacy of communications between parties, Phil Zimmerman of the United States has come up with shareware program called PGP (Pretty Good Privacy) that allows people to encrypt or protect their email.

Digital Signatures

To ensure authentication of information, signatures can be provided by the person sending the message with his / her private key. This signature is created as an encrypted file that cannot be duplicated by any other means. This ability to authenticate a message's source and accuracy has made the e-commerce more widespread on the Internet. Encryption and digital signatures have made credit – card charges over the Internet feasible.

11.8 NETIQUETTE OR NET MANNERS

All cultures and societies have standards of conduct and customs. Typically, if you remember to be courteous and respectful of others on the network, you'll be fine. General do's and don'ts typically include but are not limited to:

- Do become familiar with and obey all the rules/use policies of your local network.
- Don't send someone large files they didn't request; don't send e-mail en masse (spamming).
- Don't SHOUT (as anything typed in all capital letters appears),
- Don't visit an FTP site as an anonymous user during that site's busy time or main business hours.
- Do read any readily available FAQ (frequently asked questions) sheets for newsgroups and websites before posting a question that may have already been answered.
- Do use your e-mail address to identify yourself at anonymous FTP sites.

- Don't use vulgar, rude or disrespectful language at any time.
- Do be aware of potential differences in cultures internationally.
- Don't camp out - this means don't log in and just leave your connection idle if you're not using it. Sign off and free up one of your provider's modems for someone else to use. While many Internet services provide users with "unlimited" Internet access, this generally means unlimited "use" not idle access.

11.9 SUMMARY

Let us recapitulate briefly what we have studied so far in this unit.

- ♦ Internet can be used for education libraries, entertainment, doing business. Internet can be used to get Government information, professional advice and so on.
- ♦ Research is in progress to develop Web Television, Remote control techniques to browse the Internet.
- ♦ Cryptography, digital signatures are some methods to ensure security of transactions on the web
- ♦ Internet ethics are required to monitor the unauthorized use of computer files or data.

11.10 SELF ASSESSMENT QUESTIONS

1. Write some areas of Internet applications?
2. How best we can use Internet in libraries?
3. What are Internet ethics?

11.11 FURTHER READINGS

- Falk, Beunet. The Internet-Basic reference from A to Z, Second Edition, New Delhi, BPB Publications,
- b) Halam, Harley. Teacher the internet. New Delhi, Prentice – Hall of India, 1999.
- a) Caderlead, Rogers. How to Use Internet Net. New Delhi, Techmedia, 2002. B P B publications, 1996

11.12 GLOSSARY

(including technical terms, hacker slang, and acronyms)

- **Anonymous FTP:** FTP (File Transfer Protocol) is another way files are transmitted via the Internet. You can also reach FTP sites via the Web. An anonymous FTP site usually allows only a certain number of anonymous users to connect and retrieve its files at one time. It typically is a database for many software programs and files.

- **Applet:** Java-enhanced objects or mini programs that can travel with a Webpage to perform a special function
- **Archie:** A tool for finding files at FTP sites.
- **ASCII Text:** American Standard Code for Information Interchange. A file with only standard "text" characters.
- **Bandwidth:** How much data can pass through an Internet pipeline at one time.
- **Baud Rate:** The rate of data transfer, usually in reference to modem speed. Modems usually transfer data in bits per second.
- **BBS:** a bulletin board service. Many private or corporate BBSs existed before the explosive growth of the Web. Many Web sites offer a form of BBS in which visitors can post messages and have threaded "conversations" by topic.
- **BinHex:** a Mac file converted from binary (non-text) to ASCII text for transporting via e-mail.; a binary compressed file (Macintosh)
- **Bit:** A binary digit. The smallest unit of data. A group of 8 bits makes one byte.
- **Bitmap:** A pattern of pixels used to display an image.
- **Browser:** A software program used for viewing Web documents. Some browsers are Netscape Navigator, Microsoft's Internet Explorer, NCSA Mosaic, and Lynx.
- **cgi-bin:** A directory on a server that typically holds various executable cgi scripts necessary to process forms and perform other types of interaction in a client-server transaction.
- **Client:** A software program on your computer (and YOU as the user of the program) that connects to a computer server to retrieve information.
- **Client-Side:** Action or interpretation that takes place on the client side of a client-server transaction. Client-side image maps, for instance, allow your browser to interpret defined hotlinks on an image rather than sending the coordinates to a Web server for interpretation.
- **Cache** (rhymes with trash): Your computer's short-term memory that allows it to temporarily store Web files for faster repeat access to those files. Remember: Trash (delete or clear) your cache often!
- **Cookie:** A persistent HTTP cookie is a Netscape enhancement in which a packet of information is sent to your browser via a server-side script, giving the webserver you are visiting a "memory" of the choices you make or information you input while viewing a Web page. When you visit again, the cookie lets the webserver "remember" you. Cookies have expirations and can be helpful at shopping or registration sites, for instance, and have many other uses.
- **Domain, Domain Name:** Category of server (.com=commercial, etc.) , official Internet name for a server. Also, **Domain Name Service** (DNS) , a directory system that looks up various servers by host name and IP address. There are also virtual domains which allow for alias names on the same server.
- **Download:** To retrieve a file from another computer.

- **E-Mail:** Electronic mail. A means of exchanging messages and/or small files with others via the Internet. Netscape Navigator and Internet Explorer have built-in e-mail capabilities; Eudora is another good e-mail software program.
- **Encryption:** Encoding messages so they are illegible to outside viewers. Especially helpful for security in Web commerce.
- **FAQ:** A FAQ sheet presents a list of frequently asked questions (and answers!) by topic. Be sure to look for these and read what's available before you seek help elsewhere.
- **File Extension:** the second part of a file name which designates its file type. In DOS file names and extensions are limited by the 8/3 rule or 8 characters per name and 3 characters per extension. It's helpful to know file extensions when using helper applications in your browser or when downloading or decompressing files.
- **Flame:** A mean-spirited e-mail or newsgroup message. Flames violate proper Internet conduct. See also, **spam**.
- **FTP:** File Transfer Protocol. A means of retrieving computer files, but also a means of uploading files to a server. FTP sites are generally special sites for downloading files. Most allow only a certain number of people to be connected at one time. You may have to make several attempts to reach a busy FTP site. Many FTP sites are now Web-based, which means you can reach them via your browser. You can FTP your files and update your Web site from home through an Internet Service Provider with the help of FTP programs including Fetch for Macintosh and CuteFTP for Windows. Netscape Navigator also has some built-in FTP uploading capabilities.
- **Freeware:** Files and programs offered into the public domain for your free use and distribution. Shareware requires a small fee. Other variations: T-shirtware, postcardware, e-mailware.
- **GIF:** a Graphics Interchange Format image used primarily for solid color inline artwork.
- **GIF Inflation:** A process in which compressed .gif images inflate in your browser's cache. This can cause your browser to crash sometimes if you are visiting a Web site with lots of images or if your cache is too full. You can never have too much RAM or a big enough cache for Web browsing.
- **Gopher:** An information retrieval system created by the University of Minnesota. Many gopher sites are now Web oriented.
- **Home Page:** a Web document's opening page. Also, the default page for your Web browser.
- **Host:** A computer providing Internet access or serving files.
- **Htx:** A file extension for a compressed Mac file
- **HTH:** Popular abbreviation in discussion groups for "hope this helps."

- **HTML:** HyperText Markup Language, the dialect of Web documents. Web pages are actually a combination of several files such as text, images and display instructions. HTML tags tell the browser how to display them all together.
- **HTTP:** HyperText Transfer Protocol of the Web.
- **Hypertext:** a term to describe non-linear writing in which you follow associative paths. The foundation of the Web.
- **Images, Image Maps:** Graphic parts of a Web document, mostly in .gif or .jpeg format. Images sometimes load onto your screen like a Venetian blind. These are called **interlaced** images and give the appearance that they are loading faster. An image map is an illustration or image with defined hotlink areas.
- **IMHO:** popular abbreviation for "in my humble opinion."
- **IP:** Internet Protocol. **IP Address:** the specific numerical Internet location of a server.
- **IRC:** Internet Relay Chat, allows real-time "talking" via the Internet.
- **Java and Javascript:** two separate computer program scripting languages, each of which enhances functionality of Web documents.
- **JPEG:** Joint Photographic Experts Group, developers of the JPEG format for compressed image files. Used primarily for photographs and other continuous tone images.
- **Listserv:** an automated mailing list allowing discussion among members by topic. There are specific rules for subscribing and un subscribing to a listserv.
- **LAN:** local area network, two or more computers connected via a cable.
- **Local Talk:** Apple's built-in LAN system for the Macintosh.
- **Login:** the process by which you identify yourself to a host computer, usually with a user ID and a password.
- **Lurkers, lurking:** Those who read mail list or news group discussions without contributing to them. It's a good idea to lurk awhile before you post a message. This is not a derogatory term on the Internet.
- **MIME:** Multipurpose Internet Mail Extensions: the Internet standard for transferring files other than text, such as audio, video, images, etc., via e-mail.
- **Mirror Site:** A server that has the same files as another server to distribute the load and offer more convenient geographic paths to clients.
- **Modem:** A modulator-demodulator, which allows your computer to send and receive data via telephone lines.
- **Moderator:** the person in charge of a mailing list or news group who reads all messages to be sure they are appropriate before posting them to the group.
- **MPEG:** Motion Picture Experts Group, developers of a compression format for video files.

- **NCSA:** National Center for Supercomputing Applications, producers of much public domain software for the Internet and scientific community. Creators of the NCSA Mosaic Web browser software.
- **Netiquette:** Proper network etiquette.
- **News Group:** A threaded discussion by topic on the Usenet network.
- **Newsreader:** A program that helps you read news groups, similar to e-mail. Built-in on Netscape Navigator. The news groups you can access will depend upon those supplied by your Internet access provider.
- **NNTP:** Net news transport protocol that governs Usenet news.
- **Offline:** Actions taken while not connected to another computer or network. Typically you can compose e-mail or view local files while being offline.
- **Online:** Being connected to another computer or network.
- **Page:** On the Web, the name of a document.
- **Plug-In:** A mini program that enhances your browser; a hundred or more are available. Be sure you set these: Shockwave, RealAudio, and Quicktime.
- **POP:** Post Office Protocol for e-mail retrieval and storage.
- **Post:** To send a message to a mailing list or news group discussion, to put up a Web page.
- **PPP:** Point to Point Protocol used for Internet connectivity. Your Internet connection will likely be via a dial-up PPP account.
- **Protocol:** A language syntax for computers.
- **Public domain:** software or files you can use or distribute freely.
- **Quick Time:** An Apple technology for multimedia data.
- **Robot:** an automatic text-indexing system that visits servers and indexes their contents. Helps create vast searchable directories.
- **Root directory:** the topmost directory on a computer.
- **SEA** Self-Extracting Archive, a compressed file format for Macintosh.
- **Server:** A computer that makes its files available to a client via a network.
- **Server-side, server-side includes:** Action or interpretation on the server side of a client-server transaction. For instance, a cgi script residing on a server can create HTML documents on the fly from form data, display a graphical odometer or page counter or redirect your browser to a particular Web document based on the type or version of software you are using.
- **Shareware:** software that may be freely distributed and tried out, with a small fee payable to the author for those who want to keep the program and use it. Be honorable. Pay your shareware fees.
- **Signature:** a text file that can be automatically appended to your e-mail messages.

