LOVELY PROFESSIONAL UNIVERSITY

INFORMATION TECHNOLOGY: APPLICATIONS

Edited By

Jovita Kaur

Printed by
LAXMI PUBLICATIONS (P) LTD.
113, Golden House, Daryaganj,
New Delhi-110002
for
Lovely Professional University
Phagwara

SYLLABUS

Information Technology: Applications

Objectives:

- To understand the applications of Information technology in organizations.
- To appreciate how information technology can help to improve decision-making in organizations.
- To appreciate how information technology is used to integrate the business disciplines.
- To introduce students to business cases, so they learn to solve business problems with information technology.
- To introduce students to the strategic applications of information technology.
- To introduce students to the issues and problems involved in building complex systems and organizing information resources.
- To introduce students to the social implications of information technology.
- To introduce students to the management of information systems.

S. No.	Topics
1.	Library automation: Planning and implementation, Automation of housekeeping operations – Acquisition, Cataloguing, Circulation, Serials control OPAC Library management.
2.	Library software packages: RFID, LIBSYS, SOUL, WINISIS.
3.	Databases: Types and generations, salient features of select bibliographic databases.
4.	Communication technology: Fundamentals communication media and components.
5.	Network media and types: LAN, MAN, WAN, Intranet.
6.	Digital, Virtual and Hybrid libraries: Definition and scope. Recent development.
7.	Library and Information Networks with special reference to India: DELNET, INFLIBNET, ERNET, NICNET.
8.	Internet—based resources and services Browsers, search engines, portals, gateways, electronic journals, mailing list and scholarly discussion lists, bulletin board, computer conference and virtual seminars.

CONTENT

Unit 1:	Library Automation *Seema Sharma, Lovely Professional University*	1
Unit 2:	Library Software Packages-I *Seema Sharma, Lovely Professional University*	19
Unit 3:	Library Software Packages-II *Jovita Kaur, Lovely Professional University*	29
Unit 4:	Database *Jovita Kaur, Lovely Professional University*	41
Unit 5:	Types of Database *Jovita Kaur, Lovely Professional University*	55
Unit 6:	Information and Communication Technology *Reena Kapoor, Lovely Professional University*	66
Unit 7:	Features and Scope of Communication *Reena Kapoor, Lovely Professional University*	81
Unit 8:	Network Media *Reena Kapoor, Lovely Professional University*	87
Unit 9:	Intranet *Jovita Kaur, Lovely Professional University*	96
Unit 10:	Classification of Libraries *Jovita Kaur, Lovely Professional University*	102
Unit 11:	Library and Information Networks in India *Seema Sharma, Lovely Professional University*	119
Unit 12:	Libraries and Information Centers in India *Seema Sharma, Lovely Professional University*	125
Unit 13:	Internet Based Resources and Service Browsers *Seema Sharma, Lovely Professional University*	141
Unit 14:	Web Portal *Seema Sharma, Lovely Professional University*	153

Notes

Unit 1: Library Automation

CONTENTS

Objectives
Introduction
1.1 Library Automation
1.2 Automation of Housekeeping Operations
1.3 Planning of Library Automation
1.4 Implementation
1.5 Library Acquisitions
1.5.1 Purpose of Library Acquisition
1.5.2 Objectives of Library Acquisition
1.5.3 Functions of Library Acquisition
1.6 Library Catalogue
1.7 Catalogue Card
1.8 Types of Catalogue Card
1.8.1 Cataloguing Rules
1.8.2 Cataloguing Terms
1.9 Online Catalogues
1.10 Library Circulation
1.11 Serials Control
1.12 Online Public Access Catalogue
1.13 Summary
1.14 Keywords
1.15 Review Questions
1.16 Further Readings

Objectives

After studying this unit, you will be able to:

- Describe the meaning of library management system
- Define catalogue card and its types
- Discuss library circulation and its levels
- State planning of library automation
- Define library acquisitions in library automation
- Explain the concept of library catalogue.

Introduction

An **integrated library system** (**ILS**), also known as a **library management system** (**LMS**), is an enterprise resource planning system for a library, used to track items owned, orders made, bills paid, and patrons who have borrowed.

An ILS usually comprises a relational database, software to interact with that database, and two graphical user interfaces (one for patrons, one for staff). Most ILSs separate software functions into discrete programmes called modules, and each of them are integrated with a unified interface. Examples of modules include:

- acquisitions (ordering, receiving, and invoicing materials)
- cataloguing (classifying and indexing materials)

Notes

- circulation (lending materials to patrons and receiving them back)
- serials (tracking magazine and newspaper holdings)
- the OPAC (public interface for users).

Each patron and item has a unique ID in the database that allows the ILS to track its activity.

Big libraries use an ILS to order and acquire, receive and invoice, catalogue, circulate, track and shelve materials. Smaller libraries, such as those in private homes or non-profit organizations (like churches or synagogues, for instance), often forgo the expense and maintenance required to run an ILS, and instead use a library computer system.

Librarians often referred to ILSs as library automation systems or automated systems in the 1970s and early 1980s. Before the advent of computers, libraries usually used a card catalogue to index their holdings. Computers came into use to automate the card catalogue, thus, the term automation system. Automation of the catalogue saves the labour involved in sorting the card catalogue, keeping it up-to-date with respect to the collection, etc. Other tasks automated include checking-out and checking-in books, generating statistics reports, acquisitions, subscriptions, indexing journal, articles and linking to them, as well as tracking interlibrary loans.

Since, the late 1980s, windowing systems and multi-tasking have allowed the integration of business functions. Instead of having to open up separate applications, library staff could now use a single application with multiple functional modules.

As the Internet grew, ILS vendors offered more functionality related to computer networks. As of 2009 major ILS systems offer web-based portals where library users can log into view their account, renew their books, and authenticate themselves for access to online databases.

In recent years some libraries have turned to major open source ILSs such as Koha and Evergreen. Common reasons noted were to avoid vendor lock in, avoid license fees, and participate in software development. Library technology organization does an annual survey of over 1,500 libraries and noted in 2008, 2% of those surveyed used open source ILS, in 2009 the number increased to 8% and in 2010 (most recent year available) 12% of the libraries polled had adopted open source ILSs.

1.1 Library Automation

Library automation which started in late 70s in few special libraries has now reached most of the university libraries. It is yet to take off in college libraries in India owing to various problems. We will try to identify the barriers, analyze the convenient steps in automating the library and the technology available. Even though this question seems to be very fundamental it is essential to emphasize this aspect as the library automation is yet to take off in majority of the Indian libraries. Secondly, while justifying need for library automation more than cost-effectiveness the benefits derived by the library users become the major consideration. Since library does not happen to be an economic entity such benefits need to be looked at in a different perspective.

To appreciate the advantages it becomes necessary to highlight the different levels of library automation. For convenience it can be visualized at four levels:

1. Library cataloging system
2. Housekeeping operations and networking
3. Development of CD-ROM library/products
4. E-mail system and internet.

Notes The library catalogue or index to the collection forms the base for most of the library activities such as acquisition, reference, bibliographic service, inter-library loan etc.

Notes

The users of library card catalogue will appreciate how fast the retrieval is, search and printing in automated environment. If the same system is available in network environment, users can have simultaneous access to the same database. From the library staff point of view the cumbersome job of printing the cards and their subsequent filing gets eliminated. Also, it conserves space and saves stationary.

The second level automation will be to use software which can handle all the housekeeping operations of the library such as acquisition, circulation and serial control thus creating a network within the library or becoming part of the existing network of the institution. Networking of computers within an organization helps the users to browse the cataloguing system from any of the workstation/terminal.

A very handy technology available for library is the CD-ROM products which can be considered at the third level. The development of CD-ROM collection not only conserves space but also provides multi-user access in network environment. There are many self-tutorial CD-ROMS available with multi-media effect. Libraries facing high incidence of mutilation of materials will benefit from such electronic products. Also people doing empirical research can download data and directly take it to other software platform for analysis and making graphical presentation.

Other technology which libraries can make use of is the e-mail system. This not only reduces the recurring expenditure but also be effective and fast. Sending reminders for non-receipt of journals by e-mail has proved to be very cost-effective. In addition to this, sharing of resources among libraries become easy. Few public domain e-mail software are available and there will be no additional expenditure incurred.

Another technology which has revolutionized the information world is the development of internet. Subscribers of internet, in addition to getting access to various public domain databases and services, will also get free e-mail and fax facility. Some publishers have started giving content pages of journals and libraries having subscription to such journals can also have full text of the articles. Many academic and research institutes have given free access to their working papers.

Barriers of library automation

Following could be the few possible barriers of library automation:

- Fear of adverse impact on employment.
- Apprehension that the technology could be too expensive.
- The library staff has to undergo extensive training.
- Lack of support from the management, may be owing to budget constraints.
- Fifth reason could be retrospective conversion of data.

Task Write down the barriers of library Automation.

1.2 Automation of Housekeeping Operations

Acquisitions, technical processing, serials control, circulation and reference services all entail time consuming manual work in traditional libraries. Though these activities are essential to proper functioning of a library, they consume professional staff time that might otherwise go towards user services and library development. Library computerization is now gaining importance necessitating the establishment of profession-wide standards. Comprehensive studies of library computer systems world over include discussions of machine-managed acquisitions, cataloguing, serials control, circulation and bibliographic service modules. The literature in this area highlights major aspects of computer's role in the library environment. Similar to several aspects of library management, the demand for more and faster information services and the decline in library resources are compelling librarians to appreciate the role of computers within their operations. In

Notes

general, librarians are looking to maximize the benefits of automation by spreading computer use to as many aspects of library activities as possible by taking advantage of developments in computer hardware and software and telecommunications.

1.3 Planning of Library Automation

Library Automation Planning is a detail study of the Library's existing system and Library's vision which enables to prepare a good technology plan and project proposal.

Notes Planning for library automation has been defined as planning for "integrated systems" that computerize an array of traditional library functions using a common database.

While this is still generally true, rapid technological change is forcing a reexamination of what it means to "automate the library."

One of the most important planning tools involves collecting basic statistical information on the library and its operations. You will find that the same basic data will be needed again and again - whether for vendors from whom you are requesting cost estimates, or for other libraries with whom you may be seeking to cooperate in implementing automation.

The following are examples of commonly needed data:

- Number of titles and volumes in the collection, current and projected;
- Number of borrowers, current and projected;
- Number of materials circulated, current and projected;
- Number of new materials acquired, current and projected;
- Interlibrary loans, lent to and borrowed from other libraries;
- Description of any cooperative arrangements involving the library; and,
- Library address and hours of operation.

Also it is important to take stock of any existing automation in the library by compiling the following data:

- Percentage of collection that has catalog records in machine-readable form;
- Description of collection without machine-readable records, by category (e.g. monographs, audiovisuals);
- Description of currently-automated library functions (if any);
- Estimates of the location and number of workstations (to show where you intend to have equipment in any future system).

Developing A Strategic Plan

A library planning to automate should undertake a process by which representative staff and users can identify service needs and objectives. The purpose of such an effort is to allow participants to articulate their interests and concerns, share perspectives and learn about possibilities in a collaborative setting.

Group interaction is an important contributing factor in the success of the goal, which is to develop and sustain library automation in the years ahead.

Here are the basic steps involved in this process:

- Plan on a two-day, intensive planning effort.
- Ask participants to identify strengths, weaknesses, opportunities and threats in the library's environment (known as "SWOT" factors in strategic planning) that are characteristic of or that confront the library.

Notes

- Group these factors into critical issue areas that are likely to have an impact on the libraries' future in developing and sustaining automation.
- Ask participants to identify ideas and perceptions in relation to the question: "How do you see the library providing user-friendly, cost-effective automated services in five years?"
- Through a method of your own devising, ask participants to prioritize all of the ideas that come out of the above two "brainstorming" exercises.
- Ask participants to shape these priorities into the draft of a strategic "vision" for automation development consisting of a statement of purpose, goals and objectives for the library.

Strategic vision now provide the framework or context for the next step in the automation process, which is to determine which library functions should be automated and in what order of priority. For example, processes that are repetitive, occupy large amounts of staff time, require retrieving information from large, unwieldy files, or are high-profile functions of the library (such as the public catalog) are prime candidates for automation.

Determining the functions that you wish to automate and their priorities relative to each other is important for all sorts of reasons. If needs and priorities are clear, functions can be automated in phases, allowing for more effective use of frequently scarce funding. Moreover, it is a way to develop credibility with funding agencies and be able to take advantage of "sudden" funding opportunities. Finally, evaluations of systems and options will be easier and more productive if you are able to match your highest functional priorities against the corresponding modules available in the marketplace.

Also planners need to be aware that there are certain cost elements involved in the installation and operation of any automated system. These may be summarized as follows:

- PLANNING AND CONSULTING COSTS include direct, out-of-pocket costs (*e.g.*, hiring a consultant) and indirect costs (*e.g.*, training staff) associated with getting started.
- PURCHASE OF THE SYSTEM includes the cost of acquiring the initial system hardware and software, as well as the cost of preparing a site for the computer system.
- TELECOMMUNICATIONS costs are those fees paid to telephone companies for connecting remote terminals or workstations to a central computer system.
- CONVERSION costs are those associated with the creation of machine-readable bibliographic and, for circulation systems, patron, records.
- ON-GOING OPERATING costs include:
    - maintenance fees
    - utility costs
    - miscellaneous supply costs
    - telecommunications costs
    - salaries and benefits (if extra staff are hired).

System Specifications

At some point, there is need to re-formulate functional priorities into "functional specifications," which may be defined as what you want an automated system to do for you, including things that your current manual system cannot do. "Technical specifications" must also be established. These include standards that must be adhered to, system performance, operation, and maintenance, as well as infrastructure requirements, such as stable sources of electricity and telecommunications, and sufficient bandwidth.

Developing clear and accurate functional and technical specifications that are specific to your library is one of the most important, if not the most important, activity that you will engage in as you plan for your automated system. These specifications will carry you through the entire procurement process, and will ensure that the system which most closely matches them will be the most useful and the most responsive to your needs.

Notes

Developing a Formal Specifications Document

RFP—that organizes and standardizes the information provided to and requested from the various system vendors.

Utilizing an RFP to solicit written responses from vendors makes it possible for you to systematically compare functionality, cost, maintenance, support, and all the other issues that are involved in system procurements. The process can save you money and will result in a wiser decision.

An RFP document should include these essential elements, among others:

- background information on the library;
- a description of how the proposals should be arranged and submitted;
- instructions on receiving vendor business and financial information;
- criteria the library will use to evaluate vendor proposals;
- questions regarding vendor training and documentation;
- your functional and technical specifications.

Also, vendors should be asked to describe:

- how they will create bibliographic, item and borrower databases;
- their system maintenance programs and services;
- their site preparation requirements;
- their delivery and installation methodologies;
- their system performance guarantees; and
- their pricing and cost strategies, in detail.

Evaluating Vendor Proposals

Upon the receipt of vendor proposals, it will be time to begin the process of system evaluation and selection. This process involves a number of key steps:

- Form a project team of persons to assist with the evaluations and the selection who have some knowledge of automation or who work in the area(s) being automated. People involved in the strategic planning process would be a good choice.
- Try to weed out proposals that are "fatally flawed," e.g., where the vendor fails to reply to any of the functional specifications or the system is missing a module for a high-priority function.
- Begin in-depth reading of the "surviving" proposals, carefully noting both deviations from the requirements as defined by the RFP and any aspect that is handled unusually well. Make a list of any parts of the response that are not clear and require further clarification.
- Schedule system demonstrations. They are an important component of the evaluation process. Allow the vendors to show off the vendor's system in the most attractive light; however, be prepared with a list of what you want to see along with questions you would like answered. Use the same list with each vendor. This permits more effective cross-comparisons.
- Consider using computerized spreadsheet software in order to compare and evaluate vendor cost proposals. Costs may not be what they seem at first glance.
- Contact some of each vendor's current clients—sites of the same library type, and of similar size, where the hardware and software modules that have been proposed to you are currently in use.
- Assign point values to the criteria listed in the RFP and assign scores to the different proposals. The system with the highest score becomes the number one finalist, the system with the second highest score number two and so on. To maintain a negotiating edge, it is better to cut to two vendors rather than one. If that is impossible, maintain the illusion anyway. Remember: The selection process is not over until the contract is signed. Until that point, never let any vendors know that they have been eliminated, including those with fatal flaws.

Notes

Task Planning of library automation being a important tool in library. Why there is a need for developing strategic plan?

1.4 Implementation

After the system selection process is complete, there are several important steps which must occur. You and your vendor will have to negotiate and sign a contract. You will want to test the system and make sure it suits your needs. You will want to make provisions for system maintenance. Finally, you will want to train both your staff and your users as much as possible to prepare them for when the system is up and running.

Notes In thinking of automation planning, there is often a tendency to focus on the hardware and software aspects of planning, and to ignore the human aspects of automation training and public relations.

To assure the success of your hard planning work, a training and public relations plan should be part of any automation project. Fortunately, training can begin long before the system is installed. By involving staff at all levels in the analysis of operations, the identification of needs, the setting of priorities, the development of specifications, and the evaluation of systems, staff will gain much of the knowledge they need as the planning progresses.

For new automated system user acceptance and enthusiasm is certainly an important ingredient in a successful planning effort. If you are implementing a public access catalog, it is probably the most important measure of success.

Public relations can allow you to accomplish three things:

- make users aware of your new system and services;
- motivate them to use the system; and,
- train them in using the new system and services effectively.

Task Why training and public relation should be a part of automation project?

Self Assessment

Fill in the blanks:

1. Library automation is divided into ..... levels.
2. ..... is an important contributing factor in the success of the goal.
3. ..... is an enterprise resource planning system for a library used to track items owned, orders made, bills, paid, and patrons who have borrowed.

1.5 Library Acquisitions

The term acquisition commonly denotes procurement of library materials which are published on nonrecurring basis including books, technical reports, government publications and audiovisual materials.

A library acquisition is the department of a library which responsible for the selection and purchase of materials or resources for the library. Acquisitions may select vendors, negotiate consortium pricing, arrange for standing orders, and/or select individual titles or resources (depending on the size of the library or system).

Notes

1.5.1 Purpose of Library Acquisition

The purpose of acquisition is to manage and control the expenditure of funds for materials that meet the collection development criteria of the library and the needs of its clientele. This means that acquisition process must be accurate, efficient and responsive to the demands of library users.

1.5.2 Objectives of Library Acquisition

The main objective of automated acquisition system is as follow.

1. To reduce labour and paper incentive work involved in manual acquisition.
2. To maintain up to date information or record of all activities involved in acquisition.
3. To have effective and efficient control over ordering, claiming and cancellation functions.
4. To provide accurate and timely financial information.
5. To provide necessary management information reports, whenever they are required.

Through this module library staff can search the entire database of library holdings for the purpose of duplicate checking etc. Using various combinations, number of reports could be generated.

1.5.3 Functions of Library Acquisition

- Ordering, claiming, receiving, preservation and payment of all library materials.
- Ordering process, library materials, order form.
- Monitoring, coordinating, implementing and evaluating all collection related activities.
- Serials check-in, control, organization and self preparation.
- Providing management and financial reports/statistics.
- Selecting and evaluating sources of supply.
- Organizing gift and exchange activities.
- Providing current awareness services.

Task Write down the functions of library acquisitions.

1.6 Library Catalogue

Figure 1.1: View of the SML card catalogue

Notes

The card catalogue at Yale University's Sterling Memorial Library is hardly used, but adds to the austere atmosphere.

Figure 1.2: Another view of the SML card catalogue

A **library catalogue** (or **library catalogue**) is a register of all bibliographic items found in a library or group of libraries, such as a network of libraries at several locations. A bibliographic item consists of information entity (*e.g.*, books, computer files, graphics, realia, cartographic materials, etc.) which is considered as library material (*e.g.*, a single novel in an anthology), or a group of library materials (*e.g.*, a trilogy), or linked from the catalogue (*e.g.*, a webpage) as far as it is relevant to the catalogue and to the users (patrons) of the library.