- **Sit:** A file extension for a compressed file (Stuff-It Archive)
 - **Smileys:** A collection of typographic symbols used to simulate expressions. :)
 - **SMTP:** Simple Mail Transport Protocol for e-mail.
 - **snail mail:** Paper mail.
 - **Spamming:** sending hundreds of inappropriate postings to a Usenet newsgroup or mailing list. Violation of Internet netiquette.
 - **System Administrator:** the person who runs a host computer or network.
 - **T1:** A high-speed network link on the Internet.
 - **T3:** An even higher network link... very big backbone connection.
 - **TCP:** Transmission Control Protocol and the basis for Internet traffic. It works with IP to ensure that packets of information travel safely on the Internet.
 - **TCP/IP:** the protocols on which the Internet was founded.
 - **Telnet:** a remote terminal emulation program that allows you to login and access a remote computer.
 - **Thread:** a group of messages that share the same subject or topic.
 - **Timeout:** the amount of idle time allowed before a connection will discontinue.
 - **TIA:** Popular abbreviation for thanks in advance.
 - **UNIX:** a popular if cryptic computer operating system. Many Web servers are UNIX-based.
 - **Upload:** To send a file to another computer.
 - **Usenet:** network for news group discussions.
 - **User id:** The name you use to login to another computer.
 - **UUENCODE:** a program that encodes binary (nontext) files for distribution via e-mail.
 - **Veronica:** an information agent that searches gopher databases.
 - **Virus:** A computer code that damages computer data and/or programs.
 - **WAIS:** Wide Area Information Servers, a searchable group of full-text databases.
 - **Webmaster:** The person in charge of a server and the documents contained on it. Derived from the term "postmaster."
 - **World Wide Web:** The newest and most ambitious Internet protocol. Responsible for explosive Internet growth in the 1990s.
 - **Worm:** a program that infiltrates a computer system and copies itself many times, filling up disk space.
- Zip:** a common Windows file extension for a compressed ZIP file

LESSON 12

LIBRARY AUTOMATION

Structure

- 12.1 Aims and objectives**
- 12.2 Introduction**
- 12.3 Definition**
- 12.4 Need for automation**
- 12.5 Benefits of library automation**
- 12.6 Computer applications in library functions**
 - 12.6.1 Acquisitions**
 - 12.6.2 Serials control**
 - 12.6.3 Circulation control**
 - 12.6.4 Information storage and retrieval**
- 12.7 Role of Computers in Information Services**
- 12.8 Summary**
- 12.9 Self Assessment Questions**
- 12.10 Further Readings**

12.1 AIMS AND OBJECTIVES

This unit attempts to explain the role of computers in library automations and various library automation activities.

After studying this unit you should be able to know.

- | | |
|-----------|---|
| 12.10.1.1 | What is library automation? |
| 12.10.1.2 | The role of computers in library and information centers. |
| 12.10.1.3 | Various library automation activities. |

12.2 INTRODUCTION

In order to meet the tremendous knowledge explosion, some new system will have to be evolved for making searches of documents that may contain answers to questions. Computer is a highly efficient, fast and accurate machine capable of processing data or performing routines as prescribed by the users. In the present day information era, the demand is for the right information at the right time to take right decision. The advancement of computer and communication technologies enables to store large amount of information in computer databases and made available to users as and when needed, irrespective of their location.

Library automation refers to the phenomenon of mechanization of traditional library activities such as acquisition, cataloguing, circulation etc., and related fields such

as information storage and retrieval, automatic indexing and abstracting etc. Terms mechanization, automation and computerization are used synonymously to denote the application of machines to library activities. The libraries have always sought of technological aid that facilitate and augment their service to users. When machines like, type-writer, microfilm readers, copiers etc., are used in libraries to speed up various routines in the libraries, the term mechanization was used. Now the advancement of Information technology enables libraries to use computers and communication infrastructure to automate all their activities and services. Hence the term computerization and automation are being used now synonymously to denote the application of computers to library activities.

The application of computer technology to library activities requires clear notion of information processing activity as well as knowledge of computer hardware and software as the computers cannot perform tasks on their own. The use of computers enables the libraries to achieve fast, accurate and efficient operations and services.

12.3 DEFINITION

Since the advent of the term automation in 1936, many definitions are found in library literature. Sometimes the terms ‘mechanization’ and ‘automation’ looked overlapped.

A few meaning full definitions of automation and library automation are given below:

Encyclopedia Britanica defines “automation is the name given to an automatic system of working. The difference between automation and mechanization, a related term, is being mainly one of degree”.

Mr. Harder introduced automation in 1936. He defined it initially as ‘the automatic handling of parts between progressive production processes’.

According to Encyclopedia of library and Information Science “Library automation is the use of automatic and semi-automatic data processing machines to perform such traditional library activities as acquisitions, cataloguing and circulation”.

‘Library automation’ is now by the far the most commonly used term for mechanization of library activities using data processing equipment.

The above definitions clearly state the following characteristics of an automated system:

- The operations or processes are carried out automatically
- Machines or computers or data processing equipment are used to automate the process.
- Avoids or reduces human action and thus saves labour
- It accelerates efficiency and speed in operation.

12.4 NEED FOR AUTOMATION

Various factors have contributed to bring about change from conventional to automated library operation. The main factors contributing to the development of automated library systems are:

1. Information Explosion: The inter-disciplinary and group research resulted in amazing growth of information generated. This information is being manifested in different physical forms such as books and non-book materials.

The quantum of information to be acquired, processed, housed and circulated by libraries has increased. Computing and other information technology offer efficient and effective tools for handling the growth of information and documents.

2. Increasing user's expectations and demands: The emerging information society has realized the importance of information and knowledge. The demands of the users for better services have far exceeded a library's ability to respond effectively with traditional methods and techniques. Computers have made users to expect better services from all social institutions including libraries.

3. Labour intensive nature of library work: Majority of the tasks performed in library operations are routine and repetitive in nature, involving intensive use of human resources. To illustrate, take the example of a bibliographic record of a book. The bibliographical details like author, title, imprint etc., are required to be recorded on book selection slips, book ordering, accessioning, cataloguing, shelf list preparation, circulation etc.,

4. Nature of records/files in libraries: A variety of files are generated and maintained in libraries. For example, in the acquisition section, books on order, books received, books recommended, books to be ordered etc., In the circulation section also files like, user file, transaction file, fines account etc., are created and maintained. The catalogue file is the bibliographic details of entire holdings of the library. These various files need constant updating.

5. Need for resources sharing: Library cooperation is one of the oldest traditions of librarianship. Pressures of inflation, budget cuts and information explosion are forcing libraries to form networks and consortia with a view to resource sharing. The use of modern information technology offers a new dimension to cooperation among libraries.

6. Application of modern management techniques: Modern management techniques such as informatics, operations research etc., are being increasingly applied to library work. Growing information and demands of the users at one hand and shrinking budgets at the other hand are forcing the librarians to adopt for modern management techniques which can only be contemplated if the library data are computerized.

7. Reducing response: The queries posed to library records, files and systems are many fold. Traditional methods of record keeping can not answer the queries quickly. The need for reducing response time is being increasingly recognized. Today library automation is thought of as a means of enhancing the library's ability to satisfy users by providing timely answers.

12.5 BENEFITS OF LIBRARY AUTOMATION

The 'versatility' and 'speed' of computers offer numerous benefits. The advantages of library automation are far-reaching. Computer application in libraries has many fold advantages as detailed below:

- 1. Reduces Drudgery:** Routine and repetitive jobs are handled easily saving time and eliminating drudgery. It is the only effective means of speeding the library services.

2. **Multiple outputs:** A variety of multiple outputs may be generated with a single input in automated systems. Outputs of various sequences and various kinds of reports may be generated without the expenditure of additional energy and resources. For example a database of bibliographic records can be used for, generating accessions lists, bibliographies, searching etc., Thus a variety of services which were hitherto contemplated but could not be offered can now be provided.
3. **Increase productivity:** Many of the library functions like acquisitions and cataloguing are partly clerical and partly intellectual involving decision making and are tedious. As a result, backlogs in the acquisition section/cataloguing section are fairly common. Computers can help solve this problem by improving productivity.
4. **Improves quality of services:** Automation enables the libraries to provide new services and improvement in the quality of services offered.
5. **Expand the range and raise the quality of existing products:** Automation will foster new products and processes in libraries. Services like Current Awareness Services (CAS) and Selective Dissemination of Information (SDI) can be provided to the users very easily and reducing the time lags.
6. **Instantaneous answers to multiple queries:** A variety of queries are posed to library subsystems, for example, the users would like to know the whereabouts of a document through the circulation system; they query the acquisition system to find out the status of a document recommended for purchase etc., answering such queries is easy, and instantaneous in an automated system.
7. **Computer library networks:** The use of computers and communication technologies in libraries enables them to form into networks. For example many computer library networks are in existence. E.g. OCLIC, INFLIBNET, CALIBNET, DELNET, ERNET etc.,
8. **Digital Access to information:** The advancement of desktop publishing enables the producers of information to make it available in digital form. Large amount of information is being stored in databases which are available on-line and as well as in CDROMS. So the use of computer in libraries makes all these digital data available to its users.

12.6 COMPUTER APPLICATIONS IN LIBRARY FUNCTIONS

The application of the computer to library operations has two aspects, namely housekeeping routines and information storage and retrieval. The housekeeping routines include acquisition and ordering work, cataloguing, circulation control, serials control and budget control, keeping of records and statistics for overall management purpose. The application of computer to information service comprises generation and collection of information, information retrieval, current awareness services, SDI etc.