Notes The **card catalogue** was a familiar sight to library users for generations, but it has been effectively replaced by the online public access catalogue (OPAC). Some still refer to the online catalogue as a "card catalogue".

Some libraries with OPAC access still have card catalogues on site, but these are now strictly a secondary resource and are seldom updated. Many of the libraries that have retained their physical card catalogue post a sign advising the last year that the card catalogue was updated. Some libraries have eliminated their card catalogue in favour of the OPAC for the purpose of saving space for other use, such as additional shelving.

Charles Ammi Cutter made the first explicit statement regarding the objectives of a bibliographic system in his Rules for a Printed Dictionary Catalogue in 1876. According to Cutter, those objectives are:

1. To enable a person to find a book of which either (Identifying objective)
    - the author
    - the title
    - the subject
    - the category
2. To show what the library has (Collocating objective)
    - by a given author
    - on a given subject
    - in a given kind of literature
3. To assist in the choice of a book (Evaluating objective)
    - as to its edition (bibliographically)
    - as to its character (literary or topical)

Notes

These objectives can still be recognized in more modern definitions formulated throughout the 20th century. 1960/61 Cutter's objectives were revised by Lubetzky and the Conference on Cataloguing Principles (CCP) in Paris. The latest attempt to describe a library catalogue's goals and functions was made in 1998 with Functional Requirements for Bibliographic Records (FRBR) which defines four user tasks: find, identify, select, and obtain.

1.7 Catalogue Card

Main Entry *e.g.*,

Arif, Abdul Majid.

Political structure in a changing Pakistani

villages / by Abdul Majid and Basharat Hafeez

Andaleeb.--2nd ed.--Lahore : ABC Press, 1985.

xvi, 367p. : ill. ; 22 cm.

Includes index.

ISBN 969-8612-02-8 (hbk.)

1.8 Types of Catalogue Card

Traditionally, these are the following types of catalogue:

- Author card: a formal catalogue, sorted alphabetically according to the authors' or editors' names of the entries.
- Title catalogue: a formal catalogue, sorted alphabetically according to the title of the entries.
- Dictionary catalogue: a catalogue in which all entries (author, title, subject, and series) are interfiled in a single alphabetical order. This was the primary form of card catalogue in North American libraries just prior to the introduction of the computer-based catalogue.
- Keyword catalogue: a subject catalogue, sorted alphabetically according to some system of keywords.
- Mixed alphabetic catalogue forms: sometimes, one finds a mixed author/title, or an author/title/keyword catalogue.
- Systematic catalogue: a subject catalogue, sorted according to some systematic subdivision of subjects. Also called a classified catalogue.
- Shelf list catalogue: a formal catalogue with entries sorted in the same order as bibliographic items are shelved. This catalogue may also serve as the primary inventory for the library.

Figure 1.3: A card catalogue in the University Library of Graz

Notes

Library catalogues originated as manuscript lists, arranged by format (folio, quarto, etc.) or in a rough alphabetical arrangement by author. Printed catalogues, sometimes called dictionary catalogues enabled scholars outside a library to gain an idea of its contents. These would sometimes be interlaced with blank leaves on which additions could be recorded, or bound as guard books in which slips of paper were bound in for new entries. Slips could also be kept loose in cardboard or tin boxes, stored on shelves. The first card catalogues appeared in the nineteenth century, enabling much more flexibility, and towards the end of the twentieth century the OPAC was developed.

Notes c. 245 BC: Callimachus is considered as the first bibliographer and is the one that organized the library by authors and subjects. The Pinakes was the first ever library catalogue.

- c. 800: Library catalogues are introduced in the House of Wisdom and other medieval Islamic libraries where books are organized into specific genres and categories.
- 1595: Nomenclator of Leiden University Library appears the first printed catalogue of an institutional library.
- 1674: Thomas Hyde's catalogue for the Bodleian Library.

More about the early history of library catalogues has been collected in 1956 by Strout.

1.8.1 Cataloguing Rules

Cataloguing (or catalogueuing) rules have been defined to allow for consistent cataloguing of various library materials across several persons of a cataloguing team and across time. Users can use them to clarify how to find an entry and how to interpret the data in an entry. Cataloguing rules prescribe -> which information from a bibliographic item is included in the entry; -> how this information is presented on a catalogue card or in a cataloguing record; -> how the entries should be sorted in the catalogue. The larger a collection, the more elaborate cataloguing rules are needed. Users cannot and do not want to examine hundreds of catalogue entries or even dozens of library items to find the one item they need.

Currently, most cataloguing rules are similar to, or even-based on, the International Standard Bibliographic Description (ISBD), a set of rules produced by the International Federation of Library Associations and Institutions (IFLA) to describe a wide range of library materials. These rules organize the bibliographic description of an item in the following areas: title and statement of responsibility (author or editor), edition, material specific details (for example, the scale of a map), publication and distribution, physical description (for example, number of pages), series, notes, and standard number (ISBN). The most commonly used set of cataloguing rules in the English-speaking world are the Anglo-American Cataloguing Rules, 2nd Edition, or AACR2 for short. In the German-speaking world there exists the Regeln für die alphabetische Katalogisierung, abbreviated RAK. AACR2 has been translated into many languages, however, for use around the world. AACR2 provides rules for descriptive cataloguing only and does not touch upon subject cataloguing.

Library items which are written in a foreign script are, in some cases, transliterated into the script of the catalogue.

1.8.2 Cataloguing Terms

- **Main entry** – generally refers to the first author named on the item. Additional authors are added as "added entries." In cases where no clear author is named, the title of the work is considered the main entry.

Notes

Sorting

In a title catalogue, one can distinguish two sort orders:

- In the grammatical sort order (used mainly in older catalogues), the most important word of the title is the first sort-term. The importance of a word is measured by grammatical rules; for example, the first noun may be defined to be the most important word.
- In the mechanical sort order, the first word of the title is the first sort-term. Most new catalogues use this scheme, but still include a trace of the grammatical sort order: they neglect an article (The, A, etc.) at the beginning of the title.

The grammatical sort order has the advantage that often, the most important word of the title is also a good keyword and it is the word most users remember first when their memory is incomplete. However, it has the disadvantage that many elaborate grammatical rules are needed, so that only expert users may be able to search the catalogue without help from a librarian.

In some catalogues, persons' names are standardized, *i.e.*, the name of the person is always (catalogued and) sorted in a standard form, even if it appears differently in the library material. This standardization is achieved by a process called authority control. An advantage of the authority control is that it is easier to answer questions (which works of some author does the library have). On the other hand, it may be more difficult to answer questions (does the library have some specific material?) if the material spells the author in a peculiar variant. For the cataloguer, it may incur (too) much work to check whether Smith, J. is Smith, John or Smith, Jack.

For some works, even the title can be standardized. The technical term for this is uniform title. For example, translations and re-editions are sometimes sorted under their original title. In many catalogues, parts of the Bible are sorted under the standard name of the book(s) they contain. The plays of William Shakespeare are another frequently cited example of the role played by a uniform title in the library catalogue.

Many complications about alphabetic sorting of entries arise. Some examples:

- Some languages know sorting conventions that differ from the language of the catalogue. For example, some Dutch catalogues sort IJ as Y. Should an English catalogue follows this suit And should a Dutch catalogue sort non-Dutch words the same way
- Some titles contain numbers, for example 2001: A Space Odyssey. Should they be sorted as numbers, or spelled out as Two thousand and one
- De Balzac, Honoré or Balzac, Honoré de Ortega y Gasset, José or Gasset, José Ortegay

In a subject catalogue, one has to decide on which classification system to use. The cataloguer will select appropriate subject headings for the bibliographic item and a unique classification number (sometimes known as a "call number") which is used not only for identification but also for the purposes of shelving, placing items with similar subjects near one another, which aids in browsing by library users, who are thus often able to take advantage of serendipity in their search process.

Task How author card is different from dictionary catalogue?

1.9 Online Catalogues

People working in Card Division, Library of Congress, Washington, D.C., ca.1900-1920s

Online cataloguing has greatly enhanced the usability of catalogues, thanks to the rise of Machine Readable Cataloguing = MARC standards in the 1960s. Rules governing the creation of catalogue MARC records include not only formal cataloguing rules like AACR2 but also special rules specific to MARC, available from the Library of Congress and also OCLC. MARC was originally used to automate the creation of physical catalogue cards; now the MARC computer files are accessed directly in the search process. OPACs have enhanced usability over traditional card formats because:

Notes

1. The online catalogue does not need to be sorted statically; the user can choose author, title, keyword, or systematic order dynamically.
2. Most online catalogues offer a search facility for any word of the title; the goal of the grammatical word order (provide an entry on the word that most users would look for) is reached even better.
3. Many online catalogues allow links between several variants of an author name. So, authors can be found both under the original and the standardized name (if entered properly by the cataloguer).
4. The elimination of paper cards has made the information more accessible to many people with disabilities, such as the visually impaired, wheelchair users, and those who suffer from mold allergies.

Self Assessment

Multiple choice questions:

4. A library acquisition is the department of library which is responsible for:
   (*a*) Selection of materials for the library
   (*b*) Purchase of materials for the library
   (*c*) Selection and purchase of materials for the library
   (*d*) All of these
5. OPAC stands for:
   (*a*) Online public access catalogue
   (*b*) Online public acquisition catalogue
   (*c*) Online payment access catalogue
   (*d*) Operation public access catalogue.
6. In 245 BC, ……. is considered as the first bibliographer.
   (*a*) Lubetzky (*b*) Cutter (*c*) Callimachus (*d*) Thomas Hyde
7. Author card a formal catalogue shorted alphabetically according to the ……. .
   (*a*) Editors (*b*) Readers (*c*) Doctors (*d*) Lawers
8. MARC stands for:
   (*a*) Machine Reading Cataloguing
   (*b*) Machine Readable Cataloguing
   (*c*) Machine Read Catalogue
   (*d*) Machinery Reading Cataloguing.

Notes

1.10 Library Circulation

Library circulation or library lending comprises the activities around the lending of library books and other material to users of a lending library. A circulation or lending department is one of the key departments of a library.

The main public service point is the circulation desk or loans desk, usually found near the main entrance of a library. It provides lending services and facilities for return of loaned items.

Notes Renewal of materials and payment of fines are also handled at the circulation desk.

Circulation staff may provide basic search and reference services, though more in-depth questions are usually referred to reference librarians at the library reference desk. The circulation desk is in most cases staffed by library aides instead of professional librarians.

Functions of the circulation desk staff may include:

- Lending materials to library users
- Checking in materials returned
- Monitoring materials for damage and routing them to the appropriate staff for repair or replacement
- Set right the library circulation software, scanners, printers, etc.
- Collecting statistics on library use, *i.e.*, patron transactions, material checkouts, etc.

Checking Out

Many items can be checked out by an automated system and do not require any paperwork. The circulation desk also provides circulation services for items such as uncatalogued items, periodicals, government documents, maps and microforms. Such items often have to be checked out "by hand". The number of library items that patrons can check out varies from library to library.

Checking In

Returned library items are processed by the circulation desk. They usually scan the barcode to identify the item and also demagnetize the item and dispatch the item on to the shelves.

Document Delivery

The circulation desk also liaises with library patrons in delivering electronic articles and documents.

Reserve

The circulation desk can also look after the reserve section such as past exam papers and unit materials.

Infringement Processing

The payment of infringements for late, lost book charges and overdue items are processed by the circulation desk. They can also lift restrictions for library patrons once the fines have been paid.

Notes

Shelving

The circulation desk also handles the shelving of items used from the Reserve section and also the reference section.

Lost and Found

Some circulation desks also provide a lost and found service. This includes commonly found items such as library cards/matric card, laptops, wallets, computer media and portable devices.

Task Write the role of check-in in Circulation desk.

1.11 Serials Control

For serials control, data to be entered are title, frequency, address of the publisher, address of the vendor, year, volume number., expected date of arrival, date of receipt, etc. Once the data for all the titles are entered, the database is ready.
Hereafter as the issues of periodicals are received, data relating to that are continuously entered. At fixed intervals, the non-receipt of the issues is checked, and reminders sent. The computer itself can generate the reminder giving all the details of issues not received including the address of the publisher/vendor.

1.12 Online Public Access Catalogue

An **Online Public Access Catalogue** (often abbreviated as **OPAC** or simply **Library Catalogue**) is an online database of materials held by a library or group of libraries. Users search a library catalogue principally to locate books and other material physically located at a library.

Early Online Catalogues

Although, a handful of experimental systems existed as early as the 1960s, the first large-scale online catalogues were developed at Ohio State University in 1975 and the Dallas Public Library in 1978.

The early online catalogue systems tended to closely reflect the card catalogues that they were intended to replace. Using a dedicated terminal or telnet client, users could search a handful of pre-coordinate indexes and browse the resulting display in much the same way they had previously navigated the card catalogue.

Did u know? Throughout 1980s, the number and sophistication of online catalogues increased.

The first commercial systems appeared, and would by the end of the decade largely replace systems built by libraries themselves. Library catalogues began providing improved search mechanisms, including Boolean and keyword searching, as well as ancillary functions, such as the ability to place holds on items that had been checked-out.

At the same time, libraries began to develop applications to automate the purchase, cataloguing, and circulation of books and other library materials. These applications, collectively known as an integrated library system (ILS) or library management system, included an online catalogue as the public interface to the system's inventory. Most library catalogues are closely tied to their underlying ILS system.

Notes

Stagnation and Dissatisfaction

There is stagnation in the development of online catalogues. Although, the earlier character-based interfaces were replaced with the web, both the design and the underlying search technology of most systems did not advance much beyond the developed stage in the late 1980s.

At the same time, organizations outside of libraries began to develop more sophisticated information retrieval systems. Web search engines like Google and popular e-commerce websites such as Amazon.com provided simpler to use (yet more powerful) systems that could provide relevancy ranked search results using probabilistic and vector-based queries.

Prior to the widespread use of the Internet, the online catalogue was often the first information retrieval system for the library users. Now accustomed to web search engines, newer generations of library users have grown increasingly dissatisfied with the complex (and often arcane) search mechanisms of older online catalogue systems.

This has, in turn, led to vocal criticisms of these systems within the library community itself, and in recent years to the development of newer (often termed 'next-generation') catalogues.

Next Generation Catalogues

The newest generation of library catalogue systems are different from earlier OPACs by their use of more sophisticated search technologies, including relevancy ranking and faceted search, as well as features aimed at greater user interaction and participation with the system, including tagging and reviews.

These newer systems are almost always independent of the library's integrated library system, instead providing drivers that allow for the synchronization of data between the two systems. While older online catalogue systems were almost exclusively built by ILS vendors, libraries are increasingly turning to next generation catalogue systems built by enterprise search companies and open source projects, often led by libraries themselves. The costs associated with these new systems, however, have slowed their adoption, particularly at smaller institutions.

Task How newest generation of library catalogue different from earlier OPAC?

Union Catalogues

Although, library catalogues typically reflect the holdings of a single library, they can also contain the holdings of a group or consortium of libraries. These systems, known as union catalogues, are usually designed to aid the borrowing of books and other materials among the member institutions via interlibrary loan. The largest such union catalogue is World Cat, which includes the holdings of over 70,000 libraries worldwide.

Related Systems

There are a number of systems that share much in common with library catalogues, but have traditionally been distinguished from them. Libraries utilize these systems to search for items not traditionally covered by a library catalogue.

They include bibliographic databases such as Medline, ERIC, Psyc INFO, and many others which index journal articles and other research data. There are also a number of applications aimed at managing documents, photographs, and other digitized or born-digital items. Particularly in academic libraries, these systems (often known as digital library systems or institutional repository systems) assist with efforts to preserve documents created by faculty and students.

Notes

Self Assessment

State whether the following statements are true or false:

9. A circulation or lending department is one of the key departments of a library.
10. The first large-scale online catalogues were developed at Ohio State University in 1975 and the Dallas Public Library in 1985.
11. The largest union catalogue is World Cat, which includes the holdings of over 70,000 libraries worldwide.
12. An integrated library system (ILS) is also known as library management system.

1.13 Summary

- An integrated library system (ILS), also known as a library management system (LMS), is an enterprise resource planning system for a library, used to track items owned, orders made, bills paid, and patrons who have borrowed.
- Library automation which started in late 70s in few special libraries has now reached most of the university libraries.
- The library catalogue or index to the collection forms the base for most of the library activities such as acquisition, reference, bibliographic service, inter-library loan etc. The users of library card catalogue will appreciate how fast the retrieval is, search and printing in automated environment.
- A library catalogue (or library catalogue) is a register of all bibliographic items found in a library or group of libraries, such as a network of libraries at several locations.
- Cataloguing (or catalogueuing) rules have been defined to allow for consistent cataloguing of various library materials across several persons of a cataloguing team and across time.
- Library circulation or library lending comprises the activities around the lending of library books and other material to users of a lending library.
- An Online Public Access Catalogue (often abbreviated as OPAC or simply Library Catalogue) is an online database of materials held by a library or group of libraries.

1.14 Keywords

Database : A large store of data held in a computer.

Invoice : A list of goods sent or services provided with a statement of the sum due.

Automation : The use of automatic equipment in a manufacturing.

Elaborate : Very detailed and complicated.

Sophisticated : Showing a lot of experience of the world and social situations.

1.15 Review Questions

1. Write a short note on OPAC.
2. Define Union catalogue.
3. Write briefly on Cataloguing terms.
4. Write a note on library acquisitions.
5. Describe the library catalogue card.
6. Discuss the online catalogue.
7. Describe the library catalogue.
8. Explain in detail about library circulation.
9. Explain in detail about online public access catalogue.

Notes

Answers : Self Assessment

1. 4
2. Group interaction
3. Integrated Library System
4. (c)
5. (*a*)
6. (*c*)
7. (*a*)
8. (*b*)
9. True
10. False
11. True
12. False

1.16 Further Readings

Books

Harris, Michael H. *History of Libraries in the Western World*. 4th ed. Lanham, Maryland: Scarecrow, 1995. 3 - "*The distinction between a library and an archive is relatively modern*".

Cossette, Andre Humanism and Libraries: *An Essay on the Philosophy of Librarianship*. Duluth, MN: Library Juice Press, 2009. Print.

Martin Schrettinger (1803): Versuch eines volltsändigen Lehrbuches der Bibliothek-Wissenschaft. Munich

Online links

http://ncsi-net.ncsi.iisc.ernet.in/workshop/material07/Shivaram.pdf

http://www.clib.dauniv.ac.in/E-Lecture/Library%20Automation1.pdf

http://www.isrj.net/May/2011/Other_Library_Automation.aspx

Notes

Unit 2: Library Software Packages-I

CONTENTS

Objectives
Introduction
2.1 General Features of the Software
2.2 Services of Software
2.3 Security for Software
2.4 Radio-Frequency Identification (RFID)
2.5 Libsys
2.5.1 Acquisition System
2.5.2 Cataloguing System
2.5.3 Circulation System
2.5.4 Serial System
2.5.5 Article Indexing System
2.5.6 OPAC System
2.6 Summary
2.7 Keywords
2.8 Review Questions
2.9 Further Readings

Objectives

After studying this unit, you will be able to:

- Explain the general features of the software
- Describe the services of software
- Define RFID in library software
- Explain about LibSys.

Introduction

This unit entitled library software packages deals with the modern software used the organization of library which will be helpful to both the librarians and the people who visit the library. The librarian can cope with a large number of people who visit the library and people can pickup their own books of choice easily. Radio-frequency identification, library systems, State of Art Library Software, and winisis are different types of software used in the modern libraries.

Software evaluation is quite a difficult task; we have to consider the following procedure, features and aids to evaluate software packages.

Preliminary Step

(*a*) **Consult other:** You do not want software that stops unexpectedly, slows down on large network, report error message, so consult with other who have already used the software in the same way you intend to use the system or consult other who have already experienced on that software.

(*b*) **Who refer to you:** the reputation of person or the institution, his/her experienced on that particular software should also be justified at this point.