The application of computers can successfully be made in the following areas in various libraries and information centers.

12.6.1 Acquisitions

Procurement of documents is one of the most fundamental activities in any library. In the automated acquisition module, documents suggested file is created. In this file one record is created for each document suggested for purchase. Each record consists of fields

to accommodate various bibliographic and other details of the document. These details include author, title, publisher, year of publication, edition etc. Besides these, in each record the fields like budget head, department/ person suggested are also included. Once this suggestions/ recommendations file is created, it is checked with catalogue file and on-order file for elimination of duplicate items. Then order file is created by selecting a vendor from the vender file and purchase order is generated for the items to be procured. When the documents are received these are cross-checked with order file and accessioned. Payment is made after inputting invoice details in the order file. Budget files, vender files and on-order files are updated. Reminders are sent to the vendors for those items which are yet to be supplied. The same bibliographic record created in the suggestion file is used by technical module for processing.

Functions of Acquisitions module

1. Getting requests for documents and entry into file using formatted screen.
2. Pre-order searching and notification of duplicate titles.
3. Creation of order file and generation of purchase orders to vendors.
4. Budget monitoring.
5. Retrieve data from acquisition file on several keys such as order number, author, title vendor, requester, budget head etc.
6. Recording the received items against order.
7. Processing payment after necessary inputting of invoice details.
8. Generation of reminders for the non received items.
9. Calculation of actual and committed expenses.
10. Maintenance of varying number of funds.
11. Generate document additions lists.
12. Generate vendor performance report.
13. Indication of order status of the document on OPAC.

Automated acquisition system generally employs the following files.

1. **Order file**:- this file contains one record for each item suggested for purchase or on-order with vendor. Each record contains bibliographic and order specific data in the form of fields. These include author, title, edition, imprint, order number budget head, vendor name, number of copies ordered, price and currency, estimated time given to the vendor for executing the order etc.
2. **Vendor file**:- this file contains vendor name, address, terms and conditions, publishers represented etc.
3. **Fund file**:- Fund file consists of records for each account. The information available in this file includes amount allocated, commitments, actual expenditure and balance available for each department can be calculated.

Automated acquisition replaces the labour intensive storing, filing and other paper handling procedures associated with manual system.

12.6.2 Serials control

The serials system provides control of journal subscription and subsequent monitoring of the scheduled arrival of individual issues. of maintaining record of budget sanctioned for serials under different categories, amount encumbered and expended, thus

providing complete budget control. This also handle serials which are received by library or gratis or on exchange.

The data elements in each records of the serials file are title, publisher, periodicity, volume numbers, or issue numbers published in a subscription year, vendor, price and currency, department for which serial is subscribed, budget head etc.

The main function of serials control system is:

1. Receiving requests for serials to be procured and creating subscription file giving necessary bibliographic details such as title, issue, volume number, subscription panel, vendor name, currency and price, budget head etc.
2. Generating purchase order to be sent to the vendors, along with payment.
3. Registration or checking of the issues as and when received in the library.
4. Generation of periodical claim letters to be sent to the vendors notifying the non- receipt of issues.
5. Generation of list of periodicals ready for binding, when all the issues in a volume of the periodical are received. This list must provide information regarding the colour and type of binding. The system must send the status of the serial to OPAC.
6. Maintaining and generating the financial statements required for management.
7. Generating the renewal list of periodicals along with estimated expenditure.

12.6.3 Circulation control

In the circulation system library members file is created. This file contains one record for each member with details like name, address, validity period, number of books eligible to borrow and the number of days, the borrowers can keep the book until renewal or return etc. This user file is integrated with catalogue file of the library in the circulation module while issuing and returning of documents.

The circulation system of the library performs the following functions:

- a. Charging or issuing of documents
- b. Discharging or returning of documents
- c. Renewing of documents
- d. Maintaining the records of various transactions, account of fines collected etc.

In the automated circulation system all the transactions are being processed by computer and maintained in different files, to facilitate generation of various reports.

The following are some of the reports generated from the circulation data:

1. The list of books issued on a particular day or during a particular period.
2. List of books borrowed by a particular member.
3. List of books reserved by members.
4. Generation of reminders to members, who have not returned the books after the due data.
5. Statement of fines collected for a particular period.
6. Various reports useful for management to take decisions regarding.

- Mostly used books
- Number of transactions taking place in a day or during a period.

- List of defaulters etc.
- 7. The automated circulation system answers the following queries instantaneously:
 - i.. The status of the book is notified in OPAC when the book is issued.
 - ii. When the required document is on issue, the system will give the details of the member along with due date.

12.6.4 Information storage and retrieval:

During the past three decades there has been a growing tendency to introduce automation in the field of information storage and retrieval. The information content of a document is extracted and restructured into a user-based format, capable of being retrieved easily through the aid of computers. In the area of information retrieval process, three tasks are generally performed by the computer, i.e. indexing, storage or organization of information in a desired format and retrieval or recall of information whenever required.

Indexing and abstracting: - The computer is best suited for indexing and abstracting purposes. In pre-coordinate indexing methods like KWIC, KWOC, KWAC, computer is being used to generate indexes. For example the chemical abstract service produces KWIC indexes using the computer. A stop-word file is created for the words like 'the', 'a', 'an', 'introduction' etc which are general words and not required for indexing since they do not represent the thought content of the document. The titles of articles to be indexed or abstracted will be entered into the computer. The computer cross checks each word of the title with the stop-word file available and produces an index entry for all the terms which are not in the stop-word file. The computers are playing an important role in derived indexing, especially pre co-ordinate indexing (PRECIS). Generation of indexes through computers reduce the time lag of the publication of periodicals. Thus, chemical abstract service, inc. published weekly issues of abstracts in different sections within time using the computer for generation of indexes in KWIC format.

The computers are also used in assigned indexing. Here, instead of stop-word file, thesaurus is compiled and stored in the computer file, which will be used in generating indexes. The thesaurus contains subject terms and their relationships with other subject terms.

Information storage retrieval systems: - In an information storage and retrieval system the data files are stored in inverted file organization. The information is stored in the form of records. Each record contains fields. One of the fields is recognized as key field and some times different fields of a record are recognized as index fields for which inverted file is created. In searching the database in information storage and retrieval systems a thesaurus is maintained in the computer file for all the subject terms. This thesaurus shows the relationships among the terms. These relationships are broader term, narrow term, relative term, and some cross references with 'see' and 'see also' etc. When this thesaurus is maintained in the computer it is easy to update with new subject terms. The program written for updating of thesaurus will look after this job. When a database is searched for information the following procedure usually followed.

- e. Analyzing the query and identifying the significant words as subject or key words with which the database is to be searched.
- f. Inputting the search terms to the computer.
- g. The computer program translates the keyed – in search terms into standard search terms available in the thesaurus.
- h. Matching of the records available in the database with the search terms.
- i. Retrieving of the matched records to answer the query.

This information storage and retrieval systems can be searched in two modes viz. Batch processing and on-line processing.

Batch processing:- In this type of information retrieval service, all the queries are collected and transferred into prescribed formats. Then at a particular / specified time all these requests together are processed with computer database to retrieve the relevant information. When the storage media used is magnetic tape, only batch processing is possible. But now a days, magnetic and optical disks with lower costs and large storage capacities are available, which allow both batch-processing and on-line processing.

On-line processing:- In on-line processing the database available in computer is directly searched and retrieved the relevant information. The databases are stored in different computers using random-access storage media. Such databases are usually maintained with inverted file organization to enable searching with different key elements. These can be accessed on-line using a terminal computer at the remote place. These databases can be searched using the telnet or internet connection. The advantage of on-line processing over batch processing is, the search can be modified during the course depending upon the response received. The user can broaden and narrow the search, depending upon the results of the search obtained. The on-line information retrieval systems provide different search techniques to retrieve the information as desired by the user.

Search strategy:- The information retrieval system provides different search techniques. Query analysis plays a major role in efficiency of information retrieval system. The query is analyzed to find different indexing terms, through which database can be searched. Later these terms are translated into standard indexing terms using the thesaurus already available in the computer. Then the database is matched with the terms to retrieve records. The database can be searched with key term / field or a combination of terms / fields using Boolean logic operators 'and', 'or' and 'not'. Various information storage and retrieval systems allow different search techniques such as truncation, proximity search etc. The search can be a delegated or non-delegated. In the delegated search the library staff performs the search operation and provides the results to the user. In non-delegated search the user can directly search the data base. The latter is more useful as the user can modify the search strategy while carrying the search depending up on the results.

12.7 ROLE OF COMPUTERS IN INFORMATION SERVICES

The use of computers in libraries improved the efficiency of services they are offering. Following are some of the services in which computers are playing an important role:

1. **Current Awareness Service (CAS):** Current Awareness Service is keeping the users of the library alert about the latest information. Many libraries provide this service in the form of bulletins. Such bulletins vary in internal structure, type of the materials included, and periodicity. The use of computers in libraries enables to provide CAS in an effective way.
2. **Selective Dissemination of Information (SDI):** SDI is one of the forms through which users are provided with recent relevant information. Here computer plays an important role. The user profile and document profiles are maintained in the computer. The computer program matches the user profiles regularly with document profile and the output is served to the users. The user profiles are modified regularly basing on the feed back. The user can save lot of his time by this type of service.
3. **Retrospective Searches:** Most of the information is now available in computer readable form. It is available as databases accessible on-line and in CD ROM and DVD. For example MEDLARS and BIOS are on-line database available in medical literature and life sciences respectively. The back issues of many abstracting and indexing journals are available in CD ROM and DVD forms. For example Biological Abstracts in DVD form are available since its starting year. These enable the user to get exhaustive information on the required topic.
4. **Bibliographies:** Bibliography is a list of documents. Libraries have been providing different bibliographies such as author, subject or chronological etc., depending on the requests of their users. The computerization of library activities enables to provide these bibliographies quickly and in different formats, which is otherwise not possible in manual system.
5. **Other uses:** All the library publications such as 'Library Profiles', 'Library use manuals', 'Library statistics', 'directory of publishers or suppliers' etc. can be produced in desired time and format. Since the data will be stored in the computer, updating of these publications is easy. Some libraries have not dispensed with catalogue cards, in spite of the automation. Such libraries are using computers for generation of catalogue cards. Thesaurus construction and updating, authority file creation and maintenance and providing management information system (MIS) for decision making are some of the activities where the computers are playing a vital role.

12.8 SUMMARY

The terms 'Automation' and 'Library automation' are defined. The need and benefits of automation in libraries are enumerated. This unit explained the automation activity of various library housekeeping operations. Discussed the role of computers in providing different services in a library are also emphasized in this unit.