(*c*) **Reputation of the manufacture and vendor** the reputation of the manufacturer and vendor should also be considered.

Notes

Documentation

(*a*) **Existing literature:** go for the software after carefully examining the existing literature and documentation on the particular software.

(*b*) **Training:** does the company or authority of the particular software provide training? Where and how the training is conducted, whether it is online, onsite should also be consider.

(*c*) **Manual:** does the training is accompanied by easy to follow supporting print material or manual?

2.1 General Features of the Software

(*a*) **Various computer platform:** the various computer platform needed to run the software, *i.e.*, server, wireless connectivity, hard disk space needed, etc.

(*b*) **Multiple platforms:** does the software able to run in multiple platforms such as windows 2000, windows N.T., windows98, 95, etc.

(*c*) **Capacity:** The restriction in total number of database/information/records in a database it can handle effectively.

(*d*) **Speed:** Speed of operation in different environment**.**

(*e*) **Flexibility:** Flexibility to handle of records of variable sizes.

(*f*) **Standardize data format:** Does it use standardize data form for importing and exporting of data.

(*g*) **De-bugging facility:** De-bugging facility and scope of proper error message while executing the software.

(*h*) **User friendliness:** Does the system easy to use? Does the system empower the experienced user with short cut and flexible tool. Does the system easy to learn? Is the system menu driven. Are the command mnemonic-based?

(*i*) **Effectiveness:** Does the system meet the specification.

(*j*) **Reliability:** Does the search give consistent result?

(*k*) **Expandability:** Is the system permit addition.

(*l*) **Total cost of the software:** Does the system comes in different module, *i.e.*, available in only circulation module, circulation plus cataloguing module. What is the total cost of the system?

(*m*) **Stream less movement of data:** Does the database built on open standard technologies such as SQL, cold fusion, or XML that allows different types of software to talk to each other. That means your different system of the software can easily and automatically shares and updates any information that have in common *e.g*. students name, address, etc.

Task Does software has flexibility to handle records of variable size?

2.2 Services of Software

(*a*) **Acquisition:** Does the system carry out duplicate checking while entering the data. Does it have the capacity to print accession register?

(*b*) **Data entry and editing:** How effective the system is for data entry? Is the software provides easy way for editing of records? Is insertion and deletion of records are easy?

(*c*) **Circulation:** provision of facility for issue, return, computation of fines, reservation of document, etc.

(*d*) **Serial control:** Provision of monitoring multiple issue of a serial, provision of grace period for receiving the serial, provision of renewal, overdue alert, entering the abstract of a serial.

Notes

(*e*) **OPAC:** Provision of reservation through OPAC, provision of searching OPAC from outside the library, provision of searching the OPAC and web simultaneously (Meta search) using a single word search.

(*f*) **Library administration:** The software should allow generating different reports, *i.e.*, collection statistics, circulation statistics and also should be helpful to create your own specialized report to meet your specialized need.

(*g*) **Enhanced MARC data:** Many software allows to catalogue website, e-Books, AV resources in addition to the library resources. These website are added by the library media specialist manually.

(*h*) **Updating:** Does the library automation system company from their own site help to install, upgrade (web-based updates), and patches or simply to help you with a particular function.

(*i*) **New technologies:**

- Provision of handling uncatalogue item.
- Provision of internet connectivity, e-mail connectivity.
- Scope of integration of the software with other school department.
- Provision of accessed the software from computer outside of the school walls via a web browser.
- Does the library software keeping pace with global technology, web enhancement, online information, virtual services, etc.
- Many latest software is now a days hosted by a vendor by an Application Service Provider (ASP) or by the school web server.
- Can other application besides library software run on the workstation?
- Can the software makes it easy to switch between the OPAC and writing station because there are times when you like that your public OPAC station to function as writing station and there are other times when you like the writing station to becomes function as OPAC.

Did u know? This is an advantage, here cataloguer can work from remote location and OPAC can be accessed from both home and school, 24 hours a day.

2.3 Security for Software

(*a*) Provision of user id/barcode, etc.

(*b*) Provision of access restriction to certain records/fields.

(*c*) Is there any provision for students and staff to log in and log off on their own.

(*d*) How new modification/new version of the software to be obtain by the librarian?

(*e*) **Power out feature:** Is there any power out feature included?

There should be a manual hand scanner available to check material in and out that can easily be connected to the compute system once its back up and running.

(*f*) **Future exist cost:** In near future if you want to switch over to another packages then the cost involved in such cases should also be consider.

Post installation

(*a*) Does the vendor gives performance/service warranty.

(*b*) Post installation support from the vendor.

Notes

Self Assessment

Fill in the blanks:

1. Radio frequency identification is a type of ..... used in the modern libraries.
2. Data entry and editing is a type of ..... Software.
3. Depending on mobility, RFID readers are classified into ..... types.

2.4 Radio-Frequency Identification (RFID)

Libraries

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

RFID makes it possible to give each product in a grocery store its own unique identifying number, to provide assets, people, work in process, medical devices, etc., all with individual unique identifiers - like the license plate on a car but for every item in the world. This is a vast improvement over paper and pencil tracking or bar code tracking that has been used since, the 1970s.

Notes With bar codes, RFID is only possible to identify the brand and type of package in a grocery store, for instance.

Furthermore, passive RFID tags (those without a battery) can be read if passed within close enough proximity to an RFID reader. It is not necessary to "show" the tag to the reader device, as with a bar code. In other words it does not require line of sight to "see" an RFID tag, the tag can be read inside a case, carton, box or other container, and unlike bar codes RFID tags can be read hundreds at a time. Bar codes can only read one at a time.

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

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

Most RFID tags contain at least two parts: one is an integrated circuit for storing and processing information, modulating and demodulating a radio-frequency (RF) signal, and other specialized functions; the other is an antenna for receiving and transmitting the signal.

RFID can be passive (using no battery), active (with an on-board battery that always broadcasts or beacons its signal) or battery assisted passive (BAP) which has a small battery on board that is activated when in the presence of an RFID reader. Passive tags in 2011 start at $ .05 each and for special tags meant to be mounted on metal, or withstand gamma sterilization go up to $5. Active tags for tracking containers, medical assets, or monitoring environmental conditions in data centers all start at $50 and can go up over $100 each. BAP tags are in the $3-10 range and also have sensor capability like temperature and humidity.

The term RFID refers to the technology. The tags should properly be called "RFID tags" not "RFIDs".

Fixed RFID and Mobile RFID: Depending on mobility, RFID readers are classified into two different types: **fixed RFID and mobile RFID**. If the reader reads tags in a stationary position, it is called fixed RFID. These fixed readers are set-up specific interrogation zones and create a "bubble"

Notes

of RF energy that can be tightly controlled if the physics is well-engineered. This allows a very definitive reading area for when tags go in and out of the interrogation zone. On the other hand, if the reader is mobile when the reader reads tags, it is called mobile RFID. Mobile readers include hand helds, carts and vehicle mounted RFID readers from manufacturers such as Motorola, Intermec, Impinj, Sirit, etc.

There are a variety of groups defining standards and regulating the use of RFID, including the International Organization for Standardization (ISO), the International Electrotechnical Commission (IEC), ASTM International, the DASH7 Alliance and EPCglobal. (Refer to Regulation and standardization below.) There are also several specific industries that have set guidelines including the Financial Services Technology Consortium (FSTC) has set a standard for tracking IT Assets with RFID, the Computer Technology Industry Association CompTIA has set a standard for certifying RFID engineers and the International Airlines Transport Association IATA set tagging guidelines for luggage in airports.

RFID has many applications; for example, it is used in enterprise supply chain management to improve the efficiency of inventory tracking and management. The Healthcare industry has used RFID to create tremendous productivity increases by eliminating "parasitic" roles that do not add value to an organization such as counting, looking for things, or auditing items. Many financial institutions use RFID to track key assets and automate -SarbanesOxley Act (SOX) compliance. Also with recent advances in social media RFID is being used to tie the physical world with the virtual world. RFID in Social Media first came to light in 2010 with Facebook's annual conference.

Task State your comments, how RFID is useful in grocessary shop.

RFID tags used in libraries: square book tag, round CD/DVD tag and rectangular VHS tag.

Among the many uses of RFID technology is its deployment in libraries. This technology has slowly begun to replace the traditional barcodes on library items (books, CDs, DVDs, etc.). The RFID tag can contain identifying information, such as a book's title or material type, without having to be pointed to a separate database (but this is rare in North America). The information is read by an RFID reader, which replaces the standard barcode reader commonly found at a library's circulation desk. The RFID tag found on library materials typically measures 50 × 50 mm in North America and 50 × 75 mm in Europe. It may replace or be added to the bar code, offering a different means of inventory management by the staff and self service by the borrowers. It can also act as a security device, taking the place of the more traditional electromagnetic security strip.

Notes

While there is some debate as to when and where RFID in libraries first began, it was first proposed in the late 1990s as a technology that would enhance workflow in the library setting. Singapore was certainly one of the first to introduce RFID in libraries and Rockefeller University in New York may have been the first academic library in the United States to utilize this technology, whereas Farmington Community Library in Michigan may have been the first public institution, both of which began using RFID in 1999.

Did u know? In Europe, the first public library to use RFID was the one in Hoogezand-Sappemeer, the Netherlands, in 2001, where borrowers were given an option.

To their surprise, 70% used the RFID option and quickly adapted, including elderly people.

Worldwide, in absolute numbers, RFID is used most in the United States (with its 300 million inhabitants), followed by the United Kingdom and Japan. It is estimated that over 30 million library items worldwide now contain RFID tags, including some in the Vatican Library in Rome. At the time of 2010, the largest RFID implementation in academic library is the University of Hong Kong Libraries which has over 1.20 million library items contains RFID tags; whereas the largest implementation for public institution has been installed in Seattle Public Library in the United States.

RFID has many library applications that can be highly beneficial, particularly for circulation staff. Since, RFID tags can be read through an item, there is no need to open a book cover or DVD case to scan an item. This could reduce repetitive-motion injuries. Where the books have a bar code on the outside, there is still the advantage that borrowers can scan an entire pile of books in one go, instead of one at a time. Since RFID tags can also be read while an item is in motion, using RFID readers to check-in returned items while on a conveyor belt reduces staff time. But, as with barcode, this can all be done by the borrowers themselves, meaning they might never again need the assistance of staff. Next to these readers with a fixed location there are also portable ones (for librarians, but in the future possibly also for borrowers, possibly even their own general-purpose readers). With these, inventories could be done on a whole shelf of materials within seconds, without a book ever having to be taken off the shelf. In Umeå, Sweden, RFID is being used to assist visually impaired people in borrowing audio books. In Malaysia, Smart Shelves are used to pinpoint the exact location of books in Multimedia University Library, Cyberjaya. In the Netherlands, handheld readers are being introduced for this purpose.

The Dutch Union of Public Libraries ('Vereniging van Openbare Bibliotheken') is working on the concept of an interactive 'context library', where borrowers get a reader/headphones-set, which leads them to the desired section of the library (using triangulation methods, rather like GPS) and which they can use to read information from books on the shelves with the desired level of detail (*e.g.* a section read out loud), coming from the book's tag itself or a database elsewhere, and get tips on alternatives, based on the borrowers' preferences, thus creating a more personalized version of the library. This may also lead them to sections of the library they might not otherwise visit. Borrowers could also use the system to exchange experiences (such as grading books). This is already done by children in the virtual realm at mijnstempel.nl, but the same could be done in physical form. Borrowers can grade the book at the return desk.

However, as of 2008 this technology remains too costly for many smaller libraries, and the conversion period has been estimated at 11 months for an average-size library. A 2004 Dutch estimate was that a library which lends 100,000 books per year should plan on a cost of 50,000 (borrow- and return-stations: 12,500 each, detection porches 10,000 each; tags 0.36 each). RFID taking a large burden off the staff could also mean that fewer staff will be needed, resulting in some of them getting fired, but that has so far not happened in North America where recent surveys have not returned a single library that cut staff because of adding RFID. In fact, library budgets are being reduced for personnel and increased for infrastructure, making it necessary for libraries to add automation to compensate for the reduced staff size. Also, the tasks that RFID takes

Notes

over are largely not the primary tasks of librarians. A finding in the Netherlands is that borrowers are pleased with the fact that staffs are now more available for answering questions.

A concern surrounding RFID in libraries that has received considerable publicity is the issue of privacy. Because RFID tags can depending on the RFID transmitter & reader-be scanned and read from up to 100 meters (330 ft) (*e.g.*, Smart Label RFID's), and because RFID utilizes an assortment of frequencies (both depending on the type of tag, though), there is some concern over whether sensitive information could be collected from an unwilling source. However, library RFID tags do not contain any patron information, and the tags used in the majority of libraries use a frequency only readable from approximately 10 feet (3.0 m). Also, libraries have always had to keep records of who has borrowed what, so in that sense there is nothing new. However, many libraries destroy these records once an item has been returned. RFID would complicate or nullify this respect of readers' privacy. Further, another non-library agency could potentially record the RFID tags of every person leaving the library without the library administrator's knowledge or consent. One simple option is to let the book transmit a code that has meaning only in conjunction with the library's database. Another step further is to give the book a new code every time it is returned. And if in the future readers become ubiquitous (and possibly networked), then stolen books could be traced even outside the library. Tag removal could be made difficult if the tags are so small that they fit invisibly inside a (random) page, possibly put there by the publisher.

Self Assessment

Multiple choice questions:

4. Radio-frequency identification involves the hardware known as:
   (*a*) Interrogators and tags (*b*) Readers
   (*c*) Tags (*d*) All of these.
5. If the readers read tags in a stationary position, it is called:
   (*a*) Fixed RFID (*b*) Mobile RFID
   (*c*) Internet RFID (*d*) IT Assets RFID.

2.5 LibSys

LibSys is integrated multi user library management software that caters to the needs of an advanced library and information professionals. It provides a tree structure system with each system comprising of several sub-systems having unmatchable depth in functionality.

- It has a powerful and user-friendly WEB-OPAC along with Windows-based OPAC.
- It runs on various platforms such as WINDOWS (95/98/NT/2000/XP), UNIX (various flavors), LINUXM, etc. Further, it adheres to standards such as MARC and Z39.50 that makes it suitable for cooperative networking and resource sharing.

The LibSys systems at a glance:

- Acquisition System
- Cataloguing System
- Circulation System
- Serial System
- Article Indexing System
- OPAC System

2.5.1 Acquisition System

It deals with approval and ordering of library materials, monitoring their receipt, invoice processing and accessioning. It also maintains expenditure and budget analyses under a variety of accounts/heads.

Notes

The **Acquisition** process consists of:

- Selecting materials for a library;
- Placing orders for the supply of books to be purchased;
- Processing materials received as gifts;
- Arranging for exchange of books;
- Receiving the books in the library;
- Accessioning them; and
- Passing the bill for payment for the books purchased.

2.5.2 Cataloguing System

It provides online catalogues in various orders maintained in traditional libraries. Additionally, it makes available instant listings under a variety of searchable fields to suit the requirements of a modern reference center.

Other than data entry facility, the system has the additional facility to accept data in standard machine readable formats such as CCF (ISO-2709), MARC (ANSI-Z39.x), etc. This makes import/export of bibliographic data in standard exchange formats possible.

Multimedia files can be attached and viewed in OPAC, meeting the requirements of certain specific libraries.

Notes The cataloguing system provides facilities to generate bibliographies, current awareness services and selective dissemination of information (SDI).

2.5.3 Circulation System

It maintains up-to-date membership records as well as the latest status of the collection meant for circulation. It facilitates printing of bar-coded ID cards, along with an optional facility to attach member's photograph. It performs all the functions related to circulation, providing suitable checks at every stage. It also takes care of infrequent but routine functions such as bindery record management, books on display in the library, latest additions to the library, etc.

2.5.4 Serial System

It provides control of subscription of periodicals and subsequent monitoring of the scheduled arrival of individual issues. It maintains records of the budget sanctioned for serials under different categories, amounts spent, thus providing complete budgetary control. It also handles serials which are received gratis or in exchange.

Task State various process of acquisition.

2.5.5 Article Indexing System

It provides the facility to create and maintain a separate articles database. It facilitates special services such as SDI, listing of current articles, bibliographies, etc.

2.5.6 OPAC System

As the acronym suggests, it provides an Online Public Access Catalogue. The bibliographic databases can be accessed with printed indexes. The system includes a word-based search facility using Boolean operators that can narrow down a search to meet very specific needs. Additional features of this system are:

Notes

- Periodic listing of recent additions to the library;
- Members can find the materials checked-out to them; and
- Reserve materials that are currently in circulation.

WEB-OPAC System

It is an optional module and provides an advanced GUI interface to enable searching of the library database through an industry standard Web browser having all the features of OPAC. etc.

Self Assessment

State whether the following statements are true or false:

6. LibSys has a powerful and user friendly WEB-OPAC along with windows based OPAC.
7. Circulation System provides control of subscription of periodicals and subsequent monitoring of the scheduled arrival of individual issues.
8. OPAC System provides an Online Public Access Catalogue

2.6 Summary

- Provision of reservation through OPAC, provision of searching OPAC from outside the library, provision of searching the OPAC and web simultaneously (Meta search) using a single word search.
- The software should allow generating different reports i.e., collection statistics, circulation statistics and also should be helpful to create your own specialized report to meet your specialized need.
- Radio-frequency identification (RFID) is a technology that uses communication through the use of radio waves to transfer data between a reader and an electronic tag attached to an object for the purpose of identification and tracking.
- Some RFID tags can be read from several meters away and beyond the line of sight of the reader. The application of bulk reading enables an almost-parallel reading of tags.
- Most RFID tags contain an integrated circuit for storing and processing information.
- Mobile readers include hand helds, carts and vehicle mounted RFID readers from manufacturers such as Motorola, Intermec, Impinj, Sirit, etc.
- The Dutch Union of Public Libraries ('Vereniging van Openbare Bibliotheken') is working on the concept of an interactive 'context library', where borrowers get a reader/headphones-set, which leads them to the desired section of the library
- LibSys is integrated multi user library management software that caters to the needs of an advanced library and information professionals.

2.7 Keywords

Relevant : Closely appropriate to the matter in hand.

ASP : An Application Service Provider (ASP) is a business that provides computer-based service to customers over a network.

RFID : Radio-Frequency Identification (RFID) is the use of a wireless non-contact radio system to transfer data from a tag attached to an object, for the purposes of automatic identification and tracking.

OPAC : An Online Public Access Catalog (OPAC) is an online database of materials held by a library or group of libraries.

SDI : Selective Dissemination of Information (SDI) was originally a phrase related to library and information science. SDI refers to tools and resources used to keep a user informed of new resources on specified topics held by a library or group of libraries.

Notes

2.8 Review Questions

1. Write a short note on reports.
2. Write briefly on membership in library.
3. Discuss the OPAC System.
4. Describe the evaluation of software packages.
5. Explain the RIFD tags used in libraries.
6. Elaborate briefly on LIBSYS.

Answers : Self Assessment

1. Software	2. Services	3. two
4. (a)	5. (a)	6. True
7. False	8. True	

2.9 Further Readings

Books

Best Careers. U.S. News & World Report USnews.com.

BLS Inflation Calculator, BLS.gov.

Occupational Outlook Handbook, 2010-11 Edition.

McCook, Kathleen de la Peña. *Introduction to Public Librarianship,p. 65. Neal Schuman*, 2011.