12.9 SELF ASSESSMENT QUESTIONS

1. What is 'Library Automation'? discuss the application of computers in different functions of a library.
2. Explain the need and benefits of library automation in college libraries.

12.10 FURTHER READINGS

Jagga Rao, N.V. Books to bytes: library and information technology in the new millennium. New Delhi, Ess Ess Publications, 2000.

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LESSON 13

SOFTWARE FOR LIBRARY AUTOMATION

Structure

- 13.1 Aim and objectives**
- 13.2 Introduction**
- 13.3 Software**
- 13.4 Library Automation Software**
 - 13.4.1 Desirable features of library software**
- 13.5 Library Software Packages**
 - 13.5.1 LIBMAN**
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 - 13.5.7 Minisis**
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 - 13.5.10 SOUL**
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- 13.7 Assignment**
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13.1 AIM AND OBJECTIVES

Planned use of computers in libraries is primarily based on software. Unlike other data the bibliographic data has some special features. There were attempts to develop the in-house software in some libraries. Few general library automation software packages are developed by commercial and non-commercial institutions. This unit explains the qualities needed for library software and features of some library software packages available.

On studying this unit, you shall learn

- what is software and distinguish application software and system software
- the qualities needed for the library software
- different library software packages available
- brief descriptions of SOUL, LIBSYS, and CDS/ISIS

13.2 INTRODUCTION

Software is a set of computer programs. Each program is a set of instructions written in some programming language such as BASIC, FORTRAN, C and C++ etc., understandable to the computer to process the data or to solve a particular problem. Some libraries attached to R&D institutions and big libraries tried to develop their own software for library automation. Unlike other data, the nature of bibliographic data is

peculiar, because of its variable length fields, repeatable fields and unpredictable fields. Hence, the general library software packages available are not many in number.

However, it is advisable to go for library automation by selecting available popular library software, instead of each library trying to develop its own software. The advantages of the general commercial or non-commercial library software package are:

1. The cost of development of the software will be more than that of the software available in the market.
2. The software available in the market is tested and developed.
3. One can visit the libraries using the software and practically assess the suitability.
4. Well documented manuals are available with the software supplied by vendors.
5. It is easy to incorporate the local variations needed in the software by the vendor.
6. Continuous technical support is provided for up-grading etc. In order to meet the user's needs there are quite a good number of library software packages which support all house-keeping operations of a library. In the following sections brief description of some software packages is given.

13.3 SOFTWARE

A software is a program i.e. a set of logically written instructions used for directing a computer system to perform particular operations. In other words, software is a set of instructions written in some computer programming language understandable to the computer. These programs are written to make the computer work and/or to process the data or to solve a particular problem. Basing on the purpose for which the programs are written the software can be broadly divided into system software and application software.

System software:

System software is a set of programs written to make the computer work. System software includes the operating systems such as MS DOS, WINDOWS, LINEX, UNIX etc. It also includes compilers, interpreters, assemblers, utility programs etc.

Application software:

Application software is a set of programs written to make use of the computer to process the data and produce the required output. Application software is written to solve a particular problem or to perform the tasks specified by the user. The most widely used and popular types of application software are Word Processing software, Data base management systems (DBMS), electronic spread sheets, graphic software, communication software etc. Library software packages CDS/ISIS, LYBSYS, SOUL, WILISYS, UNILIB etc. also come under the category of application software.

13.4 LIBRARY AUTOMATION SOFTWARE

As we know, there are many library housekeeping operations such as Acquisition, Technical processing, Serials control, Circulation of documents, budgetary control and generation of various reports needed for decision making in the library. Besides these,

there is an important task of information storage and retrieval. Library software packages are developed to automate some or all functions of a library.

The application software packages are available in two different categories. One is pre-written software and the other is custom-made software. The pre-written software may be written for general purpose by vendors that may be useful to computer users. These are DBMS packages (dBase, Foxpro etc.). The pre-written software may also be written for special purpose such as library applications, Information storage and retrieval etc, Ex. CDS/ISIS, SOUL, LIBSYS etc.

The custom-made software is also pre-written software by vendors, but these are modified according to the need of the library by vendor itself. Suppose if a library is so specialized in nature that none of the library application software available from a number of vendors is found suitable, then the library may entrust the work to a vendor to develop the application software, exclusively to take care of the requirement. This software we call custom made software.

Many vendors and institutions developed number of software packages for library operations. These software packages are available in varying costs and for different sizes of the libraries. These software packages run on different operating system environments. Some packages run on MS DOS and some on WINDOWS and some on multi user operating systems UNIX, XENIX etc. Some library packages which can run on Local Area Network (LAN) also available. In the following sections we shall see salient features of some library software packages.

13.4.1 Desirable features of library software

1. Portability: The software must be able to run in any standard computer hardware or environment
2. The package must have efficient search routines, since the library data base will grow continuously.
3. Software must have efficient features to save the disk space, because of bibliographic data nature.
4. The software must be menu driven and user friendly.
5. The software should be accompanied by manuals.
6. The software must be flexible to accommodate the local variations.
7. The assured and continuous vendor support should play an important role in selection of the software.
8. The software must be upgradeable.

13.5 LIBRARY SOFTWARE PACKAGES

Following are some of the software packages designed for library operations:

13.5.1 LIBMAN

It is a user friendly software package designed for small and medium libraries. It is menu driven. It has been developed by M/s Kasbah Systems, Madras. It is used under MSDOS environment. It incorporates the fundamental features of automatic retrieval of data files, details of member of the library, listing of fines and loan register facilities. This software can handle 60,000 records and provide double level access to database. The double level access comprises restricted access to users and unrestricted access to library.

13.5.2 WILISYS

It is also menu driven user friendly package developed by M/s WIPRO computers

Ltd., Bangalore, for library computerization. It consists of two major components.

a) WILIMAX: WIPRO Library Management System.

b) WILITRAX: WIPRO Abstracts systems (Bibliographic Search)

Both these packages are developed in 'C' language using UNIEFY relations database management system for data storage. This software adopted the combination of both fixed and variable length fields for optimum utilization of storage space and speedy retrieval. The package is aimed at computerization of different activities such as library housekeeping operations, information retrieval etc., The software provides different modules for various house keeping operations such as Acquisitions, Cataloguing, Circulation, Periodicals, Maintenance etc.,

13.5.3 UNILIB

M/s Hindustan computer ltd., Bangalore developed this software package for medium and large size libraries. It runs on UNIX or XENIX platform. It is fully integrated multi user software. It is menu driven and easy to operate. It ensures maximum productivity, minimum data entry requirement. It provides efficient search and query facilities. It has two level security features ensuring privacy to each user and library staff.

13.5.4 Golden Libra

It is Library management software that runs on IBM PCXT and its compatibles. It keeps track of subscription, ordering, storage and retrieval of books/periodicals. The program generates reports on various matters such as over-due periodicals, list of periodicals and books (code wise, location wise, subject wise) and reports to supplier for non-receipt of periodicals and books. A stock module is provided in this software, to give the status of stocks at a given periodicity, including the valuation of books. This system has been tested at British council and American Council libraries.

13.5.5 Archives

This is developed by M/s Minafax Electronic System, Bombay to suit the needs of any size and type of libraries. It is integrated computer software which covers all the functions of library management. It runs on PC, PC/XT, PC/AT under MSDOS environment. This software maintains vendor file, accession register, periodical register and record of issue and returns in the circulation section. It also keeps track of budgetary control and generates account statements.

13.5.6 Librarian

This library management software is developed by M/s Mudra Electronics, New Delhi. This package helps in all spheres of activities of library such as receipt and issue of books, check the availability of books, search the database by title or author, list the over-due books and various circulation functions. It can handle 5000 transactions per day,

10000 member records and 1,50,000 books data. It is networking software, which can run on LAN.

13.5.7 MINISIS

MINISIS (mini- computer based information system) developed by IDRC, Canada. It runs on mini computer systems. MINISIS supports variable length fields and subfields which may repeat or not exist at all. It is based on rational database theory. Its practical application allows databases to be defined as selected parts of large databases, selected parts of larger records or combinations of databases and records. It is very flexible

in database creation. The software used modular programming approach and special programming language. Its security system controls processor and data base access. It has capability of SDI service.

13.5.8 LIBSYS

LIBSYS is integrated library management software designed for almost all the operations of library. It is multi user system and a single database can be shared by all the terminals. This software is available in single user versions and multi user versions. So, LIBSYS which can run on MSDOS or UNIX environments may be selected depending up on the size and need of the library. It is menu driven and user friendly. Different modules are provided for different operations in a library.

Salient feature of LIBSYS software:

- i) **Acquisition subsystem:** this module of the software deals with ordering of library material, receipts, monitoring, invoice processing and accessioning. It also maintains expenditure analysis by budget heads.
- ii) **Cataloguing sub-system:** This module provides a powerful data entry facility to accept data in standard machine readable formats such as MARC, OCLC etc., This module provides facilities to generate bibliography, Thesaurus construction, Current Awareness Service, SDI and import/export of bibliographic databases in standard exchange formats.
- iii) **Serial sub-system:** This module provides control of periodicals subscription and subsequent monitoring, such as arrivals, claims for missing or overdue issues etc. This module maintains records of budget. This also handles serials which the library acquires on gratis or on exchange.
- iv) **OPAC:** The public access system provides on-line facility to search the bibliographic database extensively. It provides key word search facility using Boolean operators.
- v) **Circulation sub-system:** This module maintains up-to-date membership records, circulation transactions, fine records etc., It takes care of infrequent but routine functions such as binding record management, display of recent additions and so on .

13.5.9 CDS/ISIS Software

The CDS (Computerized Documentation System)/ISIS (Integrated Set of Information System) is generalized information storage and retrieval software. It is developed by UNESCO in the year 1985 and distributed free of charge in India by National Information System for Science and Technology, Department of Scientific and Industrial Research, Government of India, New Delhi. It is designed specifically for the management of structured non-numeric, text oriented databases. The records of the database can be structured into repeatable fields, which in turn can consist of subfields.

This software constitutes a set of programs written in PASCAL language. The system is menu-driven. The user is presented with different menus to use the software. The text of the menus can be translated into other languages. The Indian languages version is also available.

This package can run on IBM – PC/XT/AT or compatible personal computers under MS-DOS operating system, having 640K (RAM) memory, a floppy drive and 10 MB hard disk, one monitor and printer. CDS/ISIS package is also available in WINDOWS

version and Multi user LAN version.