R. Hoetzlein. *The Organization of Human Knowledge: Systems for Interdisciplinary Research*. 2007.

Online links

http://www.aimglobal.org/technologies/RFID/what_is_rfid.asp

http://www.cs.umd.edu/class/spring2007/cmsc818z/himantika_818z.pdf

http://publications.drdo.gov.in/gsdl/collect/dbit/import/v18dbit 1805009.pdf

http://nopr.niscair.res.in/bitstream/123456789/3225/1/ALIS%2054(3)%20146-151.pdf

Notes

Unit 3: Library Software Packages-II

CONTENTS

Objectives
Introduction
3.1 Software for University Library (SOUL)
3.1.1 Hardware and Software Requirement
3.2 Features of SOUL
3.3 Modules of SOUL
3.3.1 Acquisition Module
3.3.2 Cataloguing Module
3.3.3 Circulation Module
3.3.4 Serials Module
3.3.5 Online Public Access Catalogue Module (OPAC)
3.3.6 Administration Module
3.4 Winisis
3.5 Summary
3.6 Keywords
3.7 Review Questions
3.8 Further Readings

Objectives

After studying this unit, you will be able to:

- State the meaning of software for university library
- Explain Hardware and software requirement
- Discuss modules of SOUL in library software packages
- Describe what winsis is.

Introduction

In this unit entitled user friendly software developed to work under client server environment. In order to design this software, the international standards, biblio graphic formats networking protocols and typical functions of all types and sizes of libraries particularly at university level are takes in to account.

We have to consider the followings to evaluate the software packages.

3.1 Software for University Library (SOUL)

The SOUL is state-of-the-art library automation software designed and developed by the INFLIBNET. It is user-friendly software developed to work under client-server environment. Although, looking at the name of the software, one may think that it is meant for University libraries only, but in fact it is flexible enough to be used for automating any type or size of library in India. While designing this software, the international standards, bibliographic formats, networking protocols, and typical functions of all types and sizes of libraries, particularly at

Notes

university level are to taken into account. The functions have been grouped into six categories, looking into the functional divisions of Indian University libraries. At present SOUL uses RDBMS on Windows N.T. operating system as back end to store and retrieve the data. However, keeping in view the trends in IT towards Linux operating system, efforts are under way also to provide SOUL to work on Linux platform. The inputs received from expert team consisting of practicing librarians and the feedbacks received from users of our earlier software, ILMS, have given a strong base for designing this software. SOUL is near total solution offered by INFLIBNET to Indian libraries. It puts library staff at ease in exploring all the functions to their advantages with the help of professionally prepared manual.

3.1.1 Hardware and Software Requirement

The minimum hardware and software configuration required to use the SOUL is given below.

Server:

Pentium @ 933 MHz with 128 MB RAM

40 GB HDD

32 x CD-ROM Drive

1.44 Floppy Drive

Colour Monitor (SVGA)

Ethernet card 10/100 Mbps

MS-SQL Server 7.0/ 2000

Windows – NT/Windows 2000 server (OS)

Client:

Pentium @ 933 MHz with 64 MB RAM

2 GB HDD with 100 MB Free space

1.44 Floppy Drive

Colour Monitor (SVGA)

Ethernet card 10/100 Mbps

Windows 95/98/2000/XP/NT (OS)

3.2 Features of SOUL

Following are few of the strong features of SOUL, which should induce librarians to use SOUL in their libraries.

- Windows-based user-friendly software.
- Well-designed screens, logically arranged functions with extensive help messages make the software.
- User friendly.
- It is based on client server architecture allowing scalability to the users.
- It uses RDBMS to organize and query the data.

Notes SOUL does not need an extensive training. With very little familiarity, one can begin using it.

- It is specially designed to work in the large academic libraries, capable of handling large number of records.
- It is multiuser software and there is no limit on simultaneous accesses.
- Supports internationally known standards such as CCF and AACR II. etc.
- Provides export and import facility and adheres to ISO 2709 format.

Notes

- Incorporates all required features to work in a networked environment *i.e.*, LAN and WAN.
- OPAC is versatile and very user-friendly with all options in-built.
- OPAC is accessible over the web using any GUI-based browsers.
- Provides comprehensive list of reports, master databases and authority files.
- Provides facility to create, view and print records in regional languages.
- Functionally it covers every conceivable operation of University library.
- Available at affordable cost.
- SOUL has been fully tested at a number of university libraries and critically evaluated by team of experts and practising librarians.

3.3 Modules of SOUL

The SOUL has been divided into following six broad modules as shown in Figure 3.1.

- Acquisition Module
- Cataloguing Module
- Circulation Module
- Serials Module
- OPAC Module
- Administration Module

Figure 3.1

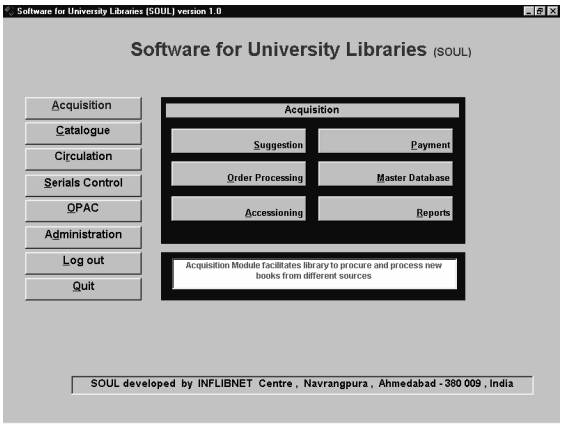
These modules have further been divided into sub-modules looking at the nature of functions handled by various functional divisions in University libraries. Brief descriptions of the same along with first screens have been given in the following pages.

3.3.1 Acquisition Module

This particular module provides facilities to handle work relating to acquisition of reading materials of all types except serials, starting from suggestion/recommendation by faculty till accessioning, invoice processing. Acquisition module comprises following six broad sub-modules as given in Figure 3.2.

Notes

Figure 3.2



- Suggestion
- Receiving/Accessioning
- Master Databases
- Order processing
- Payment
- Reports

Suggestion: Sub-module enables creation/updation of databases of new items suggested by a faculty member along with bibliographical details and also suggestor's details such as name, department, user code, budget code etc. Books received through placement of purchase orders as well as those received as gratis are handled from this module. Selecting items for approval, incorporating further details like approval date, budget head, approver's name, rejected items, its date and reasons for rejection are also handled here. Number of required reports having combination of several fields can be easily generated.

Order Processing: Selecting the items for ordering, vendor/publisher selection, assigning order and reference number, setting deadlines for supply and other details can be done under this sub-module. Facilities for sending reminders, canceling orders, generating certain reports specific to these modules, are provided.

Receiving/Accessioning: This function supports cross checking with order, receiving partial/full supply of items listed in order, duplicate checking with an existing title, assigning accession numbers along with further necessary details required and merging the records with existing database, if items are already in the collections.

Payments: Payments sub-module allows processing of the regular invoices, advance payments, and recording of every information pertaining to each invoice including conversion rates, handling charges discounts etc. Facility for generating reminders to supplier or publisher. Searching the status of payment and generation of reports are other strong features added in this sub-module.

Master Databases: Publisher, vendor, Currency and budget codes (both source wise and department wise) are few major master databases that are frequently handled/created here. Updation, deletion of all this is possible from here.

Reports: There are 13 major reports relating to acquisition that can be created with number of parameters. Acquisition module is capable of handling almost every function that is being carried out in acquisition division of university libraries.

3.3.2 Cataloguing Module

Catalogue module function begins with selecting the items that have already been accessioned in the previous module and furnishing rest of the information as per AACR-II rules. Providing user

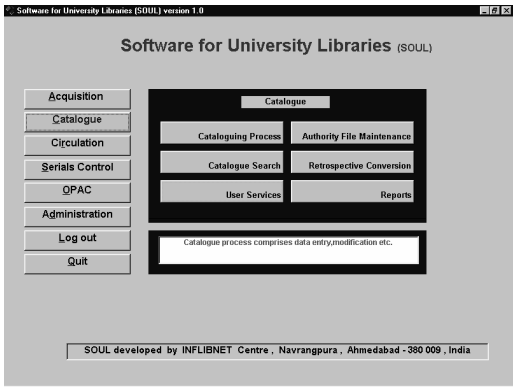
Notes

services such as recent addition services, CAS, creation and updation of authority files, etc., are other major functions supported by SOUL. A comprehensive worksheet covering almost every field facilitates data entry of all types of books, conference proceedings, theses, etc. Facility to create database in the regional languages, using respective scripts is also provided. This module allows the library staff to conduct comprehensive searches for existing items before cataloguing new items and has provision of import and export of records and retrospective conversion.

Functionally this module has been organized into following sub-modules as given in Figure 3.3.

- Cataloguing process
- Catalogue search
- User services
- Authority file maintenance
- Retrospective Conversion
- Reports

Figure 3.3



Catalogue Process function allows to pick-up the accessioned item, under process, for the cataloguing purpose. Here one can add remaining information as per specified standards, such as additional bibliographical information, subject headings, classification number, etc. Editing of existing records for maintaining consistency can also be done here.

Notes **Catalogue Search** enables search of the existing items, its status, identifying duplication etc., for the purpose of day-to-day cataloguing. This is similar to OPAC.

User Services sub module has three major functions *viz.*, generating current awareness list (by date, subject, etc), compiling of bibliographies with various combinations and alert services to individual users.

Authority File Maintenance includes creating, updating and using of major authority files for names such as publisher, languages, corporate bodies, meetings, authors, physical media, and types of material and also for subject descriptors. This is a unique feature added to this software taking into account the consistency that each library needs to maintain while creating records.

Retrospective Conversion has two major functions *viz.*, data entry of old collection with minimum information without going to first sub-module and import and export of data from and to external sources. By using this function libraries can download the matched records from INFLIBNET union catalogue or other sources and export the records for contributing to union catalogue, etc. A versatile ISO2709 interface developed at INFLIBNET, which is built-in to this module, enables to carry out the job.

Notes

Reports module allows generation of catalogue cards as per AACR-II, generation of recent editions reports subject and class number wise and other related reports. The catalogue module basically supports all major functions relating to technical processing and has been designed as per the international standards.

Task State the role of user services in Cataloguing module.

Self Assessment

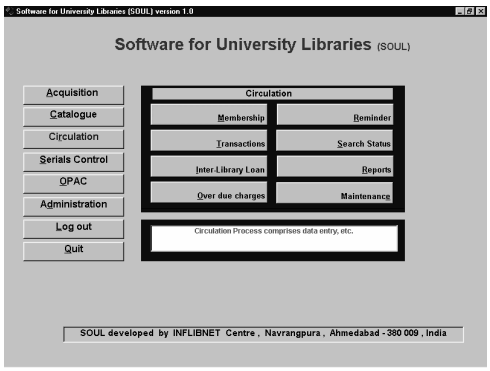
Fill in the blanks:

1. The SOUL is divided into ……. broad modules.
2. Acquisition module comprises ……. broad sub-modules.

3.3.3 Circulation Module

Circulation being vital front-end function of any library, sufficient care has been taken in designing this module to achieve transactions within minimum possible time. This module has provision for all possible function handled in a typical academic library, *i.e.* membership, issues, returns, ILL, reminders, over dues, reservations, recall, etc. All these functions have been organized into following eight logical sub-modules as given in Figure 3.4.

Figure 3.4



- Membership
- Inter-Library-Loan
- Reminder
- Reports
- Transactions
- Overdue collection
- Status Search
- Maintenance.

Membership sub-module provides the facility to create all types of member records, assigning unique membership code, borrowing privileges, renewal, issue of no-due certificates, master databases for codes, etc, searching the status of membership or an item, suspending the membership and generating related reports.

Transactions: Transactions mean handling all major functions such as issue, return, renewal, reservation, recall or reminder of an item, etc. This module also handles cancellation of reserved books, lost/missing books, searching the member status and searching catalogue, module etc. Transaction is based on Accession number and Member code. This module supports generating and readings of bar code labels. A unique facility in this module allows one to see simultaneously the details of members, items borrowed, dues, etc. while the transaction process is on. This enables issue counter staff as well end-user to know the exact status of the members borrowing.

Inter Library Loan allows lending of items to specified member library and also borrowing items from other libraries, issues, reminders, etc. This sub-module has been developed comprehensively to take care of all the details of user libraries, individuals and items loaned.

Notes

Over due collection facilitates are the collection of overdue charges in full or in part, providing receipts, keeping up-to-date accounting and tallying totals, etc. Using this function one can generate daily, weekly, monthly reports to find out as to how much overdue charges have been collected.

Reminder module handles individual and group reminder generation for all overdue materials. Comprehensive listing of materials that are overdue can also be generated within a specific period giving from and to dates.

Did u know? **Search status** enables the library circulation desk staff to check the status of a member or items borrowed by a user and overdue items.

Maintenance is yet another comprehensive sub-module, which covers binding, lost and cost recovery of books, damaged books, withdrawn books, etc.

Reports sub-module allows the generation of as many as 16 major reports and with many combinations. Above all this module is capable of handling large transactions. If various functions built in this module are effectively puts to use the library staff will save lot of time and help to avoid repetitive jobs.

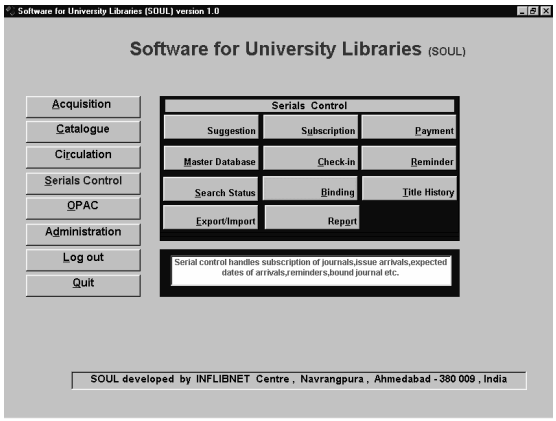
3.3.4. Serials Module

This module allows one to create an exclusive database for different serials. Handling serials is most complicated job for the library staff. This module has been designed to deal with all these complicated jobs quite effectively.

Notes Serials Module helps in keeping track of every title received in the library.

All functions starting from suggestions, master databases, subscriptions, checking, payment, reminder, binding title history export/import, etc., have been covered. For the convenience of users, these functions have been grouped under following logical sub-modules as given in Figure 3.5.

Figure 3.5



- Suggestions
- Payment
- Check-in
- Binding
- Title history
- Report generation
- Subscription
- Master Databases
- Reminders
- Status search
- Export/Import

Notes

Suggestion: sub-module enables one to record and keep a track of all the suggestions received for subscribing to serials. Selection of these titles for approval, preparing budget estimates and generation of related reports are covered under this sub-module.

Subscription module takes care of ordering/renewal of serials, follow-up relating to the same, sending reminder, if invoices are not received, generating orders by supplier or publisher are included under this option.

Payment function supports processing and recording of all details relating to each invoice, including supplementary invoice such as invoice processing, credit notes processing, reports generation, etc.

Master databases option allows creation of large number of frequently used master databases *viz*., title entry, language, class number, publisher, binder, country, department, currency, frequency, budget heads, binding type, delivery modes, reports, etc. Of these, title entry is an important one. It is here that the creation of database for each title with bibliographic information begins in the serial module.

Check-in is crucial function to record the receipt of each issue of serial and its accompanying material. To enable one to record the issues, system has a facility to generate schedule in advance for each title by providing necessary inputs *viz*., Vol. no(s), Issue no(s), frequency, date of publication of first issue, mode of delivery, total number of issues, etc.

Sending reminders for non-receipt of issues or issues that are overdue, etc., for single or all titles by supplier, publisher, etc., can be done using this sub-module.

Binding supports making sets, generating order, payments, accessioning bound volumes, etc.

Status search option facilitates one to find out the status of every thing starting from subscription to check-in of issues.

Title history is provided to keep record of ceased, suspended, discontinued titles and also title change, splits, mergers along with holdings information for each and every title in the database.

Export/Import of data in ISO2709 format is also provided to enable library to transfer the existing records in to SOUL and also contribute data to INFLIBNET union database.

Reports are a comprehensive function, which has more than 15 built-in reports of all types with different combinations. This adds to the strength of serial module. Serial module is designed to handle large number of titles, with many options giving maximum flexibility to user libraries.

Task State the role of serials module in library.

3.3.5 Online Public Access Catalogue Module (OPAC)

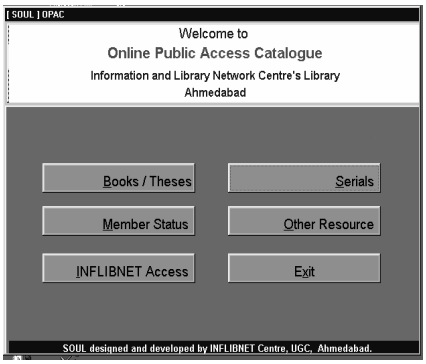
One of the major attractions of SOUL is that it has a powerful Online Public Access Catalogue as given in figure 3.6 with a choice of search options and variety of display formats. OPAC is a dynamic information desk that allows library staff to post library calendar, library rules and regulations, announcements, or any other information of user interest. SOUL increases the functionality of library's OPAC terminals by allowing the users to access the internal as well as external resources. This enables the users to access various databases developed at INFLIBNET. Library can keep entire collection available at users' fingertips. This powerful, yet easy-to-use and user friendly searching tool allows user to quickly find the materials in the library. Some of the major features of OPAC are:

- SOUL includes Boolean operation when more than one search option is to be used.
- Search results can be sorted according to the preference of search item.
- User has option to select variety of display formats.
- Display of records are according to AACR-II format.
- Easy and quick to search with options.
- Status of each book starting from acquisition module is reflected.

Notes

- Search key fields, such as, author, title, keywords, class number, accession number, etc
- Accessible through the GUI-based web browsers like Netscape Communicator, Internet Explorer, etc.
- User can see the status of currently borrowed items by entering his/her borrower number.
- Search results can be saved and printed.
- Selection of databases can be made according to the choice of users.

Figure 3.6



3.3.6 Administration Module

Administration module as given in Figure 3.6 has been to authorize users, *i.e.*, the library staff to use various modules. Assigning login and password to use each module of the system is done by the system administrator. The security function, backups, recovery of data and other utility functions are some of the features added under this module. Users have been categorized into three levels looking into nature of functions handled by the staff at different levels.

Self Assessment

Multiple choice questions:

3. Title history and Report generation are submodules of ..... .
   (*a*) Administration Module (*b*) Serials Module
   (*c*) Circulation Module (*d*) Cataloguing Module
4. ..... is crucial function to record the receipt of each issue of serials and its accompanying materials.
   (*a*) Payment (*b*) Binding (*c*) Reports (*d*) Check-in

3.4 Winisis

CDS/ISIS is a software package for generalized Information Storage and Retrieval systems developed, maintained and disseminated by UNESCO.

Did u know? CDS/ISIS was first released in 1985 and since then over 20,000 licenses have been issued by UNESCO and a worldwide network of distributors.

It is particularly suited to bibliographical applications and is used for the catalogues of many small and medium-sized libraries. Versions have been produced in Arabic, Chinese, English, French, German, Portuguese, Russian and Spanish amongst other languages. UNESCO makes the software available free for non-commercial purposes, though distributors are allowed to charge for their expenses.

Notes

CDS/ISIS is an acronym which stands for Computerized Documentation Service/Integrated Set of Information Systems. In 2003, it was stated that "This package is accepted by libraries in the developing countries as standard software for information system development".

The original CDS/ISIS ran on an IBM mainframe and was designed in the mid 1970s under Mr Giampaolo Del Bigio for UNESCO's Computerized Documentation System (CDS). It was based on the internal ISIS (Integrated Set of Information Systems) at the International Labour Organization in Geneva.

In 1985, a version was produced for mini and micro-computers programmed in Pascal. It ran on an IBM PC under MS-DOS. Winisis, the Windows version, first demonstrated in 1995, may run on a single computer or in a local area network. A JavaISIS client/server component was designed in 2000, allowing remote database management over the Internet from Windows, Linux and Macintosh computers. Furthermore, GenISIS allows the user to produce HTML Web forms for CDS/ISIS database searching. The ISIS_DLL provides an API for developing CDS/ISIS based applications. The OpenIsis library, developed independently from 2002 to 2004, provided another API for developing CDS/ISIS-like applications.

The most recent effort towards a completely renewed FOSS, UNICODE implementation of CDS/ISIS is the J-Isis project, developed by UNESCO since 2005 and currently maintained by Mr. Jean Claude Dauphin.

CDS/ISIS is menu-driven generalized information to rage and Retrieval system designed specifically for the computerized management of structured non-numerical databases. One of the major advantages offered by the generalized design of the system is that CDS\ISIS is able to manipulate an unlimited number of databases each of which may consist of completely different data elements. Although some features of CDS/ISIS require some knowledge of and experience with computerized information systems, once an application has been designed the system may be used by persons having had little or no prior computer experience. For advanced users having access to computer professionals, CDS/ISIS offers an integrated programming facility allowing the development of specialized applications and/or the functional extension of the software as originally provided. It has the largest installed base of about 1390 installations and is a PC version available on a number of platforms like Windows 95, Windows NT, DOS, Claris etc. It has a number of fields, records, alternate scripts, multimedia capability, and Web interface. Many specialized application products have been developed around CDS\ISIS (Sanjay and Trishna library software packages, for example). Besides in libraries, the package can be equally used to create databases. An ideal software package for small and medium-size libraries, it was distributed free of charge initially; now it is priced at ₹ 15001. The package performs a variety of operations related to information storage and retrieval with powerful search capabilities and flexible database management. It allows interlinking records from more than one database, use of more than one data sheet, and conforms to 180-2709. The major functions provided by CDS\ISIS allow you to: Define databases containing the required data elements Enter new records into a given database Modify, correct or delete existing records Automatically build and maintain fast access files for each database in order to maximize retrieval speed Retrieve records by their contents, through a sophisticated search language Display the records or portions thereof according to your requirements Sort the records in any sequence desired Print partial or full catalogues and/or indexes Develop specialized applications using the CDS\ISIS integrated programming facility. **Database Menu:** The bottom part of the menu normally contains the list of the most recently opened databases. You may open any one of them by simply clicking on the corresponding entry. It also allows you to import data from external files recorded according to the 180-2709 standard format for information interchange and also to extract a database or a portion thereof normally for transmitting it to other users. You may also use this command to perform some reformatting of the records of a database and then use the import function to store the reformatted data into the original or a different database. It also allows you to print the output of a given query and/or to print a selected range of records.

Browse Menu: It allows the whole database to be browsed or edited independently from any search performed; displays the list of searches performed so far, from which you may select the one desired. It also facilitates in displaying the record (according to the currently selected format) or displaying either the current format or the current record in ASCII.xt format.

Notes

Configure Menu: This allows you to change the language in which menus, windows, prompts and system messages will be displayed. When you select this, a list of available languages is displayed from which you may select the one desired. Once selected, a language remains in effect until you change it again. It allows display of the current parameter settings.

Utilities Menu: This allows you to add or delete a field with specified contents to a range of Master file records. It also allows adding or deleting or replacing a field with specified contents to all the records retrieved by a given search. Windows Menu: It arranges windows so that they overlap, starting in the upper-left corner of the main CDS/ISIS window. Help Menu provides helps In troubleshooting while working with the software.

Windows Version (WINISIS): The Windows version (compatible with Windows 3.1x, 95, 98, Me, NT4 and Win 2000), version 1.4 was released in January 2001 has been totally re-written in C++ language (as against Pascal in DOS and Unix versions). This move provides a common standardized language for all platforms - DOS, Windows, Unix etc. This reduces maintenance costs, increases portability, and renders implementation of client-server architecture easy. No conversion is needed when moving from CDS/ISIS DOS to CDS\ISIS for Windows. Same database and inverted files of DOS can be used here. Some changes in formatting language and displays however occur (Vyasamurthy, 2001). It includes all the features of the MS-DOS version except some database utilities such as the database re- initialization. It is designed for current MS-DOS users who wish to migrate to the Windows environment, as well as for new users

The ISIS for Windows (WINISIS) plays an important role for automation of library operations in developing countries like India because of its easy-to-use features, convenient availability, negligible cost of implementation, continuous development and support from UNESCO, and a large user community. Recent developments in WINISIS, such as web-enabled interface, tools for data conversions into bibliographic standards and handling of digital documents, have made it a potential tool for development and management of digital libraries.

Due to fast expansion of higher education in India in the recent years, a large number of new and established institutions are embarking upon implementation of ICT for provision of library and information services. There is also increasing interest among information professionals to use open source information processing tools, such as WINISIS, Greenstone, DSpace, EPrint, etc. However, limited training opportunities in non-metropolis are an impediment to the spread of these tools. About 30 informational professionals and 5 trainers were trained during the workshop at Thapar University, which attempted to fulfill this need of library and information community.

The objective of the workshop was to equip existing and potential users of WINISIS with skills in the advanced features of the software, such as hyper-linking, web interfacing, full text document processing and exchange of data.

The format of the workshop was designed to offer a flexible learning environment that included lecture demonstration, group activities, visits/access to library databases for live demonstration and extensive practical training. WINISIS and other supporting products were distributed to the participants.

Self Assessment

State whether the following statements are true or false:

5. Winisis, the window version first demonstrated in 1995, may run on a single computer or in a local area network.
6. Browse menu is the bottom part of the menu normally contains the list of the most recently opened databases.

3.5 Summary

- The SOUL is state-of-the-art library automation software designed and developed by the INFLIBNET.
- Catalogue Process function allows to pick-up the accessioned item, under process, for the cataloguing purpose.

Notes

- Transactions mean handling all major functions such as issue, return, renewal, reservation, recall or reminder of an item, etc.
- This module allows one to create an exclusive database for different serials.
- Check-in is crucial function to record the receipt of each issue of serial and its accompanying material.
- Reports are a comprehensive function, which has more than 15 built-in reports of all types with different combinations.

3.6 Keywords

SOUL	: State of art library software designed and developed by INFLIBNET.
IIL	: Interlibrary loan is a service whereby a user of one library can borrow books or receive photocopies of documents that are owned by another library.
OPAC	: Online public Access catalogue is an online data base of materials held by a library or group of libraries.
Retrospective conversion	: Retrospective conversion is the process by which existing hard-copy catalogues and lists, whether on paper or cards are converted into machine readable form.

3.7 Review Questions

1. Write a note on SOUL. Discuss the minimum hardware and software required for SOUL.
2. Describe the features and modules of SOUL.
3. Briefly discuss about WINISIS.
4. Define administration module.

Answers : Self Assessment

1. Six	2. Six	3. (b)
4. (d)	5. True	6. False

3.8 Further Readings

Books

Harris, Michael H. *History of Libraries in the Western World*. 4th ed. Lanham, Maryland: Scarecrow, 1995. 3 - *The distinction between a library and an archive is relatively modern*.

Cossette, Andre Humanism and Libraries: *An Essay on the Philosophy of Librarianship*. Duluth, MN: Library Juice Press, 2009. Print.

Martin Schrettinger (1803): Versuch eines volltsändigen Lehrbuches der Bibliothek-Wissenschaft. Munich.

Online links

http://www.inflibnet.ac.in/soul/about.htm

http://portal.unesco.org/ci/en/ev.php-URL_ID=14760&URL_DO

Notes

Unit 4: Database

CONTENTS

Objectives
Introduction
4.1 Concept of Database
4.2 Evolution of Database and DBMS Technology
4.3 General-Purpose of DBMS
4.4 Database Approach
4.5 Summary
4.6 Keywords
4.7 Review Questions
4.8 Further Readings

Objectives

After studying this unit, you will be able to:

- Discuss the concept of database
- Describe about the evolution of database and DBMS technology
- Explain the general-purpose DBMS.

Introduction

A **database** is an organized collection of data for one or more purposes, usually in digital form. The data are typically organized to model relevant aspects of reality (for example, the availability of rooms in hotels), in a way that supports processes requiring this information (for example, finding a hotel with vacancies).

Notes The term "database" refers to logical and physical materialization of its data, content, in files, computer memory, and computer data storage.

This definition is very general, and is independent of the technology used. However, not every collection of data is a database; the term database implies that the data is managed to some level of quality (measured in terms of accuracy, availability, usability, and resilience) and this in turn often implies the use of a general-purpose Database management system (DBMS). A general-purpose DBMS is typically a complex software system that meets many usage requirements, and the databases that it maintains are often large and complex.

The term database is correctly applied to the data and data structures, and not to the DBMS which is a software system used to manage the data. The structure of a database is generally too complex to be handled without its DBMS, and any attempt to do otherwise is very likely to result in database corruption. DBMSs are packaged as computer software products. Well-known products include the Oracle DBMS, Access and SQL Server from Microsoft, DB2 from IBM and the Open source DBMS MySQL. Each such DBMS product currently supports many thousands of databases all over the world. The stored data in a database is not generally portable across different DBMS, but can inter-operate to some degree (while each DBMS type controls a database of its own database type) using standards like SQL and ODBC. A successful general-purpose of DBMS is designed in such a way that it can satisfy as many different applications and application designers as possible. A DBMS also needs

Notes

to provide effective run-time execution to properly support (*e.g.*, in terms of performance, availability, and security) as many end-users (the database's application users) as needed. Sometimes, the combination of a database and its respective DBMS is referred to as a Database system (DBS).

A database is typically organized according to general Data models that have been evolved since the late 1960s. Notable data modules are the Relational model (all the DBMS types listed above support databases-based on this model), the Entity-relationship model (ERM; primarily utilized to design databases), and the Object model (which has more expressive power than the relational, but is more complicated and less commonly used). Some recent database products use XML as their data model. A single database may be viewed for convenience within different data models that are mapped between each other (*e.g.*, mapping between ERM and RM is very common in the database design process, and supported by many database design tools, often within the DBMS itself). Many DBMSs support one data model only, externalized to database developers, but some allow different data models to be used and combined.

The design and maintenance of a complex database requires special skills: the staff performing this function are referred to as database application programmers (different from the DBMS developers/programmers) and database administrators, and their task is supported by tools provided either as part of the DBMS or as free-standing (stand-alone) software products. These tools include specialized Database languages including Data Description Languages, Data Manipulation Languages, and Query Languages. These can be seen as special-purpose programming languages, tailored specifically to manipulate databases; sometimes they are provided as extensions of existing programming languages, with added special database commands. Database languages are generally specific to one data model, and in many cases they are specific to one DBMS type. The most widely supported standard database language is SQL, which has been developed for the relational model and combines the roles of Data Description Language, Data manipulation language, and a Query language.

A way to classify databases involves the type of their contents, for example: bibliographic, document-text, statistical, multimedia objects, etc. Another way is by their application area, for example: Accounting, Music compositions, Banking, Manufacturing, Insurance, etc.

The explanation is carried out by demonstrating examples of various database types, describing the motivation for developing the database concept since the 1960s, outlining major requirements that databases typically need to meet, and then major functional topics of databases. Database management systems (DBMSs), is briefly described how needed database requirements are met by contemporary technology.

Task Write a short note on Database.

4.1 Concept of Database

The database concept has evolved since 1960s to ease increasing difficulties in designing, building, and maintaining complex information systems (typically with many concurrent end-users, and with a diverse large amount of data. It has evolved together with the evolvement of Database management systems (DBMSs) which enable the effective handling of databases. The terms database and DBMS define different entities, and they are inseparable: A database's properties are determined by its supporting DBMS and vice-versa.

With the progress in technology in the areas of processors, computer memory, computer storage and computer networks, the sizes, capabilities, and performance of databases and their respective DBMSs have grown in orders of magnitudes. For decades it has been unlikely that a complex information system can be built effectively without a proper database supported by a DBMS.

Notes

No widely accepted exact definition exists for DBMS. However, a system needs to provide considerable functionality to qualify as a DBMS. Data collection needs to meet respective usability requirements (broadly defined by the requirements below) to qualify as a database.

Did u know? The Oxford English dictionary cites a 1962 technical report as the first to use the term "database."

Self Assessment

Fill in the blanks:

1. An organized collection of data for one or more purposes, usually in digital form is called ..... .
2. SQL stands for ..... .

4.2 Evolution of Database and DBMS Technology

The introduction of the term database coincided with the availability of directaccess storage (disks and drums) from the mid-1960s onwards. The term represented a contrast with the tape-based systems of the past, allowing shared interactive use rather than daily batch processing.

In the earliest database systems, efficiency was perhaps the primary concern, but it was already recognized that there were other important objectives. One of the key aims was to make the data independent of the logic of application programmes, so that the same data could be made available to different applications.

The first generation of database systems were navigational and pointers from one record to another. The two main data models at this time were the hierarchic model, epitomized by IBM's IMS system and the Codasyl model (Network model, implemented in a number of products such as IDMS.

The Relational model was first proposed in 1970. Later it was insisted that applications should search for data by content, rather than by following links. This was considered necessary to allow the content of the database to evolve without constant rewriting of applications. Relational systems placed heavy demands on processing resources, and it was not until the mid 1980s that computing hardware became powerful enough to allow them to be widely deployed. By the early 1990s, however, relational systems were dominant for all large-scale data processing applications, and they remain dominant today (2011) except in niche areas. The dominant database language is the standard SQL for the Relational model, which has influenced database languages also for other data models.

As the relational model emphasizes search rather than navigation, it does not make relationships between different entities explicit in the form of pointers, but it represents using primary keys and foreign keys. While this is a good basis for a query language, it is less well suited as a modeling language. For this reason a different model, the Entity-relationship model which emerged shortly later (1976), gained popularity for database design.

During 1970s, database technology has kept pace with the increasing resources becoming available from the computing platform: notably the rapid increase in the capacity and speed (and reduction in price) of disk storage, and the increasing capacity of main memory.

Notes The rigidity of the relational model has a limitation in handling information that is richer or more varied in structure than the traditional 'ledger-book' data of corporate information systems.

Notes

for example, document databases, engineering databases, multimedia databases, or databases used in the molecular sciences. Various attempts have been made to address this problem, many of them gathering under banners such as post-relational or NoSQL. Two developments of note are the Object database and the XML database. The vendors of relational databases have fought off competition from these newer models by extending the capabilities of their own products to support a wider variety of data types.

4.3 General-Purpose of DBMS

A DBMS has evolved into a complex software system and its development typically requires thousands of person-years of development effort. Some general-purpose of DBMSs, like Oracle, Microsoft SQL server, and IBM DB2, have been in on-going development and enhancement for thirty years or more. General-purpose of DBMSs aim is to satisfy as many applications as possible, which typically make them even more complex than special-purpose databases. However, the fact that they can be used "off the shelf", as well as their amortized cost over many applications and instances, make them an attractive alternative (Vs. one-time development) whenever they meet an application's requirements.

Though, attractive in many cases, a general-purpose DBMS is not always the optimal solution: When certain applications are pervasive with many operating instances, each with many users, a general-purpose DBMS may introduce unnecessary overhead and too large "foot print" (too large amount of unnecessary, unutilized software code). Such applications usually justify dedicated development. Typical examples are e-mail systems, though they need to possess certain DBMS properties: e-mail systems are built in a way that optimizes e-mail messages handling and managing, and do not need significant portions of a general-purpose DBMS functionality.

People Involved

Three types of people are involved with a general-purpose DBMS:

1. **DBMS developers -** These are the people that design and build the DBMS product, and the only ones that touch its code. They are typically the employees of a DBMS vendor (*e.g.*, Oracle, IBM, Microsoft, or volunteers or supported by interested companies or organizations in the case of Open source DBMSs (*e.g.*, MySQL). They are typically skilled system programmers. DBMS development is a complicated task, and some of the popular DBMSs have been under development and enhancement (also to follow progress in technology) for decades.
2. **Application developers and Database administrators -** These are the people who design and build an application which is used in the DBMS. Another group of members design the needed database and maintain it. The first group members write the needed application programmes which the application comprises. Both are well familiar with the DBMS product and use its user interfaces (as well as usually other tools) for their work. Sometimes the application itself is packaged and sold as a separate product, which may include the DBMS inside (subject to proper DBMS licensing), or sold separately as an add-on to the DBMS.
3. **Application's end-users** (*e.g.*, accountants, insurance people, medical doctors, etc.) - These people know the application and its end-user interfaces, but he need not know and to understand the underlying DBMS. Thus the intended and main beneficiaries of a DBMS, are only indirectly involved with it.

Task What does DBMS developers do in DBMS?

Notes

Self Assessment

Multiple choice questions:

3. DBMS stands for:
   (*a*) Database Management system
   (*b*) Digital Mapping system
   (*c*) Data Borrowing and Movement Software.
   (*d*) Database Manipulation Software.
4. Three types of people are involved with a general-purpose.....
   (*a*) Microsoft's SQL server (*b*) Microsoft's Access
   (*c*) DBMS (*d*) Oracle corporation's oracle.

4.4 Database Approach

Traditionally, data accessed through computers has been stored on different storage media in the form of individual files. Files proved to be quite satisfactory so long as computerisation was limited to a few application areas and use of computers is restricted. However, as the actual users grew in number, with the advent of online sharing systems, the file systems gave rise to many serious problems. The discipline of database systems evolved in response to these problems.

It may be emphasised that the database approach is more than merely a different computer technique involving the storage of data and the use of additional generalised software. It involves a new approach to designing and operating information systems throughout the enterprise and can have far reaching effects beyond the data processing department. Stated differently, database approach regards data as a resource to be managed along with more generally recognised resources of an organisation (such as staff, finance, equipment and premises) so as to be available to a variety of applications and users. The integrated database is intended to provide a consistent view of the institution's/enterprise's data for all user departments. Although, each department has responsibility for specific data, several departments using the same type of data can operate on the same data values. In other words, a parochial view of data would be discouraged and the uncoordinated exchange of information among departments would not be necessary. Instead, all basic data would be input to the database by each department responsible for it and retrieved (possibly in summarised form) by those departments needing access to it.

The database approach is not dependent on any particular structure of data; many of these concepts can be applied to files as well. The database approach cannot be practically implemented in the absence of a computer. In many respects database approach is characterised by the word efficiency. In principle, one can do any thing with non-database systems as with database systems. In practice, the cost of doing certain things without the benefit of the database approach is so prohibitive that the possibility is dismissed. The two main contributors to prohibitive cost are the data redundancy and the uncontrolled searching time. The database approach is beneficial when online access to data is provided. With online access, the collection of data and extracting of timely reports becomes fairly straightforward as the restrictions or delays of batch processing are not imposed on the user. However, it may be emphasised that the database approach is rooted in the attitude of: sharing valued data resources; releasing control of those resources to a common responsible authority.

Database Definition

The major problem one faces in the study of database technology relates to the determination as to what precisely constitutes a database. The casual use of the term database tends to refer to any organised collection of data capable of being accessed by a computer. This could be applied to a couple of reels of magnetic tape or a few boxes of punched cards (obsolete now) or a collection of floppies containing data. As such, this interpretation does not constitute a precise definition for the concept.

Notes

The literature published on the subject of databases in the field of library and information science tends to focus on the use of online search services and searching techniques. There is not much clearly identifiable literature on the creation and management of textual databases covering the procedural aspects of building and managing information packages consisting largely bibliographic information. This section outlines the concept of database, issues related to its need and its composition.

Different Approaches to Database

In the literature of computer science, one encounters a number of definitions for the term database. Let us examine some of the definitions so as to understand different approaches to this concept.

(*i*) "A collection of data on a defined range of subjects together with all the information needed to access that data".

(*ii*) "A named collection of units of physical data which are related to each other in a specific manner".

(*iii*) "*A* generalised, common integrated collection of (company or installation owned) data which fulfils the data requirements of all applications which exist in an enterprise".

(*iv*) "The term database refers to just the information file. Database software is the set of programs whose function is to manage the data and programs that operate on it. The database system is the entire hierarchy of elements, files and application programs that result in efficient management of information".

(*v*) "*A* database is a collection of data organised in a manner which allows retrieval and uses that data by anyone needing it. A database is organised and designed to allow a large number of users to draw information from it for many purposes in many different formats".