With the help of this software you can first define the database structure, design electronic data entry work sheet, provide for indexing parameters for creating search elements, specify output formats and then create, modify, retrieve and display database records. One can also produce printed lists in various formats.

Capabilities of CDS/ISIS Software:

1. It handles structured text data as a series of records.
2. It handles variable length fields and variable length records.
3. It handles sub-fields within the field.
4. It handles repeatable fields.
5. It minimizes the storage space on the disk, as it does not take a fixed amount of memory for each field in each record.
6. It is an ideal tool to create databases in line with ISO:2709 standard to facilitate export and import of records.
7. It provides efficient data entry facility through user defined work sheets.
8. It provides powerful search facilities via an index or inverted file created by the user defined fields.
9. It provides powerful search language to search the database and retrieve records. In a CDS/ISIS database information can be searched by using Boolean operators (AND, OR, NOT), truncation and proximity search operators.
10. It offers an integrated programming facilities allowing specialized application of the software as originally provided.
11. It handles unlimited number of databases, each of which may contain maximum number of 16 million records.
12. It handles the maximum record size of 800 characters, having up to 200 fields.

CDS/ISIS system Functions:

With the help of CDS/ISIS you can:

1. Define a database associated with an entity- type or entity-types.
2. Enter new records into a given database, through an electronic work-sheet.
3. Update, i.e. modify, correct or delete records.
4. Automatically build and maintain fast access files for each data base in order to maximize retrieval speed.
5. Retrieve records by their contents, through sophisticated search facilities.
6. Display the records or portions thereof according to your requirements or desired formats.
7. Sort the records in any desired order or sequence.
8. Print reports according to the desired formats.
9. Develop specialized application using the CDS/ISIS Pascal programming module available in the package.

The generalized nature of CDS/ISIS allows creating databases according to one's specific requirements through a set of EIGHT programs or services, classified into two broad categories – User services, and System services. These eight modules perform the different functions.

System services programs:

The four system service programs are concern of the library database administrator. These provide facility to create new databases and perform various system tasks. These programs are:

ISISDEF Service: It is meant to define database structure, work sheets for data entry, display formats, and indexing terms etc.

ISISUTL Service: It provides miscellaneous system utilities such as to edit menus, system work sheets etc.

ISISXCH Service: It is used to take the back-up of the data base and export and import records.

ISISPAS Service: It is used to write one's own programs in PASCAL language and integrate into package.

User Services Programs

The four user services program modules provide the different functions and these are concerned with the user of the package.

ISISENT Service: It is used to generate, edit and modify the records.

ISISRET Service: It allows for retrieval of information with the help of search language provided and displays the results.

ISISINV Service: It allows for creating and updating the index or inverted file.

ISISPRT Service: It allows for printing, sorting and to display the search results.

CDS/ISIS is powerful information storage and retrieval software which can handle variable length fields, repeatable fields and unpredictable fields. Thus it saves the disk space. The package is available with clearly written manuals to assist the user in understanding and using. This package has not provided any modules or programs to utilize for the library housekeeping operations. However, this package is very flexible to use and the PASCAL interface it has provided can be used to write and integrate programs for library housekeeping operations.

13.5.10 SOUL (Software for University Libraries):

The main objective of the university libraries is to support higher education and research. In order to achieve this objective university libraries acquire large number of documents in the form of books, periodicals and other reading materials and provide number of services to meet the ever growing demands of their users. Most of the staff time is being consumed for routine activities, leaving little or no time to provide efficient services in university libraries. Having realized the need for automation of the university libraries, the University Grants commission established an autonomous institution called INFLIBNET with a major program of modernization of libraries and information centers for information transfer and access. To facilitate automation of university libraries INFLIBNET developed SOUL software.

Features of SOUL Software:

Following are some of the important features of SOUL which suits to the automation of college and university libraries.

1. SOUL is Windows based user friendly software.

2. Well designed screens, logically arranged functions with extensive help messages make the software user friendly.
3. It is based on client server architecture.
4. It uses Relational Data Base Management System to organize and query the data.
5. SOUL does not need an extensive training, with little familiarity, one can begin using it.
6. It is specially designed to handle large number of records.
7. It is multi-user software and there is no limit on simultaneous access.
8. It supports internationally known standards such as CCF, MARC and AACR.
9. It supports export and import facility and adheres to ISO 2709 format.
10. Its OPAC (Online Public Access Catalogue) is accessible over the web using any GUI (Graphic User Interface) based browsers.
11. Its OPAC is versatile and very user friendly with all search options in built.
12. It provides comprehensive list of reports, master databases and authority files.
13. Functionally it covers all the operations of the library.

SOUL works in client/server mode in Windows environment using MS-SQL server as back end tool. It is available in single user and multi-user versions. The multi-user version works on Windows 2000 or Windows NT. It supports the multilingual database creation and web access. The SOUL database can be accessed over internet with any GUI browser.

Hardware and Software requirement for SOUL:

The minimum hardware and software required to run SOUL package is given below:

For Server

CPU: Pentium III @ 833 MHz
RAM: 128 MB 133 MHz SDRAM
10 GB Hard disk @10,000 RPM
48 X CDROM drive
1.44 MB Floppy Drive
Colour monitor
Ethernet Card: 19/100 MBPS
Standard key board and mouse
32 Bit controllers
Windows NT or Windows 2000 server
Microsoft SQL server 7.0

For client

CPU: Pentium III @ 833 MHz
RAM: 64 MB 133 MHz SDRAM
10 GB Hard disk 48 X
CDROM Drive
1.44 MB Floppy Drive
Ethernet Card 10/100
MBPS
Colour monitor
Key board and

mouseWindows

98/2000

Functions of SOUL:

The following six modules are available in SOUL to perform different functions in the library.

- Acquisition module
- Cataloguing module
- Circulation module
- OPAC module
- Serials control module
- Administration module

Acquisition module: The function of this module is to facilitate a library to procure and process new books. This module helps to keep track of library's budget, besides the other functions. It consists of six sub-modules to perform the following functions:

- o to record suggestions for new books,
- o order processing with vendors,
- o accessioning of the documents received,
- o payment processing after the receipt of the ordered items,
- o to generate various reports like invoice register, accession register, items on order, status of the suggested items etc.
- o to create master databases of library suppliers, currency, budget heads etc.

Cataloguing Module: This module covers all the activities carried out in cataloguing section of a library. The record created in the acquisition module will be modified into a full-pledged bibliographic record by adding some data. Thus, it reduces the repetitive work. It contains six sub-modules to perform the following functions:

- o to create new bibliographic record, edit the records etc.
- o to provide user services like CAS and SDI.
- o to facilitate authority file maintenance
- o to provide retrospective conversion, through backup, import and export facility.
- o to generate various reports like documents by subject, by collection type etc., needed in cataloguing section.
- o To provide catalogue search by author, title, subject, accession number, class number, free text search and Boolean search.

Circulation Module: Circulation module includes all the elements of circulation section required in a library. It facilitates to create members database, perform transactions such as charging and discharging of documents etc., fines maintenance, over due reminders etc. It also provides facility to generate various reports.

Serials Control Module: This module provides all the necessary inputs for serials control in a library. It contains different sub-modules to provide the functions like, new subscriptions, renewal of subscriptions, check-in of the issues received, generating claims for the non receipts, budgetary control etc. Automated serial control system reduces many clerical

operations involved in renewals, claims etc.

OPAC Module: This module is freely accessible to all, unlike the other modules for which access can be controlled by the administrator. This module is a catalogue of all the material such as books, theses, serials, etc. available in the library. It helps the user to search the bibliographic data base of the library by author, title, subject, class number, accession number, free text and Boolean search.

Administration Module: This module helps the administrator to provide access rights to different modules for different staff members as per the requirement. The OPAC module is accessible to all and the access to other modules can be restricted by the administrator. Only the administrator has got the access to perform export, import and backup functions of the database.

Advantages of SOUL software:

This software is developed by a government institution meant for the automation of libraries. It covers almost all activities and functions of a library. Following are some of the advantages of SOUL:

1. It is available at lower cost, since it is developed by government sponsored institution
2. The INFLIBNET periodically upgrade the software periodically basing on the feed back received from the users and make it available to its users free of cost.
3. The INFLIBNET provides on-site and off-site training to use the software.
4. This software followed common communication format and MARC format to facilitate exchange of records.
5. Well documented manuals are supplied with this software to facilitate the user to run the package with ease.
6. The modular nature and LAN support of this package helps even the decentralized library systems to perform the tasks simultaneously.
7. INFLIBNET provides free technical support in installation and use of this software.
8. Since it is developed especially for university libraries, it covers all the tasks through its different modules and sub modules.

13.6 SUMMARY

This unit explained the definition of software, and distinguishing features of application software and system software. The qualities of the software to be considered while selecting the software for library automation are also enumerated. Brief descriptions of some library software packages are given. The features, advantages and functions of SOUL, CDS/ISIS and LIBSYS are discussed in detail.

13.7 ASSIGNMENT

1. Define software and explain the application of SOUL software in your library.
2. List out various library software packages and explain the features of CDS/ISIS
3. Discuss the types of software and qualities desired for the software to be selected.

13.8 FURTHER READINGS

INFLIBNET. SOUL manual

Kashyap, M.M. Database Systems: design and development. New Delhi: Sterling publishers Pvt. Ltd. 1993. UNESCO. CDS/ISIS manual

LESSON 14

NET WORKS

Structure

- 14.1 Aim and objectives**
- 14.2 Introduction**
- 14.3 What is a computer Network?**
- 14.4 Components of a network**
 - 14.4.1 Software**
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- 14.6 Networks Architecture**
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- 14.9 Summary**
- 14.10 Assignment**
- 14.11 Further Readings**

14.1 AIM AND OBJECTIVES

This unit explains the definition and components of computer networks. It also described the architecture of computer networks with advantages and disadvantages. Few networks are described briefly.

After studying this unit you shall know

- What is a computer network
- Components and architecture of networks
- Some important existing networks

14.2 INTRODUCTION

Networks have been a part of society for a longtime. The Post Offices network moves information from one location to another. The telegraph network allowed brief information messages to move about the country and then around the world.

For our purpose we define the network as the interconnection of points or nodes for the purpose of communicating information. A computer network is a mechanism that connects computers so they can exchange or communicate digital information with one another. A computer network can use a variety of media to move messages from the source location to a destination. The computer networks have emerged from the interaction of computer and communication technologies. The main objective of computer networks is speedy transmission of reliable and quality information with greater integration of data, graphics, image audio and video.

We are witnessing rapid technological developments and the proliferation of information resources. The users are becoming more information conscious than ever before, demanding the need-based and timely information. Library co-operation is age old traditional practice to meet the growing demands of the users. As the computer and communication technologies are developed and within the reach of libraries resource sharing among libraries has become easy. So it is the duty and obligation on the part of the information managers to make provision for information access by optimizing the information technology through network applications.

14.3 WHAT IS A COMPUTER NETWORK

Two or more computer systems interconnected through a data communication channel or medium is called a computer network. The computers or peripheral devices such as printers, scanners etc., are connected to the channel through network interface card (NIC). Each device connected in a network through channel is called node. The node may be a computer or any one of its peripherals.

14.4 COMPONENTS OF A NETWORK

A computer network consists of both hardware and software. Following is the brief descriptions of the various components involved in a computer network.

14.4.1 Software

Software means a set of computer programs written, to operate the computers or to solve a problem. In a computer network this software includes network operating system, communication protocols, and network interface card drivers.

Network operating System: There are two types of network operating systems.

1. **Peer-to-peer:** This is an operating system that allows users to share the resources on their computers and to access shared resources on other computers. This software is loaded into each node in the network with built-in networking support. Ex. UNIX, LINEX.
2. **Dedicated Server:** In a dedicated server operating systems one or more computers act solely as dedicated file servers. One or more computers act as clients or work-stations. So in this type, two kinds of operating systems are found, one on the server computers and one on the client computers. This is basically a client-server operating system servicing both server and client computers. Ex. Novel Netware, Windows-NT

14.4.2 Hardware

Hardware of computer network comprises of the following:

1. All types of computers such as personal computer, Mini Computer, Main Frame and super computer. Some of these act as servers and some as clients or nodes or workstations.

-Servers: Those computers on a network which provide dedicated services are called servers. Ex. File server, E-mail Server, Database Server, Print Server etc..

-Clients: Those computers which act as joint work stations are called clients. Client computers are attached to the network through Network Interface Card. Client software is loaded into the computer or it may have the software that supports communication directly with others. The client software has the capacity to redirect network requests from users to servers.

2. **Peripherals:** There are number of peripherals which can be shared in a network. These include storage devices attached to the server, CD-Rom drives, Printers, Plotters, Scanners etc., All these resources are made available for use by the authorized users on the network.

14.4.3 Network Interface Cards

A network interface card (NIC) is a small device that allows a computer workstation to connect to the network. These network interface cards are available with different capacities of speed. Most common are 10 megabits per second (MBPS) or 100 MBPS. For wireless networks, wireless modem is used instead of NIC.

14.4.4. Cabling System

Cable includes a variety of media that connects servers and the workstations together, for transmission of information. Whereas, cable is not required in wireless networks that use radio or infrared technologies. There are three types of transmission media, which are briefly described below:

Twisted pair cable: It is the most common communication medium, which allows simultaneous transmission of information. It is very easy to handle, splice, connect and install. To assure the quality of data transmission, one wire carries the signal, while the other wire is grounded and absorbs signal interference. There are two broad groups of twisted – pair cable viz., unshielded and shielded twisted –pair. The most popular form of shielded twisted-pair cable is called category-5 or Cat-5. The data transmission rate and bandwidth are 10MBPS and 500 KHZ respectively. When this type of cable is used in network a repeater must be used for every 100 meters of spacing. This type of cable is used to connect the computers in an office or buildings such as library.

Coaxial Cable: Coaxial cable is composed of a centre wire surrounded by insulation and then a grounded shield of braided wire. It is less susceptible to interference or noise than a twisted-pair cable. Coaxial cable is the backbone of local area network, both within a building and between buildings, for connecting workstations together. It provides greater bandwidth than twisted-pair cable. The data transmission rate of coaxial cable is 500 Mbps and its bandwidth is 550 MHz. Repeaters are required for every 10 kilometers of cabling.

Optical fiber: Optical fibers are made of glass or plastic fibers that transmit digital signals in the form of light pulses. The optical fiber core is five times as wide as the wavelength of infrared light. The data transmission rate and bandwidth of the optical fiber is 2 Gigabyte per second. Optical fiber cable is not affected by magnetic or radio frequency interference. The error rate is too far below than twisted pair cable. The Optical fiber cable, with higher bandwidths is available at the lower rates. Thus many campus local area networks are installing optical fiber as backbone, in spite of its slight higher installation costs. Repeaters are not required up to 100 kilometers of spacing in the network.

The following table summarizes the characteristics of communication media discussed above.

Medium	Data Rate	Bandwidth	Repeater spacing
Twisted-pair	10 Mbps	500 KHz	100 mts.
Coaxial cable	500 Mbps	550 MHz	1-10 Kms
Optical fiber	2 Gbps	2 Gbps	10-100Kms

14.4.5. Network Devices:

Different types of cables which are discussed above are employed in establishing a computer network. Each type of cable has its own distance limitations due to signal loss and other electrical properties. Various devices are used to extend the distance of a network segment and inter-connect networks. Following is the brief outlines of some of the devices.

Repeater: It is device which regenerates the signal and doubles the allowable length of the cable in a network.

Bridge: It is a device used to join two separate network segments. It acts as a traffic controller. It may be standalone device or exist in network servers.

Router: It is a device that can read the address information in a data packet and determine the best possible path to its destination. It provides connectivity to all the networks available on the globe. E.g. INTERNET

Hub and Switch: These are devices used to build structured cabling systems to connect all the computers in a department. Switch is somewhat intelligent than hub.

14.5 NEED FOR A COMPUTER NETWORK

There are several reasons for establishing a computer network. Following are a

1. Programs and file sharing: the programs and data files are stored on a server computer and accessed by many network users.
2. Resource Sharing: Network provides communication link that lets users to share many devices such as printers, scanners, costly storage devices etc. This will eliminate the duplication of resources and saves the expenditure and time.
3. Database sharing: Database Management system applications are ideal for a network. It allows multiple users simultaneously access a file without corrupting the data.
4. Work groups: A network provides a way to create groups of users that are not located within the same department or town or country. People from different corners can collaborate on projects, document processing etc.,
5. Centralized Management: A Network provides a way to centralize servers and their data along with other resources for easy maintenance and security.
6. Improved productivity: Network improves communication among staff and provides timely access to relevant data, which improves decision making. Thus improves productivity in the department or library.

14.5.3 Networks Architecture

Architecture of a computer network is defined by its topology, cable access method and communication protocols it use.

14.6.1 Topology

There are four basic topologies or ways to configure the cabling of the network. These include star, ring, bus and mesh topologies.

Star Topology: Most of the Local Area Networks use a star configuration. In this configuration each workstation or node is connected by a cable and all cables branch from a single location, such as file server, a hub or switch. Ex. Ethernet 10Base-T and Token Ring. (figure-1 c)

Advantages: Network Maintenance: The presence of Central hub makes service of the network easy.

One device, one connection: Connectors are the most common failure of a LAN. In this topology only one pair of connectors needs to be repaired in the case of failure.

Problem diagnosis: Finding faults or problems in a network is easier with central hub.

Simple protocols: Because there is no contention among nodes on the network, the communication protocol is simpler.

Disadvantages:

- a) Slow data transmission: the Data transmission among nodes is slow, since all the traffic must pass through the central hub.
- b) Amount of Cabling: Because cabling is routed to each node on the network, more cable is used than with other approaches
- c) Failure: If the central hub fails the entire network fails.

Ring Topology: In the ring topology the network cable connects back to itself. All devices are connected to one another in the shape of a closed loop or ring. The signals travel in a ring from one device to another until it reaches its destination from the source node. ex. Token ring and ARCNET. (figure – 1 f)

Advantages:

Short cable length: Unlike the star topology, the ring configuration uses less cabling and connectors.

14.6.1.1.1 Reliability: It increased network reliability.

Disadvantages:

- a) Failure: A node failure is network failure. Because all data passes through each node on the ring.
- b) Faults: Fault detection takes some time, since it is necessary to examine and test more than one node.
- c) Reconfiguration problems: Adding nodes to the ring topology network creates problems

Bus Topology: A bus topology has the cable strung out from one computer to the next in a daisy-chain fashion. The end of the cable does not need to be brought back to the originating point as in ring topology. The ends of the cable are terminated with a resistor.

Each device is connected to the communicating media using cable taps. Ex. Ethernet coaxial networks. (figure – 1 b)

Advantages:

1. Short cable length: Since there is a single data path connecting all nodes the amount of cable used is least among all the topologies. The installation is simple.
2. Resilient Hardware: The single cable approach makes network maintenance an easy task.
3. Expendability: Additional nodes can easily be connected to an existing bus network.

Disadvantages:

1. Fault diagnosis: When network fails, the detection of the fault is time consuming.
2. Fault isolation is difficult: Repairing the fault may require replacement of a connector, multiple connectors or a segment of the cable itself.
3. Intelligent nodes: The nodes have to perform access control work.

Mesh Topology: In a mesh topology devices are connected with many redundant interconnections between network nodes. (figure – 1 g)

Advantages:

1. Since there is a great amount of redundancy, network traffic can continue even in the event of failure at some points.
2. A partial mesh topology provides full redundancy to some devices while other devices are connected to one or two nodes on the network.

Disadvantages:

1. It is the most expensive topology to implement.
2. Cable requirement is very high.
3. Fault diagnosis and maintenance is somewhat difficult.

14.6.2 CABLE ACCESS METHODS

There are two primary methods to allow a device to gain access to the network. They are Ethernet and Token ring.

Ethernet: It is a statistical contention scheme that allocates resources on a first-come first-served basis. In technical terms, the access method is called carrier-sense multiple access with collision detection (CSMA/CD). Each device waits until the channel is ideal before transmitting data and then listens to verify that no other station has also transmitted data. In the event of collision each device waits a random period of time before transmitting again.

Token Ring: In this method a node which wants to communicate checks the channel first and a ring is passed as a token by a device when it wants to use the network. Until that device has completed its required task with the network no other workstation or device on the network will be able to access the network. In this method contention for access is eliminated.

14.6.3 COMMUNICATION PROTOCOLS

These are the rules and procedures used on a network to communicate among nodes that have access to the cable system in local area network. Protocols govern two levels of communication. High-level protocols define how nodes and applications communicate and lower-level protocols define how signals are transmitted over a cable. In between these two levels there are some protocols that establish and maintain communication sessions between computers and monitor the traffic.

Ex. P2P Collaborative software in peer-to-peer networking

TCP/IP in Internet.