(*vi*) "In its most basic form, a database consists of a number of data elements, each of which is a unit of data that is complete in itself. A part number for example, is a typical data element. These elements are organised into logically related groups called data structures. The data files in database system are organised in a fashion that permits their use in several applications rather than a single application. Thus, in a database system the focus shiftsfrom a particular application and its specific input and output needs to a more general requirement for the data files to serve a number of applications'.

It may be noted that each of the above definitions regards the 'database' from a different view point, its access, purpose, description, contents and integration. Yet, each refers to a specific collection of organised data rather than any data on computer-readable media. The last mentioned definition is a comprehensive one, which clearly explains the concept of a database and also brings out the essential difference between a database and a traditional computer file. This definition also refers to a database system. It is important to distinguish the term database from the term database system, all the components of which cooperate to collect, manipulate, manage and deliver information.

Database Features

One of the main purposes of a database is that the data in the database should be used for a variety of different applications. To achieve this it is important for a database to possess the following features:

- it must be substantially non-redundant (that is to say that the database should not have duplication of data) because duplication of data leads to difficulty in ensuring data consistency, and results in the wastage of storage space:
- it must be program-independent so that the data can be moved or restructured without the need to make alterations to programs. This concept is known as 'data independence';
- it must be capable of being used by all programs;

Notes

- it must include all necessary data relationships, to support the variety of different uses to which data is put;
- it must have common approach to retrieval, additions and deletions and amendments to data.

Notes A database can be analysed from two viewpoints: The physical storage of the data or logical or conceptual view of data.

Files are used to physically store data in a database. Most databases use either direct files or indexed files or a combination of the both to physically store data on disk. Users and applications do not need to know anything about the physical data storage. Stored with actual data will be a description of the database, which enables the DBMS to retrieve information from the database and to store new data in appropriate places in the database establishing relationships with other data if relevant.

The logical or conceptual database is concerned with how the data is logically organised and how the data can be retrieved for information purposes. In case access is required to a series of linked files, it is necessary to have guidelines regarding allocation of data to specific files within the database system, and defining the optimum links between files. Based on the model followed for the structuring of data there are three basic types of databases and the associated DBMS namely: hierarchical, network and relational.

Hierarchical databases are structured in such a way that the relationships between data items follow a branching tree-type arrangement. In other words, the database consists of elements, which act, in a parent-child relationship. The relationships within the database are established when the database is created, that is to say that the database designer defines which is a child element of the parent element. An element within a database can have only one parent element. The data stored in the lower levels of a hierarchy database can only be accessed through the parent element.

The network database approach is based on explicit links or pointers between related entities. In a network model of database, there is more direct link between the data items at various levels. This is achieved by the use of pointers linking data at different levels. This approach requires a large number of links established between data elements, which occupy a large amount of storage space.

Relational databases use a type of data structure, which has been commonly adopted in database systems. In relational database systems, information is held in a set of relations or in the form of tables. Rows in such tables correspond to records while columns in these tables are equivalent to fields. The data items in various relations are linked through a series of keys. Relational databases are designed using a technique known as 'normalisation'. 'Normalisation' is used to break data into tables so that the fields in each table are dependent only on one key field and not linked to any other key. This process ensures that insertions, deletions and amendments may be made on to the data without any difficulty.

In addition to the above-discussed types of databases, other types of database structures such as multimedia databases and object oriented databases are also in existence. Multimedia structures are used to manage such databases, which deal with pictures, animation, sound and text as well as tables. The storage needs of these materials are certainly different from the types discussed earlier.

The Multi Media DBMS (MM-DBMS) attempts to use a range of technologies like relational technology for tables, image storage devices for graphics and animation, and provide facilities to the users.

Types of Databases

There are many ways of categorising databases. One of the categorisations might be a numerical and textual database. Another way of looking at them is by their coverage *i.e.,* local, regional and global. Databases are generally stored on magnetic or optical media such as disks and accessed

Notes

either locally or remotely. They may include access to a particular organisation's database covering transactions and financial records, or to other databases that might be accessed remotely. Some of these databases may hold publicly accessible information such as abstracting and indexing databases, full texts of reports or directories, etc., on the other hand, their might be databases which are shared within an organisation or group of organisations.

Did u know? Databases available to information users in the public domain and which might be accessed remotely or online via some online search services, or locally on CD-ROM, can be categorised as Reference or Source databases.

Reference databases direct the user to another source where the information sought by the user is available. This might be a document, an organisation or an individual. Some of the examples include: bibliographic databases, catalogue databases and referral databases. Let us try to know what these categories of databases are.

Catalogue Databases

These types of databases indicate the collection of a given library or a group of libraries Constituting a library network. These databases list the type of collection, namely, monographs, journal titles and other items possessed by the library. They merely provide citations to the documents along with their call numbers to enable easy location of the documents.

Referral Databases

This type of databases offers references to information or data such as names and addresses of organisations, and other directory type of data.

It may be mentioned here that source databases contain the original source data, and are considered as one type of electronic document. After successful consultation of a source database, the user should have the information that is required by him and should not need to seek information in another original source. Source databases may be categorised into:

- numeric databases, which contain numerical data of different types such as statistics and survey data;
- full text databases of news paper items, technical specifications and computer software;
- hybrid databases which contain a mixture of textual and numeric data;
- multi-media databases, which include information stored in a mixture of different types of media including sound, video, pictures, text and animation.

Bibliographic Databases

These types of databases contain citations or bibliographic references sometimes along with brief abstracts of literature. They indicate to the user the content of the full text, the source where it can be located (*e.g.,* journal title**,** conference proceedings) and whether they contain mere citations or provide abstracts or summaries of the original documents covered.

Bibliographic databases, contain a series of bibliographic records, with each record containing some combination of the under mentioned components:

- document number
- author
- title
- source reference

Notes

- abstracts
- full text
- indexing terms or keywords or phrases
- citations including the total number of references
- language of the document
- call number or location

Each of these items is known as a data element and is represented by a field. There are different bibliographic record formats and there is considerable variation between them. It may be mentioned here that the components listed above do not generally (except in case of those containing abstracts) give information of the text of the document but only indicate where the information might be found. Of course, a good informative abstract, if provided for each reference may furnish valuable information to the user and enhance the utility of the database.

Database Architechture

The architecture of a database is commonly viewed in terms of three separate levels of description: conceptual, external and internal.

The overall logical description of the entire database is the conceptual level. This overall description is commonly known as a schema. It may also be called a community user view. Subsets of the schema that contain only the data needed for particular applications may be defined. These are called sub-schemas or user views. The sub-schemas provide a description at the external level. The description of physical storage structures used to store database on a specific computer system is the internal description.

Explained in simple language, it might be stated that a database can be analysed from two viewpoints—the physical storage of the data and the logical or conceptual view of data. Files are used to physically store data in a database. Most databases use either direct files or indexed files or a combination of the two to physically store data on a disk.

The logical or conceptual view of a database is concerned with how data is logically organised and how data can be retrieved for information purposes. There are three different methods (architectures) of logically organising data in a database. They are hierarchy model, network model and relational model.

Advantages of Database Systems

The Database Systems provide the following advantages over the traditional file system

1. *Controlled redundancy:* In a traditional file system, each application program has its own data, which causes duplication of common data items in more than one file. This duplication/redundancy requires multiple updations for a single transaction and wastes a lot of storage space. We cannot eliminate all redundancy due to technical reasons. But in a database, this duplication can be carefully controlled, that means the database system is aware of the redundancy and it assumes the responsibility for propagating updates.
2. *Data consistency:* The problem of updating multiple files in traditional file system leads to inaccurate data as different files may contain different information of the same data item at a given point of time. This causes incorrect or contradictory information to its users. In database systems, this problem of inconsistent data is automatically solved by controlling the redundancy.
3. *Program data independence:* The traditional file systems are generally data dependent, which implies that the data organization and access strategies are dictated by the needs of the specific application and the application programs are developed accordingly- However, the database systems provide an independence between the file system and application program, that allows for changes at one level of the data without affecting others. This property of database systems allow to change data without changing the application programs that process the data.

Notes

4. *Sharing of data:* In database systems, the data is centrally controlled and can be shared by all authorized users. The sharing of data means not only the existing applications programs can also share the data in the database but new application programs can be developed to operate on the existing data. Furthermore, the requirements of the new application programs may be satisfied 'without creating any new file.
5. *Enforcement of standards:* In database systems, data being stored at one central place, standards can easily be enforced, by the DBA. This ensures standardised data formats to facilitate data transfers between systems. Applicable standards might include any or all of the following—departmental, installation, organizational, industry, corporate, national or international.
6. *Improved data integrity:* Data integrity means that the data contained in the database is both accurate and consistent. The centralized control property allow adequate checks can be incorporated to provide data integrity. One integrity check that should be incorporated in the database is to ensure that if there is a reference to certain object, that object must exist.
7. *Improved security:* Database security means protecting the data contained in the database from unauthorised users. The DBA ensures that proper access procedures are followed, including proper authentical schemes for access to the DBMS and additional checks before permitting access to sensitive data. The level of security could be different for various types of data and operations.
8. *Data access is efficient:* The database system utilizes different sophisticated techniques to access the stored data very efficiently.
9. *Conflicting requirements can be balanced:* The DBA resolves the conflicting requirements of various users and applications by knowing the overall requirements of the organization. The DBA can structure the .system to provide an overall service that is best for the organization.
10. *Improved backup and recovery facility:* Through its backup and recovery subsystem, the database system provides the facilities for recovering from hardware or software failures. The recovery subsystem of the database system ensures that the database is restored to the state it was in before the program started executing, in case of system crash.
11. *Minimal program maintenance:* In a traditional file system, the application programs with the description of data and the logic for accessing the data are built individually. Thus, changes to the data formats or access methods results in the need to modify the application programs. Therefore, high maintenance effort are required. These are reduced to minimal in database systems due to independence of data and application programs.
12. *Data quality is high:* The quality of data in database systems are very high as compared to traditional file systems. This is possible due to the presence of tools and processes in the database system.
13. *Good data accessibility and responsiveness:* The database systems provide query languages or report writers that allow the users to ask ad hoc queries to obtain the needed information immediately, without the requirement to write application programs (as in case of file system), that access the information from the database. This is possible due to integration in database systems.
14. *Concurrency control:* The database systems are designed to manage simultaneous (concurrent) access of the database by many users. They also prevents any loss of information or loss of integrity due to these concurrent accesses.
15. *Economical to scale:* In database systems, the operational data of an organization is stored in a central database. The application programs that work on this data can be built with very less cost as compared to traditional file system. This reduces overall costs of operation and management of the database that leads to an economical scaling.
16. *Increased programmer productivity:* The database system provides many standard functions that the programmer would generally have to write in file system, The availability of these functions allow the programmers to concentrate on the specific functionality required by the users without worrying about the implementation details. This increases the overall productivity of the programmer and also reduces the development time and cost.

Notes

Disadvantages of Database Systems

In contrast to many advantages of the database systems, there are some disadvantages as well. The disadvantages of a database system are as follows:

1. *Complexity increases:* The data structure may become more complex because of the centralised database supporting many applications in an organization. This may lead to difficulties in its management and may require professionals for management.
2. *Requirement of more disk space:* The wide functionality and more complexity increase the size of DBMS. Thus, it requires much more space to store and run than the traditional file system.
3. *Additional cost of hardware:* The cost of database system's installation is much more. It depends on environment and functionality, size of the hardware and maintenance costs of hardware.
4. *Cost of conversion:* The cost of conversion from old file-system to new database system is very high. In some cases the cost of conversion is so high that the cost of DBMS and extra hardware becomes insignificant. It also includes the cost of training manpower and hiring the specialized manpower to convert and run the system.
5. *Need of additional and specialized manpower:* Any organization having database systems, need to be hire and train its manpower on regular basis to design and implement databases and to provide database administration services.
6. *Need for backup and recovery:* For a database system to be accurate and available all times, a procedure is required to be developed and used for providing backup copies to all its users when damage occurs.
7. *Organizational conflict:* A centralised and shared database system-requires a consensus on data definitions and ownership as well as responsibilities for accurate data maintenance.
8. *More installational and management cost:* The big and complete database systems are more costly. They require trained manpower to operate the system and has additional annual maintenance and support costs.

Databases

A user seeks information to satisfy his or her information need which may be available in varieties of documents stored a library/information centre. Library catalogues (both card catalogue and OPAC) and other bibliographic databases act as an interface between users and their documents of interest. Users approach to the documents, that can satisfy his/her information need, can be categorised into two groups [Bhattacharya, 1979]-Known document approach and Unknown document approach. In the first, case, user can specify a document by using the name(s) of its author(s), or collaborator(s), or series, or by its title. When the query for the document is formulated by using the name-of-subject contained in it, the approach is termed as unknown document approach. The treatment of a document as unknown document in catalogues or bibliographic databases requires subject description and bibliographic description. Similarly, the treatment of a document to satisfy known document approach calls for bibliographic description and headings or access points derived from bibliographic description. Bibliographic description is the process of recording details for describing and identifying bibliographic items. The process of bibliographic description requires standardisation, for making bibliographic file to be consistent. The development of national, international and regional systems for the exchange of machine readable bibliographic information will not be possible unless a high level of standardisation is attained. A standard related to bibliographic description is a set of general rules agreed to internationally or nationally. The practice of standard bibliographic description in the development of library catalogues and bibliographic databases requires a series of operations. The identification of these unit operations leads to the formulation of principles of bibliographic description and general rules of procedures. The principles and general rules of bibliographic description provide a scientific basis to the field of cataloguing and to the creation of bibliographic records. The application of ICT to the cataloguing process has brought with it demands for precision and logic in the recording of

Notes

bibliographic data. For bibliographic control, the first principle is standardisation, compatibility and integration. Within the same principle standards may vary. Easy interchange of bibliographic records requires agreement on standards governing the medium of exchange.

Bibliographic data are generated by bibliographers, cataloguers, abstractors and indexers, publishers and booksellers and appear in a range of products, including but not limited to library catalogues, online databases, publishers and booksellers lists, abstracting and indexing services and bibliographies. The nature of bibliographic and cataloguing data appears to be identical, but bibliographic data have an independent existence and need separate consideration. Cataloguing, in fact, is one of the many applications of bibliographic data management. Haggler and Simmons [1982] define bibliographic data as "elements of information, which help to identify a piece of recorded communication as a physical object". They identified three types of functional data groups:

- Data that uniquely identify a particular document and distinguish it from others;
- Data, which reveal an association of two or more documents *(e.g.,* common authorship, continuation or reprint); and
- Data, which describe some characteristics of the intellectual content of a document *(e.g.,* statement of subject).

Bibliographic Description: An Overview

Organisation of bibliographic data elements leads to the creation of bibliographic records. Bibliographic record has been defined as the sum of all the areas and elements, which may be used to describe, identify or retrieve any physical item of information content. Bibliographic description is the assemblage of data elements sufficient to identify a bibliographic item and to distinguish it from others. In manual systems *(e.g.,* card catalogue), a collection of bibliographip data elements are grouped under the main access points or headings as per the cataloguing code in use. Such record of an item in a catalogue is called an 'Entry'. Entries are usually identified by the kind of access they provide *e.g.,* 'author entry' or 'subject entry'. The distinction between bibliographic record and entry is most visible in computerised environment where the master bibliographic record is stored in the machine and computer programmes generate entries from it. Dempsey [1989] identified three groups of bibliographic dataset-bibliographic description and control data (data describing, identifying and providing controlled access to items), subject data and content description. The first two groups of data generally appear in library catalogues and bibliographic databases. They include:

- data naming an item *(e.g.,* title, alternative title);
- data naming persons or bodies connected with the creation of an item *(e.g.,* author, artist, cartographic agency);
- data describing hierarchical, lateral or lineal relationships between items *(e.g.,* component part, host item, numbering in series, companion item, name of earlier edition or version);
- data indicating intellectual content *(e.g.,* subject heading, abstract);
- data naming persons or bodies connected with the production of an item as a physical object *(e.g.,* publisher, designer);
- data indicating form or nature of item *(e.g.,* bibliography, documentary, novel);
- data indicating mode of expression or communication *(e.g.,* verbal, pictorial);
- data describing the physical appearance, characteristics and constituents of an item *(e.g.,* map, film, dimensions, number of volumes or parts, technical information needed for use); and
- data assigned by a bibliographic or other agency for purpose of identification and control *(e.g.,* ISBN).

The above list shows that bibliographic description deals with two categories of data—data providing access and data describing items. The level and extent of bibliographic description depends on the application and purpose of bibliographic records. The major application domains are the production or creation of:

Notes

- authoritative national records and national bibliography;
- bibliographic records for international exchange;
- bibliographic records for cooperative systems;
- records for use in individual libraries;
- records for abstracting and indexing services;
- records for subject bibliographies/authors' bibliographies;
- records for use in online information retrieval systems (including WWW); and
- records in book trade.

Bibliographic record may be viewed as a package of data, the content of which varies according to the different needs and purposes for which it is intended. The selection and inclusion of data elements for the bibliographic record must be based on user needs. The aggregate of data in a bibliographic record are broadly divided into following groups:

- Descriptive data elements (as defined in the ISBDs);
- Data elements used in headings for persons, corporate bodies, titles and subjects. They function as filing devices or index entries;
- Data elements used to organise a file or file of records (such as classification numbers, abstracts, summaries or annotations); and
- Data specific to the copies of the library collections (such as accession numbers and call numbers).

Bibliographic record should be constructed according to the agreed rules and standards. There are many widely used standards for constructing bibliographic records *(e.g.,* AACR2 for national bibliographies or library catalogues) but the most striking contribution has been made by IFLA, with its programme of ISBDs. ISBD(G) [Genereal International Standard Bibliographic Description] is intended to provide the generalised framework for descriptive information required in a range of different bibliographic activities. The bibliographic data elements which are required for this purpose are set out in eight areas: Title and statement of responsibility -Edition-Material specific data-Publication, distribution data-Physical description-Series-Notes-Standard number and terms of availability Each of these areas is further divided into discrete elements. The elements are cited in given order and separated by the punctuation prescribed. The complete set of ISBD data is sufficient to ensure identification of bibliographic item and many cataloguing codes (including AARC2) have adopted ISBD(G) as a basis for their own rules for description. The family of ISBDs (includes standard for cartographic materials, non-book materials, printed music, antiquarian books, monographs, serials and other continuing materials and electronic resources) is utilised for the purpose of bibliographical description but the choice and form of access points are based on the Paris Principles (the statement of principles adopted at the International Conference on Cataloguing Principles held in Paris in 1961) adopted in national cataloguing rules. Bibliographic formats (such as MARC family, CCF, UNIMARC, etc.) have also applied ISBDs as base format. But cataloguing codes and bibliographic formats cannot represent all the characteristics of different digital information resources. As a result various general and domain specific metadata schemas (such as Dublin Core, FGDC, ONIX, GILS, etc.) have been developed for description of electronic resources.

Task Discuss advantages and disadvantages of DBMS.

Self Assessment

State whether the following statements are true or false:

5. Cost of conversion is the advantage program of a database system.
6. Bibliographic record should be constructed according to the agreed rules and standards.

Notes

4.5 Summary

- A database is an organized collection of data for one or more purposes, usually in digital form.
- A database is typically organized according to general Data models that have been evolved since the late 1960s.
- The database concept has evolved since 1960s to ease increasing difficulties in designing, building, and maintaining complex information systems (typically with many concurrent end-users, and with a diverse large amount of data.
- In the earliest database systems, efficiency was perhaps the primary concern, but it was already recognized that there were other important objectives. One of the key aims was to make the data independent of the logic of application programs, so that the same data could be made available to different applications.
- The Relational model was first proposed in 1970. Later it was insisted that applications should search for data by content, rather than by following links.

4.6 Keywords

SQL : Structured Query Language is an standard language for manipulations.

DBMS : A Database Management System (DBMS) is a software package with computer programs that control the creation, maintenance, and use of a database.

ERM : Entity-Relationship Modeling (ERM) is a database modeling method, used to produce a type of conceptual schema or semantic data model of a system, often a relational database, and its requirements in a top-down fashion.