Z39.50 Search and retrieval standard.

14.7 CATEGORIZATION OF COMPUTER NETWORKS

When personal computers emerged in early 1980's they initially existed as standalone machines. When it was recognized that connecting these PCs together would allow an array of hardware and software to be shared, the computer network was born. The computer networks can be categorized basing on geographical area covered, type of usage and topology.

14.7.1 By Geographic area covered:

Basing on the geographical area covered by computer network they are again categorized as LAN, MAN, WAN and Internet.

Local Area Network (LAN) : A LAN by its very definition is limited geographically to an office, a floor in a building, an entire building or a campus of an institute. LAN provides high bandwidth and often uses inexpensive media such as twisted pair cable.

The benefits of a LAN include:

1. More expensive peripheral devices, such as printer, scanners, fax Machine etc., can be shared by all users connected to LAN. The net effect is that the Library will need to purchase few peripheral devices and save money.
2. As personal computers become more powerful, the price/performance ratio is more in a network.
3. Information can be shared. Data files, digital documents can be placed in server computers and shared by many users.
4. Computer software programs can be shared.
5. Performance quality: Each user gets access to the resources needed, while idle time is minimized.
6. Reliability: There will be a number of resources on the network, so if one device is inoperable; other options are likely to exist.
7. Users can send and receive e-mails within the organization and to the outside world, through Internet connection.
8. LANs increased the return on investment that was made when the personal computers were initially purchased.
9. Telecommunication costs are minimized, as multiple dial-outlines are not needed.
10. Licensed databases can be shared by every one with the network.

11. Portability of data and software is fast within the network.
12. Incremental growth: Computer resources can be added in an incremental manner rather than having to replace a large system with an even larger system. Thus investment occurs in a more measured and affordable manner.

Metropolitan Area Networks (MAN): Metropolitan Area network, as the name implies, span a large city or several cities. The ownership of MAN rests with common carriers or government. These networks use expensive transmission media. MAN is usually high speed fiber optic network that connect LAN segments within a metropolitan area by means of microwave or leased public telephone lines.

Ex: CALIBNET, DELNET, MALIBENT Etc.,

Wide Area Networks (WAN): A network that span a country or countries is called wide area network these networks use expensive media. The ownership of the network generally lies with common carrier or government departments. If a library having branch libraries spread over a large geographic area, say a state in a country, want to establish a computer network, WAN is the only possible technology. There are many connection choices available ranging from Telephone Company circuits, Microwave, Fiber optics, Satellite etc., Ex. INFLIBNET, NICNET, EARNET.

The MAN and LAN may be single networks on their own or they are network of LANs. The INTERNET is the network of networks, which is a super highway of information available on the globe.

14.8 SOME IMPORTANT NETWORKS

14.8.1 NICNET

The NICNET (National Informatics Center NETwork) is a general data network established in India. It is a government data network operated by National Informatics center, Delhi. It has been developed to provide computing and communication infrastructure for planning and decision making by the government. Besides handling of numeric management data, it provides on-line access to MEDLARS data base of National Library of Medicine, USA. The center also subscribes to large number of data bases on CD ROM like COMPUINFO, OSHRM, Cancer-CD and collaborates with NISSAT and Biotechnology Information System.

14.8.2 DELNET (Delhi Library Network)

DELNET (Delhi Library NETwork) has been in operation since January 1988 and was registered as a society in 1992. It was initially sponsored by the National Information System for Science and Technology (NISSAT), Department of Scientific and Industrial Research, Government of India. It is currently being promoted by the National Informatics Centre, Department of Information Technology, Ministry of Communications and Information Technology, Government of India and India International Centre, New Delhi.

Though it is started as Metropolitan Are Network in DELHI, later its membership

was extended to national and International level subscribers. There are about 932 subscribers, out of which 13 members are outside India.

The main objectives of DELNET are:

To promote sharing of resources among the libraries by developing a network of libraries, by collecting, storing and disseminating information and by offering computerized services to the users;

To undertake scientific research in the area of Information Science and Technology, create new systems in the field, apply the results of research and publish them;

To offer technical guidance to the member-libraries on collecting, storing, sharing and disseminating information;

To coordinate efforts for suitable collection development and reduce unnecessary duplication wherever possible;

To establish /facilitate the establishment of referral and /or research centres, and maintain a central online union catalogue of books, serials and non-book materials of all the participating libraries;

To facilitate and promote delivery of documents manually or mechanically;

To develop specialized bibliographic database of books, serials and non-book materials;

To develop databases of projects, specialists and institutions;

To possess and maintain electronic and mechanical equipment for speedy communication of information and delivery of electronic mail;

To coordinate with other regional, national and international networks and libraries for exchange of information and documents;

14.8.3 INFLIBNET:

Information Library Network (INFLIBNET) is a major programme of the University Grants Commission (UGC) initiated in 1991 with its headquarters located at Ahmedabad. The program is directed towards modernization of libraries and information centers for information transfer and access, to support scholarship, learning academic pursuits by establishing a national network of libraries and information centers in universities, institutions of higher learning, R&D institutions in India. It is basically a co-operative endeavor in resource development, sharing and its utilization at national level. INFLIBNET is now functioning as an autonomous institution under UGC.

The aims of the center are

- to promote and establish communication facilities for information transfer and access.
- To establish computer communication network INFLIBNET for linking colleges, universities and R&D institutions to avoid duplication of efforts.

Achievements of the center:

- a) Automation of University libraries: It has been providing non-recurring grants to universities to purchase computers and other peripherals for automation.

About 142 universities have received this grant by January 2002.

- b) SOUL software: Developed software for university libraries and providing to colleges and universities at low cost. It is also providing all technical support in using the software.
- c) Manpower development: To handle the automation and networking activity it is offering training to library staff of universities.
- d) Union Databases: Development of the data base is one of the important activities of the center. So far it has developed books data base with 7 lakhs records. Theses data base with 1.8 lakhs records, 30,000 serial holdings. It is also maintaining data base of experts and research projects data base.
- e) Information services: It has been providing access to the data bases listed above through its web site. It is also providing COPSAT and OCLC first search services in off-line mode.
- f) Standards: to maintain consistency and quality in data bases created it has published and supplied the document "INFLIBNET Standards and guidelines for data capturing" to all participating libraries.
- g) Inter library Loan: It has identified some big university libraries as Resource centers and providing inter library loan to participating libraries.

14.9 SUMMARY

This unit explained what is meant by a computer network and various components used in a network. The networks can be classified basing on the geographical area covered, access method followed and architecture adopted. The details of all these aspects are discussed in detail. A detailed note of the need for networking of libraries is also given. In the present day information era networking of libraries is a must to provide 'every information its user' and 'every user his/her information'

14.10 ASSIGNMENT

1. What is a computer network? Explain various components of computernetwork.
2. Discuss the architecture of computer network.
3. Explain the need of computer networks in the context of library and information centers and list some of the existing computer library networks.
4. Write an essay on INFLIBNET.

14.11 FURTHER READINGS

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LESSON 15

DIGITAL LIBRARIES

Structure

- 15.1 Aim and objectives**
- 15.2 Introduction**
 - 15.2.1 What are digital Libraries?**
 - 15.2.2 Digital, Electronic and virtual libraries**
- 15.3 Origin of digital libraries**
- 15.4 Purposes of digital library**
- 15.5 Advantages of Digital Libraries**
- 15.6 Characteristics of Digital Library**
- 15.7 Prerequisites**
- 15.8 Problems of Digital Libraries**
- 15.9 Digital library initiatives**
- 15.10 NCSTRL: An example of Digital library**
- 15.11 Summary**
- 15.12 Self Assessment Questions**
- 15.13 Further Readings**

15.1 AIM AND OBJECTIVES

Digital library is an evolving area of research, development and application. It provides information in electronic form to large number of geographically distributed users. In this unit key features of digital libraries are explained.

After studying this unit you should be able to understand:

- What is digital library?
- Meaning of Electronic, Digital and Virtual libraries
- Origin, purpose and advantages of Digital libraries.
- Characteristics and pre-requisites of a Digital library.
- Problems of Digital libraries.
- Some Digital library initiatives.

15.2 INTRODUCTION

Libraries have existed for centuries. When we thought of the term 'Library', it invokes in our mind that it is a storehouse of documents. These documents are in the form of books, journals, magazines, newsletters, reports etc. Later with the advancement of technology newer media such as films, filmstrips, video and audio cassettes, CD ROMs are found in the libraries. Most of us view the library as a place where these documents are acquired, organized, stored and retrieved for the purpose of consultation, search and extraction and dissemination information. The recent developments in information technology, the INTERNET, World Wide Web (WWW) led to the development of the new era of electronic and/or digital libraries. The Internet has enabled global connectivity of computers and the development of various tools and techniques for networked information provision and access.

The World Wide Web which in an integration of different types of access tools provides a 'network information environment' which means digital information that is produced, managed and accessed over computer networks. The walls of the libraries have begun to be less solid with the use of technologies like OPACs , CD ROMs and Online databases. Focus of libraries has been changing from just-in-case use (i.e. publications acquired in the belief that they will be used some day by some users) to 'just-in-time accesses' to information over the network. Digital libraries aim to provide access to information on demand regardless of location of the user and the computer in which information is stored.

In the following sections we shall examine the definitions of digital libraries, and its services etc.

15.2.1 What are digital Libraries?

There are several perceptions of the term 'digital library' just like an Indian fable, in which the story teller presents an array of descriptions from each of six blind men, when in the presence of an actual elephant.

There are many definitions of a 'digital library'. Following are some which suits our purpose:

According to Paul Kantor a digital Library "is that set of global inter networked libraries" that includes the following criteria:

- A collection of texts, images or data in digitized form.
- A set of systems for indexing and navigating or retrieving in that collection.
- One or more defined community of users.

According to the Berkeley Digital Library Project, University of California, the digital library is "be a collection of distributed information sources, producers of information make it available, and consumers find it perhaps through the help of automated agents".

Christine Borgman defines digital library "as a set of electronic resources and associated technological capabilities for creating, searching and using information... they are an extension and enhancement of information storage and retrieval systems that manipulate data in any medium."

Based on common aspects among these definitions, digital libraries may be defined as electronic information collections containing large and diverse repositories of digital objects, which can be accessed by a large number of geographically distributed users. Such repositories would exist in locations physically near or remote from the users. Digital objects include text, images, maps, sounds, videos, catalogues and indices and hypertext multimedia compositions etc.