Normalization : Database Normalization is the process of organizing the fields and tables of a relational database to minimize redundancy and dependency. It usually involves dividing large tables into smaller (and less redundant) tables and defining relationships between them.

4.7 Review Questions

1. Explain the meaning of database.
2. Describe the concept of database in few words.
3. Write a note on major purposes of data base.
4. Describe the evolution of database and DBMS technology.
5. Explain the advantages and disadvantages of Database Management Systems.

Answers : Self Assessment

1. Database	2. Structured Query Language	3. (a)
4. (c)	5. False	6. True

4.8 Further Readings

Books

Best Careers. U.S. News & World Report USnews.com.

BLS Inflation Calculator, BLS.gov.

Occupational Outlook Handbook, 2010-11 Edition.

McCook, Kathleen de la Peña. *Introduction to Public Librarianship*,p. 65. Neal Schuman, 2011.

Online links

http://searchsqlserver.techtarget.com/definition/database

www. wikipedia.com

Notes

Unit 5: Types of Database

CONTENTS

Objectives
Introduction
5.1 Types of Database
5.2 Database Architecture
5.3 Bibliographic Database
5.4 Summary
5.5 Keywords
5.6 Review Questions
5.7 Further Readings

Objectives

After studying this unit, you will be able to:

- Describe the various types of database
- Discuss about the database architecture
- Explain the bibliographic database.

Introduction

An organized collection of data for one or more purposes, usually in digital form is called database. A database is typically organized according to general data models that have been evolved the late 1980s. A way to classify data base involves the type of their contents, for *e.g.*, bibliographic, document text, statistical, multimedia objects etc. The explanation is carried out by demonstrating various types of database.

Some of the database types are described in detail.

5.1 Types of Database

The following are examples of various database types. Some of them are not main-stream types, but most of them have received special attention (*e.g.*, in research) due to end-user requirements. Some of them exist as specialized DBMS products, and some of the functionality types that some of them provide have been incorporated in existing general-purpose DBMSs.

Active Database

An active database is a database that includes an event-driven architecture which can respond to conditions both inside and outside the database. Possible uses include security monitoring, alerting, statistics gathering and authorization. Most modern relational databases include active database features in the form of database trigger.

Analytical Database

Analysts may do their work directly against a data warehouse or create a separate analytic database for Online Analytical Processing (OLAP). For example, a company might extract sales records for analyzing the effectiveness of advertising and other sales promotions at an aggregate level.

Notes

Data Warehouse

Data warehouses archive data from operational databases and often from external sources such as market research firms. Often operational data undergoes transformation on its way into the warehouse, getting summarized, anonymized, reclassified, etc. The warehouse becomes the central source of data for managers and other end-users who may not have access to operational data. For example, sales data might be aggregated to weekly totals and converted from internal product codes to use UPCs so that it can be compared with ACNielsen data. Some basic and essential components of data warehousing include retrieving, analyzing, and mining data, transforming, loading and managing data so as to make it available for further use.

Operations in a data warehouse are typically concerned with bulk data manipulation, and as such, it is unusual and inefficient to target individual rows for update, insert or delete. Bulk native loaders for input data and bulk SQL passes for aggregation are the norm.

Distributed Database

Usually Distributed database refers to spatial distribution of a database and possibly the DBMS over computers and sometimes over different sites.

Examples are databases of local work-groups and departments at regional offices, branch offices, manufacturing plants and other work sites.

Notes Distributed databases can include segments of both common operational and common user databases, as well as data generated and used only at a user's own site.

Document-oriented Database

Utilized to conveniently store, manage, edit and retrieve documents.

End-user Database

These databases consist of data developed by individual end-users. Examples of these are collections of documents, spreadsheets, presentations, multimedia, and other files. Several products exist to support such databases. Some of them are much simpler than full fledged DBMSs, with more elementary DBMS functionality (*e.g.*, not supporting multiple concurrent end-users on a same database), with basic programming interfaces, and a relatively small "foot-print" (not much code to run as in "regular" general-purpose databases). The general-purpose DBMSs can be used for such purpose using basic user-interface subsets for basic database operations, while still enjoying the database protections that these DBMSs can provide.

External Database

These databases contain data collected for use across multiple organizations, either freely or via subscription. The Internet Movie Database is one example.

Graph Database

A graph database is a kind of NoSQL database that uses graph structures with nodes, edges, and properties to represent and store information. General graph databases that can store any graph are distinct from specialized graph databases such as triple stores and network databases.

Hypermedia Databases

The World Wide Web can be thought of as a database, albeit one spread across millions of independent computing systems. Web browsers "process" this data one page at a time, while Web

Notes

crawlers and other software provide the equivalent of database indexes to support search and other activities.

In-memory Database

An in-memory database (IMDB; also main memory database or **MMDB**) is a database that primarily resides in main memory, but typically backed-up by non-volatile computer data storage.
Accessing data in memory reduces the I/O reading activity and response time is critical, such as telecommunications network equipment, main memory databases are often used.

Did u know? Main memory databases are faster than disk databases.

Operational Database

These databases store detailed data about the operations of an organization. They are typically organized by subject matter, process relatively high volumes of updates using transactions. Essentially every major organization on the earth uses such databases. Examples include customer databases that record contact, credit, and demographic information about a business' customers, personnel databases that hold information such as salary, benefits, skills data about employees, Enterprise resource planning that record details about product components, parts inventory, and financial databases that keep track of the organization's money, accounting and financial dealings.

Major Database Usage Requirements

The major purpose of a database is to provide an information system (in its broadest sense) that utilizes it with the information the system needs according to its own requirements. A certain broad set of requirements refines this general goal. These requirements translate to requirements for the software tool that supports a certain database type, *i.e.*, a DBMS, to allow conveniently building a database of that DBMS's type for a given application. If this goal is met by a DBMS, the designers and builders of a specific database can concentrate on the application, and not deal with building and maintaining the underlying DBMS. Also, since a DBMS is complex and expensive to build and maintain, it is not economical to build such a new tool (DBMS) for every application. It is desired to provide a flexible tool for handling databases for as many as possible given applications. A flexible, general purpose DBMS indeed meets requirements of many information systems. However, in some case a certain application's database's specific requirements cannot be met by an existing DBMS, building a database for it (and its supporting DBMS) becomes a very complex task.

Task Define the major purposes of database.

Functional Requirements

Certain general functional requirements need to be met in conjunction with a database. They describe what is needed to be defined in a database that supports any specific application.

Defining the Structure of Data: Data Modeling and Data Definition Languages

The database type needs to be based on data models that are sufficiently rich to describe all the application's aspects needed to be supported by that database. Data definition languages exist to describe needed databases within the models. Data definition languages are typically data model specific.

Notes

Manipulating the Data: Data Manipulation Languages and Query Languages

The database data models needs support by sufficiently rich Data manipulation languages to allow DB manipulation and information retrieval from it as needed by the database's application. These languages are typically data model specific.

Protecting the Data: Database Security

The DB needs build-in security means to protect its content (and users) from dangers of unauthorized users (humans or programmes). Also types of unintentional breach are included.

Describing Processes that use the Data: Workflow and Business Process Modeling

Manipulating database data often involves processes of several interdependent steps, at different times (*e.g.*, when different people's interactions are involved; *e.g.*, generating an insurance policy). Data manipulation languages are typically intended to describe what is needed in a single such step. Dealing with multiple steps typically requires writing quite complex programs. This area has evolved in the frameworks of workflow and business processes with supporting languages and software packages. Traditionally these frameworks have been out of the scope of common DBMSs, but utilization of them has become common-place, and often they are provided as add-on's to DBMSs.

Operational Requirements

Operational requirements are needed to be met by a database in order to effectively support an application. Though it may be expected that operational requirements are automatically met by a DBMS, in fact it is not so for most of them: To be met substantial work of design and tuning is needed by database administrators. It is typically done through special database user interfaces and tools, and thus may be viewed as secondary functional requirements (but not less important than the primary).

Availability

A DB should maintain needed levels of availability, *i.e.*, the DB needs to be available in a way that a user's action does not need to wait beyond a certain time range before starting executing upon the DB. Availability also relates to failure and recovery from it (see Recovery from failure and disaster below): Upon failure and during recovery normal availability changes and special measures are needed to satisfy availability requirements.

Performance

Users' actions upon the DB should be executed within needed time ranges.

Isolation Between Users

When multiple users access the database concurrently the actions of a user should be uninterrupted and unaffected by actions of other users. These concurrent actions should maintain the DB's consistency (*i.e.*, keep the DB from corruption).

Recovery from Failure and Disaster

All software systems, including DBMSs, are prone to failures for many reasons (both software and hardware related). Failures typically corrupt the DB, typically to the extent that it is impossible to

Notes

repair it without special measures. The DBMS should provide automatic recovery from failure procedures that repair the DB and return it to a well defined state.

A different type of failure is due to a disaster, either by Nature (*e.g.*, Earthquake, Flood, and Tornado) or by Man (*e.g.*, intentional physical systems' sabotage, destructive acts of war). Recovery from disasters (Disaster recovery), which typically incapacitate whole computer systems beyond repair (and different from software failure or hardware component failure) requires special protecting means.

Backup and Restore

Sometimes it is desired to bring a database back to a previous state (for many reasons, *e.g.*, cases when the database is found corrupted due to a software error, or if it has been updated with erroneous data). To achieve this a **backup** operation is done occasionally or continuously, where each desired database state (*i.e.*, the values of its data and their embedding in database's data structures) is kept within dedicated backup files (many techniques exist to do this effectively). When this state is needed, *i.e.*, when it is decided by a database administrator to bring the database back to this state (*e.g.*, by specifying this state by a desired point in time when the database was in this state), these files are utilized to **restore** that state.

Self Assessment

Fill in the blanks:

1. ..... Archive data from operational databases and often from external sources such as market research firms.
2. Databases store detailed data about the operations of an organization is called ..... .
3. The database needs ..... to protect its content from dangers of unauthorized users.

5.2 Database Architecture

Database architecture may be viewed, to some extent, as an extension of Data modeling. It is used to conveniently answer different end-user requirements from a same database. For example, a financial department of a company needs the payment details of all employees as part of the company's expenses, but not other many details about employees, that are the interest of the human resources department. Thus different departments need different views of the company's database that both include the employees' payments, possibly in a different level of detail (and presented in different visual forms). To meet such requirement effectively database architecture consists of three levels: external, conceptual and internal. Clearly separating the three levels was a major feature of the relational database model implementations that dominates 21st century databases.

- The **external level** defines how each end-user type understands the organization of its respective relevant data in the database, *i.e.*, the different needed end-user views. A single database can have any number of views at the external level.
- The **conceptual level** unifies the various external views into a coherent whole, global view. It provides the common-denominator of all the external views. It comprises all the end-user needed generic data, *i.e.*, all the data from which any view may be derived/calculated. It is provided in the simplest possible way of such generic data, and comprises the back-bone of the database. It is out of the scope of the various database end-users, and serves database application developers and defined by database administrators that build the database.
- The **Internal level** (or Physical level) is as a matter of fact part of the database implementation (see section below). It is concerned with cost, performance, scalability and other

Notes

operational matters. It deals with storage layout of the conceptual level, provides supporting storage-structures like indexes, to enhance performance, and occasionally stores data of individual views (materialized views), calculated from generic data, if performance justification exists for such redundancy. It balances all the external views' performance requirements, possibly conflicting, in attempt to optimize the overall database usage by all its end-uses according to the database goals and priorities.

All the three levels are maintained and updated according to changing needs by database administrators who often also participate in the database design.

The above three-level database architecture also relates to and being motivated by the concept of Data independence which has been described for long time as a desired database property and was one of the major initial driving forces of the Relational model. In the context of the above architecture it means that changes made at a certain level do not affect definitions and software developed with higher level interfaces, and is being incorporated at the higher level automatically. For example, changes in the internal level do not affect application programs written using conceptual level interfaces, which saves substantial change work that would be needed otherwise.

On one hand it provides a common view of the database, independent of different external view structures, and on the other hand it is uncomplicated by details of how the data is stored or managed (internal level). In principle every level, and even every external view, can be presented by a different data model. In practice usually a given DBMS uses the same data model for both the external and the conceptual levels (*e.g.*, relational model). The internal level requires a different level of detail and uses its own data structure types, typically different in nature from the structures of the external and conceptual levels which are exposed to end-users (*e.g.*, the data models above): While the external and conceptual levels are focused on end-user applications, the concern of the internal level is effective implementation details.

Task State the role of database architecure in Financial department of an organisation.

Access Control

Database access control deals with controlling who (a person or a certain computer program) is allowed to access what information in the database. The information may comprise specific database objects (*e.g.*, record types, specific records, data structures), certain computations over certain objects (*e.g.*, query types, or specific queries), or utilizing specific access paths to the former (*e.g.*, using specific indexes or other data structures to access information).

Database access controls are set by special an authorized (by the database owner) personnel that uses dedicated protected security DBMS interfaces.

Database Design

Database design is done before building it to meet needs of end-users within a given application/information-system that the database is intended to support. The database design defines the needed data and data structures that such a database comprises. A design is typically carried out according to the common three architectural levels of a database (see Database architecture above). First, the conceptual level is designed, which defines the over-all picture/view of the database, and reflects all the real-world elements (entities) the database intends to model, as well as the relationships among them. On top of it the external level, various views of the database, are designed according to (possibly completely different) needs of specific end-user types. More external views can be added later. External views requirements may modify the design of the conceptual level (*i.e.*, add/remove entities and relationships), but usually a well designed conceptual

Notes

level for an application well supports most of the needed external views. The conceptual view also determines the internal level (which primarily deals with data layout in storage) to a great extent. External views requirement may add supporting storage structures, like indexes, for enhanced performance. Typically the internal layer is optimized for top performance, in an average way that takes into account performance requirements (possibly conflicting) of different external views according to their relative importance. While the conceptual and external levels design can usually be done independently of any DBMS (DBMS-independent design software packages exist, possibly with interfaces to some specific popular DBMSs), the internal level design highly relies on the capabilities and internal data structure of the specific DBMS utilized.

A common way to carry out conceptual level design is to use the Entity-relationship model (ERM) (both the basic one, and with possible enhancement that it has gone over), since it provides a straightforward, intuitive perception of an application's elements. An alternative approach, which preceded the ERM, is using the Relational model and dependencies (mathematical relationships) among data to normalize the database, *i.e.*, to define the ("optimal") relations (data tupple types) in the database. Though a large body of research exists for this method it is more complex, less intuitive, and not more effective than the ERM method. Thus normalization is less utilized in practice than the ERM method.

Another aspect of database design is its security. It involves both defining access control to database objects (*e.g.*, Entities, Views) as well as defining security levels and methods for the data itself (See Database security above).

Entities and Relationships

The most common database design methods are based on the Entity relationship model (ERM, or ER model). It consists of "Entities" and the "Relationships" among them. Accordingly a database consists of entity and relationship types, each with defined attributes (field types) that model concrete entities and relationships. Modeling a database in this way typically yields an effective one with desired properties (as in some normal forms; see normalization below). Such model can be translated to any other data model (*e.g.*, Relational model) required by any specific DBMS for building an effective database.

Database Normalization

In the design of a relational database, the process of organizing database relations to minimize redundancy is called normalization. The goal is to produce well-structured relations so that additions, deletions, and modifications of a field can be made in just one relation (table) without worrying about appearance and update of the same field in other relations. The process is algorithmic and based on dependencies (mathematical relations) that exist among relations' field types. The process results in bringing the database relations into a certain "normal form". Several normal forms exist with different properties.

Database Building, Maintaining, and Tuning

After designing a database for an application arrives the stage of building the database. Typically an appropriate general-purpose DBMS can be selected to be utilized for this purpose. A DBMS provides the needed user interfaces to be utilized by database administrators (*e.g.*, Data definition language interface) to define the needed application's data structures within the DBMS's respective data model. Other user interfaces are used to select needed DBMS parameters (like storage allocation parameters, etc.).

After completing the database and making it operational arrives the database maintenance stage: Various database parameters may need to be changed and tuning for better performance,

Notes

application's data structures may be changed or added, new related application programs may be written to add to the application's functionality, etc.

Database Storage

Database storage is the container of the physical materialization of a database. It comprises the Internal (physical) level in the Database architecture. It also contains all the information needed (*e.g.*, metadata, "data about the data", and internal data structures) to reconstruct the Conceptual level and External level from the Internal level when needed. Though typically accessed by a DBMS through the underlying Operating system (and often utilizing the operating systems' File systems as intermediates for storage layout), storage properties and configuration setting are extremely important for the efficient operation of the DBMS, and thus are closely maintained by database administrators. A DBMS, while in operation, always has its database residing in several types of storage (*e.g.*, Computer memory and external Computer data storage, as dictated by contemporary computer technology. The database data and the additional needed information are coded into bits, possibly in very large amounts. Data typically reside in the storage in structures that look completely different from the way the data look in the conceptual and external levels, but in ways that attempt to optimize (the best possible) these levels' reconstruction when needed by users and programs, as well as for computing additional types of needed information from the data (*e.g.*, when querying the database).

In principle the database storage (as computer data storage in general) can be viewed as a linear address space (a tree-like is a more accurate description), where every bit of data has its unique address in this address space. Practically only a very small percentage of addresses is kept as initial reference points (which also requires storage), and most of the database data is accessed by indirection using displacement calculations (distance in bits from the reference points) and data structures (see below) which define access paths (using pointers) to all needed data in effective manner, optimized for the needed data access operations.

Database Security

Database security denotes the system, processes, and procedures that protect a database from unauthorized activity.

DBMSs usually enforce security through access control, auditing, and encryption:

- Access control manages who can connect to the database via authentication and what they can do via authorization.
- Auditing records information about database activity: who, what, when, and possibly where.
- Encryption protects data at the lowest possible level by storing and possibly transmitting data in an unreadable form. The DBMS encrypts data when it is added to the database and decrypts it when returning query results. This process can occur on the client side of a network connection to prevent unauthorized access at the point of use.

Benefits of Database Management

Database management systems are programmes that are written to store, update, and retrieve information from a database.

Notes There are many databases available in the market. The most popular are the Oracle and SQL Server.

The Oracle database is from the Oracle Corporation and the SQL Server is from the Microsoft Corporation. There are freely available database like MySQL. These are open source databases.

Notes

Database Management Systems are available for personal computers and for huge systems like mainframes.

Structured Query Language is used for querying the databases. Variations of this structured query language in the form of T-SQL and PL-SQL are available. The data that is available in the database is represented in various formats. Usually a report writer's programme is bundled with the database for generating reports. Crystal reports is one such application that is bundled with SQL Server 2000 and later versions of it. These report generating programme makes it easy for generating any kind of report-based on the data that is available in the database. Graphics components are also available in the database management systems to generate reports in the form of charts and graphs.

Did u know? DB2 is a database from IBM for Mainframe systems.

Products like Quest can be used in conjunction with your database to get more out of your database. The database quality and performance can be improved by using the productivity tools provided for the DBAs by Quest. This product enables to develop and test SQL code for optimum quality and performance for an application before it ever reaches the production environment. Business threatening performance issues before they reach the end user level are detected and diagnosed. These issues are resolved as early as possible without interrupting the business. Monitoring, diagnostics, tuning, space management and high availability are the solutions that are provided by Quest like products. Automation and enforcement of business processes are done by using these products. Impact analysis, patch management, version control, audit trial documentation and migration support are available in most of the database management products.

Self Assessment

Multiple choice questions:

4. ERM stands for:
   (*a*) Entity Relationship Model (*b*) Entry Record model
   (c) Entry Relationship Mechanism (*d*) Entry Relationship Manual.
5. SQL data base is from ..... corporation.
   (*a*) Microsoft (*b*) IBM (*c*) Oracle (*d*) All of these.
6. ..... is the container of the physical materialization of a database.
   (*a*) Database storage (*b*) Database management
   (*c*) Database security (*d*) Data store.