The key components of digital library are

- The digital library is not a single entity.
- The digital library requires technology to link the resources of many.
- The linkages between the many digital libraries and information services are transparent to end users.
- Universal access to digital libraries and information services is a goal.
- Digital library collections are not limited to document surrogates: They extend to digital artifacts that can not be represented or distributed in print formats.

15.2.2 Digital, Electronic and virtual libraries:

The terms Electronic Library, digital library and virtual library have been used synonymously. In the following definitions of the terms some distinctions have been made:

Electronic Library: A library that provides collections and / or services in electronic form. Ex. films, optical videodisk, CD Rom etc.

Digital Library: A library that provides collections and / or services in digital form. Ex. DVDs, On-line databases.

Virtual Library: A Library that does not physically exist. It is often used to denote library with distributed collections or services that appear and act as one. Ex: a Web-site with pointers and links to other sites.

The concept of digital library is rooted in age-old dream of creating virtual library. But digital library is different from virtual library because of its physical identification. O'Donnell differentiates digital library from virtual library as it can still maintain a physical presence, whereas virtual library is a vast, ideally universal collection of information and with instantaneous access to that information wherever it physically resides. One person's digital library is often another's virtual library. However, the term digital library has been in usages to encompass both electronic library and virtual library.

15.3 ORIGIN OF DIGITAL LIBRARIES

It was in the year 1945 Vanneral Bush who conceived the idea of storing all the information that the end user would like to know on a single desktop device. By 1965 the works of J.C.R. Licklider and Theodore Nelson, recognized the possibility of creating what we now refer to as a digital library. Nelson used the term hypertext and defined it as "non-sequential writing". This hypertext became a reality in the 1980's with the introduction of large amounts of memory and storage in personal desktop computers.

There are some prototype digital library systems that have developed since 1965. To name a few;

1. Project Intrex at MIT in 1960s
2. OBAR (Ohio Bar Automated Research) provided on-line access to full-text legal statutes. It was a precursor to the now familiar LEXIS service, which is a legal database available on-line.
3. Project Gutenberg started in 1970s with goal of producing full-text versions of classic monographs. It presently contributes approximately one e-text each day of production.
4. In 1980s Library of Congress started several projects towards digital libraries. As a first step in the year 1982 LC announced Optical Disk Pilot project, an electronic digital imaging system containing images of books, journals and other research materials held by the Library.

These initial explorations formed as seeds to present day digital libraries.

15.4 PURPOSES OF DIGITAL LIBRARY

The purposes of digital library are to:

1. Collect, store and organize information and knowledge in digital form.
2. Promote economic and efficient delivery of Information.
3. Put considerable investments in computing/communication Infrastructure.
4. Strengthen communication and collaboration between research, business, government and educational communities.
5. Contribute for life long learning opportunities.

15.5 ADVANTAGES OF DIGITAL LIBRARIES

1. **Ability to search:** The ability to search provides an enormous advantage to electronic forms of materials, when an ASCII version is available. Most of the modern material is now produced using desktop publishing (DTP) via computers. So the information can generally be provided in ASCII form and be searched. Reference documents which are to be consulted rather than read will be converted into electronic form. Printed encyclopaedias are giving way to CD-ROMs which are small, cheaper and for more effective. Ex. Encyclopaedia Britannica available in CD ROM.

2. **Ubiquity:** Many simultaneous users can access a single electronic copy from many locations. The information can be delivered with electronic speed, and it would be possible to reformat the information as per the user preference, since users get a screen

display of the required information, rather than a physical object which contains it. Loss rates by theft are eliminated in digital libraries.

3. **Support Wider-range of material:** Digital storage permits libraries to expand the range of material they can provide to their users. Storing the information in digitized form is much safer and of better quality than its predecessors viz., cassette tapes. Many international databases are available with or without charge on the internet. So the digital libraries provide excellent service through its wider and dispersed resources.

4. **Preservation:** Digital information can be copied without error. If one copy of any document is survived, number of copies can be multiplied instantaneously. So preservation of documents may not be under guard.

5. **Access current Information:** Since majority of the research findings are being published directly in electronic form, which is available readily, digital libraries provide access to up-to-date current literature.

15.6 CHARACTERISTICS OF DIGITAL LIBRARY

The following are some of the major characteristics of a digital library:

- **Accessibility to network:** - The information stored in digitized form must be accessible through network.
- **Compatibility to handle large amount of information:** The mediums used to store information must be of high capacity to store large amounts of information without hampering its quality in search and retrieving.
- **Speedy:** Mediums used to store information must provide speedy retrieval Ex. DVD. The computers and channels of communication used must be of high speed nature to disseminate information speedily in correlation with fourth law of library science.
- **Searching and retrieval:** The information stored in digital forms must be accompanied by the relevant software for searching and retrieval through all possible access points.
- **User – friendly interface:** The information is available in digital form and accessible through Internet, irrespective of the locations of the sources of information and users. So the software must be user friendly to understand and retrieve information easily.
- **Compatibility to multimedia:** The medium used to store the information in digital form and the software used to retrieve it must allow to include text, images, sound graphics etc.,

15.7 PREREQUISITES

The following are some of the prerequisites for establishing a digital library.

- High Speed computer
- Multimedia Kit

- Fast Scanner
- Server segments
- Printer
- LAN Connectivity
- Internet connectivity
- Trained Library Staff

15.8 PROBLEMS OF DIGITAL LIBRARIES

Even though libraries all over the world are marching towards digitization, there exist some problems in the process and their maintenance. Following is the brief description of some problems.

1. Longevity of Storage Media: The digital archival media used are magnetic tapes, CD-ROMs, DVDs. Magnetic tape is not a reliable medium due to its inherent qualities of demagnetization, oxidation and material decay. During 1980s CD-ROMs emerged as powerful medium with a life-span of 30-100 years. Now DVDs having several standards pushed CDs behind the screen. The changes and improvements of storage medium raise serious questions about the future of digitized materials and their alternation. Like print media digital media is also affected by light, heat, moisture, pollution etc.

2. Technology obsolescence: The technology used for digitization is undergoing rapid changes. The computer hardware, software, media etc., are also undergoing great revolution. The digitized materials become unreadable if the background devices became obsolete as time passes by which ultimately results in the loss of data. So while selecting the storage medium technological obsolescence should be taken into consideration.

3. Migration: Due to technological obsolescence, the digital systems need to change from one configuration to another. This results in more expenses and loss of data.

4. Selection of Documents: In an age of information explosion and publication explosion there is a big dilemma about what type of documents are to be digitized and what type of documents not to be digitized. The documents in high demand to day may become obsolete even tomorrow because of the vast developments in the subject and interdisciplinary nature of research. National Digital Library Program of Library of Congress selected those documents for digitization which signifies the nation's rich cultural heritage. The opinion of subject experts and users must be ascertained before selecting the documents for digitization.

5. Copyrights: Copyright of the digital document created and the documents to be digitized is a big problem. According to one estimate, about 5% books are out of copyright, 92% books are out of print but they are under copyright and 3% books are in print and copyrighted. It is very easy to copy, replicate message and distribute digital information. In view of this situation enforcing copyright laws in digital environment is a major issue.

15.9 DIGITAL LIBRARY INITIATIVES

Six major projects were launched during 1994-98 under digital library initiative funded by National Science foundation (NSF) DARPA and NASA in United State of America.

JSTOR (Journal storage) Project was started in University of Michigan. It has been serving more than 350 academic institutions around the world. Its database is growing at the rate of 100000 pages per month. It is a commercial service.

The Informedia Project at Carnegie Melon University is a terabyte digital Video Library.

Several digital library projects have been started in European countries and in several countries of Asia.

In India also digital library projects were initiated by Department of scientific and Industrial Research (DSIR), Department of Information Technology (DIT), Department of Culture etc.,

The digital library of India initiative (DLI) was launched in September 2003 by president of India. DLI portal is operational from its site <http://www.dli.ernet.in>. Digital library initiative of India is being implemented in close collaboration with Universal Digital Library (UDL) project at Carnegie Melon University. Overall Coordinator of UDL project is Prof. Raj Reddy at Carnegie Melon University and Prof. N.N. Balakrishnan is the coordinator of the India Nodal Centre at Indian Institute of Science, Bangalore.

Digital Library of India could so far scanned 8400 books in various languages viz., English, Telugu, Tamil, Sanskrit, Kannada and Hindi. There are four regional mega centers and twenty scanning centers established with the target of scanning 2,50,000 books in various Indian languages.

15.10 NCSTRL: AN EXAMPLE OF DIGITAL LIBRARY

NCSTRAL stands for Networked Computer Science Technical Report Library. It is one of the famous operational digital libraries. NCSTRL was put into operation in 1995 combining the best features of two earlier projects viz., wide area technical report service (WATRS) and Dienst CSTR (Computer science technical reports)

NCSTRL provides unified access to catalogue records and complete documents of computer science technical reports stored in distributed servers around the world, through the World Wide Web (WWW).

Participation in NCSTRL is open to all academic departments awarding Ph.D., in computer science / engineering and to research facility of industry and government. Currently over 200 departments around the world are participating.

NCSTRL is aimed to provide financial and scholarly advantages to all its users and participants. Researchers can gain easy and quick access to a large body of scholarly information. Authors gain a wider audience. The departments can get an effective management system for their technical reports and eliminate much expenditure. It can be accessed free of cost on Internet. Its web-site address is <http://WWW.nestral.org>.

The technology underlying NCSTRL is a network of inter-operating digital library servers. These servers provide three services.

- Repository service, that store and provide access to documents.
- Indexing Service, that allow searches over bibliographic records
- User interface service, that allows search by author title or abstract and view the information as HTML document or in Post Script.

15.11 SUMMARY

The library and Information centers are moving into an era of digital libraries. This unit discussed the definition, characteristics, advantages and problems of digital libraries. A brief note to distinguish 'electronic library', 'digital library' and 'virtual library' is also given in this lesson. Different digital library initiatives started and on-going at international and national level are discussed. NCSTRL an operational digital library was discussed in detail.

In the present 'Information era' majority of the information is available in digital form. For example the whole "Biological Abstracts" which is an indispensable tool to researchers in life sciences is available in DVD. Internet is providing lot of information in digital form.

15.12 SELF ASSESSMENT QUESTIONS

1. Define 'digital library' and explain the purpose and advantages of digital libraries.
2. Discuss different digital library initiatives.
3. What are the characteristics and pre requisites of digital library?
4. Distinguish 'electronic library', 'digital library', and 'virtual library' and give a brief note on the digital library initiatives in India

15.13 FURTHER READINGS

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