5.3 Bibliographic Database

A **bibliographic database** is a database of bibliographic records, an organized digital collection of references to published literature, including journal and newspaper articles, conference proceedings, reports, government and legal publications, patents, books, etc. In contrast to library catalogue entries, a large proportion of the bibliographic records in bibliographic databases describe analytics (articles, conference papers, etc.) rather than complete monographs, and they generally contain very rich subject descriptions in the form of keywords, subject classification terms, or abstracts.

A bibliographic database may be general in scope or cover a specific academic discipline. A significant number of bibliographic databases are still proprietary, available by licensing agreement from vendors, or directly from the abstracting and indexing services that create them.

Notes

Many bibliographic databases evolve into digital libraries, providing the full-text of the indexed contents. Others converge with non-bibliographic scholarly databases to create more complete disciplinary search engine systems, such as Chemical Abstracts or Entrez.

Self Assessment

State whether the following statements are true or false:

7. A bibliographic database is a database of bibliographic records, an organized digital collection of references to published literature, including journal and newspaper articles, conference proceedings etc.
8. A bibliographic database may be general in scope or cover a specific academic discipline.

5.4 Summary

- An active database is a database that includes an event-driven architecture which can respond to conditions both inside and outside the database.
- Analysts may do their work directly against a data warehouse or create a separate analytic database for Online Analytical Processing (OLAP).
- Usually Distributed database refers to spatial distribution of a database and possibly the DBMS over computers and sometimes over different sites.
- These databases contain data collected for use across multiple organizations, either freely or via subscription. The Internet Movie Database is one example.
- A graph database is a kind of NoSQL database that uses graph structures with nodes, edges, and properties to represent and store information.
- Operational requirements are needed to be met by a database in order to effectively support an application.
- Database architecture may be viewed, to some extent, as an extension of Data modeling. It is used to conveniently answer different end-user requirements from a same database.
- Database access control deals with controlling who (a person or a certain computer program) is allowed to access what information in the database.
- Database storage is the container of the physical materialization of a database. It comprises the Internal (physical) level in the Database architecture. It also contains all the information needed (*e.g.*, metadata, "data about the data", and internal data structures) to reconstruct the Conceptual level and External level from the Internal level when needed.
- A bibliographic database may be general in scope or cover a specific academic discipline. A significant number of bibliographic databases are still proprietary, available by licensing agreement from vendors, or directly from the abstracting and indexing services that create them.

5.5 Keywords

MMDB : Main memory database (MMDB) is a database that primarily resides in main memory.

OLAP : In computing, online analytical processing, (OLAP) is an approach to swiftly answer multi-dimensional analytical (MDA) queries.

Data Architecture : Database architecture may be viewed, to some extent, as an extension of Data modeling. It is used to conveniently answer different end-user requirements from a same database.

Data Modeling : Data modeling in software engineering is the process of creating a data model for an information system by applying formal data modeling techniques.

Notes

5.6 Review Questions

1. Define Database and its types.
2. Write short note on Access control.
3. What is meant by database storage?
4. Write briefly on database design.
5. Write down the benefits of Database Management.
6. Explain the bibliographic database.
7. Explain the types of database.
8. Elaborately discuss on database architecture with neat sketch.

Answers : Self Assessment

1. Data warehouses	2. Operational database	3. Build in-security
4. (a)	5. (c)	6. (a)
7. True	8. True	

5.7 Further Readings

Books

C. W. Bachmann, *The Programmer as Navigator*.

Graves, Steve. *COTS Databases for Embedded Systems*, Embedded

Computing Design magazine, January, 2007. Retrieved on August 13, 2008.

TeleCommunication Systems Signs up as a Reseller of TimesTen; Mobile Operators and Carriers Gain Real-Time Platform for Location-Based Services. Business Wire.

Argumentation in Artificial Intelligence by Iyad Rahwan, Guillermo R. Simari.

Online links

http://www.theukwebdesigncompany.com/articles/types-of-databases.php

www.wikipedia.com

Notes

Unit 6: Information and Communications Technology

CONTENTS

Objectives
Introduction
6.1 ICT in Society
6.2 Fundamentals of Communication
6.3 Meaning of Communication
6.4 Importance of Communication
6.5 Fundamentals of Communication Media
6.5.1 Two Wire Open Lines
6.5.2 Twisted-pair Cable
6.5.3 Coaxial Cable
6.5.4 Fiber Optic Cable
6.6 Wireless Communication
6.6.1 Radio Waves
6.6.2 Microwave Towers
6.6.3 Infrared Waves
6.7 Summary
6.8 Keywords
6.9 Review Questions
6.10 Further Readings

Objectives

After studying this unit, you will be able to:

- Discuss ICT in Society
- Describe the fundamentals of Communication
- Define meaning of Communication.
- Explain the importance of communication.
- State about the fundamentals of communication media.

Introduction

Information and communications technology is usually called **ICT**. It is often used as an extended synonym for information technology (IT), but is usually a more general term that stresses the role of unified communications and the integration of telecommunications (telephone lines and wireless signals), intelligent building management systems and audio-visual systems in modern information technology. ICT consists of all technical means used to handle information and aid communication, including computer and network hardware, communication middleware as well as necessary software. In other words, ICT consists of IT as well as telephone, broadcast media, all types of audio and video processing and transmission and network-based control and monitoring functions. The expression was first used in 1997 in a report by Dennis Stevenson to the UK government and promoted by the new National Curriculum documents for the UK in 2000.

ICT is often used in the context of "ICT roadmap" to indicate the path that an organization will take with their ICT needs.

Notes

The term ICT is now also used to refer to the merging (convergence) of audio-visual and telephone networks with computer networks through a single cabling or link system. There are large economic incentives (huge cost savings due to elimination of the telephone network) to merge the audio-visual, building management and telephone network with the computer network system using a single unified system of cabling, signal distribution and management. This in turn has spurred the growth of organizations with the term ICT in their names to indicate their specialization in the process of merging the different network systems.

"ICT" is used as a general term for all kinds of technologies which enable the users to create access and manipulate information. ICT is a combination of information technology and communications technology.

In an increasingly interconnected world, the interactions among devices, systems, and people are growing rapidly. Businesses need to meet the demands of their employees and customers to allow for greater access to systems and information. All of these communications needs must be delivered in a unified way. By offering a scalable infrastructure, cloud computing models enable companies to work smarter through more agile and cost-effective access to technology and information. This unified platform reduces costs and boosts productivity across a business and beyond. Part of an information and communications technology roadmap should involve consolidating infrastructures, while providing added benefits to users in collaboration, messaging, calendaring, instant messaging, audio, video, and Web conferencing. Cloud computing is driving more efficient IT consumption and delivery and taking ICT to the next level.

Notes "ICT" is used as a general term for all kinds of technologies.

6.1 ICT in Society

ICT has taken over every aspect of our daily lives from commerce to leisure and even culture. Today, mobile phones, desktop computers, hand held devices, e-mails and the use of Internet has become a central part of our culture and society.

Notes ICT has made us a global society, where people can interact and communicate swiftly and efficiently.

ICT has contributed towards the elimination of language barriers. Examples of (ICT) tools are emails, instant messaging (IM), Chat rooms and social networking websites, such as Facebook and Twitter, Skype, iPhones, cellular phones and similar applications. A disadvantage is that older generations find it difficult to keep up with the ever changing technologies available today. The resistance to change and inability to keep up with rapid technology evolution are areas to note. Many people in society are not in a position to take advantage of available technology. This may be due to poverty, geographical location or lack of access to technology.

ICT in Education

In current education systems worldwide, ICTs have not been as extensively implemented as might be found in other fields, such as business. Reasons for the absence of these technologies in education vary. Some experts suggest it is the high costs associated with implementing these technologies that prevents schools from using them in the classroom. Other experts argue that the social nature of current education systems, which require a substantial amount of personal contact between teachers and their students, prevents these technologies from being better integrated in the classroom setting.

Task State your reason how ICT is helpful in education.

Notes

Uses

The use of ICTs in education extends beyond classrooms with computers and an Internet connection. There is a wide variety of ICTs currently available to schools and universities that can be implemented to enhance students' overall learning experiences in numerous ways. Those schools and universities that have implemented ICTs primarily use these technologies to fulfill three objectives:

- **Increase Networking Opportunities**: ICTs helps connect schools to other schools, as well as individuals within those schools to one another. This ability to network is especially important for students in rural areas and students in developing countries.
- **Provide Distance Learning**: With the advent of ICTs, learning has become Web-based. As a result, ICTs have started to replace correspondence schools.
- **Supplement Traditional Learning**: One of the most common uses of ICTs in education involves students using software programmes such as Microsoft Word to produce otherwise traditional written assignments.

Advantages

As with other technologies that have been implemented in education throughout the years, ICTs offer a number of advantages to both students and educators when successfully integrated into a learning environment. Some of these advantages include:

- **Increased Access to Resources:** Unlike the traditional classroom that is locked at the end of the school day, ICTs allow students to access educational resources from anywhere at any time.
- **Interactive Learning Experiences:** Many educators deliver information to their students in the form of lectures. ICTs allow students to access information through videos, podcasts, and a variety of other interactive media, which creates a more engaging learning experience for students.
- **Student-Centered Learning:** In a traditional classroom, students cannot control how lessons are planned. Through the use of ICTs, students can take control of their learning experiences. Students can decide when class is in session, as well as how the lesson material will be presented.

Did u know? Increased access to resources is especially valuable for students with special needs and those students who live in rural areas or developing countries.

Disadvantages

Although ICTs can enhance student learning in many ways, there are some disadvantages associated with implementing these sophisticated technologies in schools and universities around the world. Some of these disadvantages include:

- **High Costs:** Implementing ICTs in the education setting can be quite costly regarding updating existing infrastructures, training teachers and developing quality course materials. To make matters worse, funding for such projects is often scarce.
- **Teacher Training:** Many teachers are unfamiliar with using ICTs in the classroom and are resistant to incorporating such technologies into their established pedagogies. To succeed, the use of ICTs in education needs to be supported by well-trained teachers.
- **Uncertain Success Rates:** Currently, no large-scale studies have been conducted that show whether or not the use of ICTs in an educational setting will result in a measurable increase in individual student achievement, making school administrators hesitant to invest in these technologies.

Notes

Task List some uses of ICT.

6.2 Fundamentals of Communication

Most of the verbal communication is from one individual to another. This is true whether in a family, social, or a work setting. One to one verbal communication affords the greatest opportunity for precision, because immediate feedback can tell one whether understood accurately. But communicating effectively involves more than just accuracy.

Notes The purpose of most communication is to influence the attitudes and behaviors of those whom we address.

Since, the human race is composed of billions of individuals, each with a different way of responding, no one approach is universally effective. So, it is important that learning to express oneself accurately and in a way that will accomplish one's purpose towards the individual.

The Basic Process of Communication

To achieve precision and effectiveness in communicating, you should understand the basic process of communication. It has four requirements:

- A message must be conveyed.
- The message must be received.
- There must be a response.
- Each message must be understood.

Let's look at these requirements one at a time.

A Message must be conveyed that sounds simple enough. You know what your thoughts are, and you know how to translate them into words. But that's where we lose the simplicity.

Each of us has our own mental dialect. It is the common language of the culture in which we grow up, modified by our own unique life's experiences. Our life's experiences add color and shades of meaning to different words. When you speak, your mental dialect must be translated into the mental dialect of the hearer. So the words you speak acquire a different color when they pass through the ears of the person who hears you.

A Message Must be Received

The second basic requirement of the one to one communication process is that the message be received and understood. Effective communicators know that they have not conveyed their meaning until they have made sure that the other person has received it exactly as they sent it. They test, with questions and observations, to make sure that the real meaning they wanted to convey has passed through the filters and has been received and understood.

Task State your views how communication is important to us.

Necessity of Response

The goal of all communication is to obtain the desired response. Communication is not just an act. It is a process. The process of communication includes transmission of information, ideas, emotions, skills, and knowledge by using symbols, words, pictures, figures, graphs, or illustrations. The act

Notes

of communication is referred to as '**transmission**'. It is the process of transmission that is generally termed as Communication.

Communication regulates and shapes all human behaviour. Therefore, it is important to have a clear understanding of the concepts of communication what is communication? Why is it important to us? How does it work? What are the elements in the process of communication? What are the different types of communication that we are engaged in? These are the questions that come to our mind when we study this subject.

Self Assessment

Fill in the blanks:

1. A combination of information technology and communications technology is known as ..... .
2. E-mails, instant messaging, chat rooms and social networking are the examples of ..... .
3. A message must be conveyed is a requirement for ..... .
4. The second basic requirement of the one the one communication is ..... .

6.3 Meaning of Communication

The English word '**communication**' is derived from the Latin noun'**communis**' and the Latin verb '**communicare**' that means '**to make common**'. Communication is a much-hyped word in the contemporary world. It encompasses a multitude of experiences, actions and events, as well as a whole variety of happenings and meanings, and technologies too. Meetings, conferences or even a procession thus can be a communication event. Newspapers, radio, video and television are all 'communication media' and journalists, newsreaders; advertisers, public relation persons and even camera crew are 'communication professionals'.

Communication in its simplest sense involves two or more persons who come together to share, to dialogue and to commune, or just to be together for a festival or family gathering. Dreaming, talking with someone, arguing in a discussion, speaking in public, reading a newspaper, watching TV, etc., are all different kinds of communication that we are engaged in everyday.

Communication is thus not so much an act or even a process but rather social and cultural 'togetherness'. Communication can be with oneself, god, and nature and with the people in our environment. Interaction, interchange, transaction, dialogue, sharing, communion and commonness are ideas that crop up in any attempt to define the term communication.

Notes According to Denis McQuail, communication is a process, which increases, commonality-but also requires elements of commonality for it to occur at all.

A common language, for instance, does not necessarily bring people together. There are other factors too at play such as a shared culture and a common interest, which bring about a sense of commonality and more significantly, a sense of community. Denis McQuail sees '**human communication**' in linear terms as the sending of meaningful messages from one person to another. These messages could be oral or written, visual or olfactory. He also takes such things as laws, customs, practices, and ways of dressing, gestures, buildings, gardens, military parades, and flags to be communication.

Thus, '**communication**' can be defined as 'the interchange of thoughts or ideas'. Again 'communication' is viewed as a transmission of information, consisting of discriminative stimuli, from a source to recipient'. In everyday life, the communication is a system through which the messages are sent, and feedback received. It is therefore, the process of transferring particular information or message from an information source to desired, definite or a particular destination.

One of the main elements of communication messages is **perception.** The effectiveness of communication is limited by the receiver's range of perception. Also, people perceive only what

Notes

they expect and understand. Lastly, communication makes a demand on the recipient, in terms of his emotional preference or rejection. Thus, communication is not to be confused with information. While information is logical, formal and impersonal, communication is perception.

Communication is more than mere transferring or transmission of ideas or thoughts. It is not a static act as some of the earlier definitions suggest but it is a dynamic process of action and interaction towards a desired goal, as suggested by later definitions. Communication is, therefore, a **process of sharing or exchange of ideas, information, knowledge, attitude or feeling among two or more persons through certain signs and symbols.**

The information is shared or exchanged through certain signs or symbols; it could be language, oral or written. While sharing and exchanging ideas or information with others, we are actually interaction with people and establishing a kind of relationship that helps us to achieve the task set before us.

Some other functional definitions of communication are:

- 'The transfer or conveying of meaning' (Oxford Dictionary)
- 'One mind affecting another' (Claude Shannon)
- 'Transmission of stimuli' (Colin Cherry)
- 'One system influences another' (Charles E. Osgood)
- 'The mechanism through which human relations exist and develop' (Wilbur Schramm)
- Communication is the process of transmitting feelings, attitudes, facts, beliefs and ideas between living beings. (Birvenu)
- Communication is the exchange of meanings between individuals through a common system of symbols. (I.A.Richards)
- Communication is the sum of all the things one person does when he wants to create understanding in the mind of another. It is a bridge of meaning. It involves a systematic and continuous process of telling, listening and understanding. (Louis Allen)

Task State your views how commuication is the process of interchanging thoughts or ideas between individuals.

6.4 Importance of Communication

Communication is important both for an individual and also for the society. A person's need for communication is as strong and as basic as the need to eat, sleep and love. Communication is the requirement of social existence and a resource in order to engage in the sharing of experiences, through 'symbol mediated interaction'. Isolation is in fact the severest punishment for human being.

Grown-ups, children and old people all need to communicate. Society punishes criminals by locking them up in solitary cells, thus, starving them of the basic need, and indeed the fundamental right to communicate. Communication thus involves active interaction with our environments-physical, biological and social. Deprived of this interaction we would not be aware of whether we are safe or in danger, whether hated or loved, or satisfied or hungry. However, most of the people take this interaction and this relationship for granted, unless we experience some deprivation of it. When that happens we adapt ourselves to the environment so that we do not lose touch, in both the literal and figurative senses. For, to lose touch is to suffer isolation.

The basic human need for communication can perhaps be traced to the process of mankind's evolution from lower species. Animals, for instance, have to be in sensory communication with their physical and biological surroundings to find food, protect themselves and reproduce their species. The loss of sensation, the inability to hear a predator for instance can mean loss of life.

Thus, it is said that the biology of human beings and other living organisms is such that they have to depend upon each other. This dependence gives rise to a situation where it is the biological necessity for the human beings to live in groups. Society is therefore, the outcome of the evolution of the human race and man is a social animal not by option but by compulsion.

Notes

Did u know? Essentially, the primary function of communication is to inform, educate, entertain, and persuade people.

Following are the basic functions of communication:

- **Education and Instruction:** The function of education starts early in life, at home and in school and continues throughout life. Communication provides knowledge, expertise and skills for smooth functioning by people in the society. It creates awareness and gives opportunity to people to actively participate in public life.
- **Information:** Quality of our life will be poor without information. The more informed we are the more powerful we become. Communication provides information about our surroundings. Information regarding wars, danger, crisis, famine, etc. is important for the safety and well being of our life.
- **Entertainment:** To break the routine life and divert our attention from the stressful life we lead today, entertainment is an essential part of everybody's life. Communications provide endless entertainment to people through films, television, radio, drama, music, literature, comedy, games, etc.
- **Discussion:** Debates and discussions clarify different viewpoints on issues of interest to the people. Through communication we find out reasons for varying viewpoints and impart new ideas to others.
- **Persuasion:** It helps in reaching for a decision on public policy so that it is helpful to govern the people. Though it is possible that one can resort to persuasion for a bad motive. Thus, the receiver must be careful about the source of persuasion.
- **Cultural promotion:** Communication provides an opportunity for the promotion and preservation of culture and traditions. It makes the people fulfill their creative urges.
- **Integration:** It is through communication that a large number of people across countries come to know about each other's traditions and appreciate each other's ways of life. It develops integration and tolerance towards each other.

Self Assessment

Multiple choice questions:

5. The act of communication is referred to as:
   (*a*) Transmission (*b*) Skills
   (*c*) Communications (*d*) Emotions.
6. Communication is derived from the latin noun.....
   (*a*) Community (*b*) Communis
   (*c*) Communicare (*d*) Transmission
7. Communication is more than mere transferring or transmission of:
   (*a*) Ideas (*b*) Thoughts (*c*) Ideas or Thoughts (*d*) None of them.
8. Quality of our life will be poor without:
   (*a*) Information (*b*) Communication
   (*c*) Discussion (*d*) Entertainment

6.5 Fundamentals of Communication Media

Various types of media (also called channels) are used to transmit digital signals over networks. The proper selection of media for data transmission is the main consideration while installing networks. This is mainly due to the following reasons:

- The efficiency of the transmission medium depends upon the characteristics of the medium.
- The form of transmitted signal must exactly match the media chosen.

Notes

- The cost of the transmission medium is also one of the important criteria while selecting the media.
- The speed of transmission varies from one medium to another.

Now, let us discuss the characteristics of each transmission medium along with their uses.

6.5.1 Two Wire Open Lines

The simplest of all transmission media is the two wire open lines. This medium consists of a pair or several pairs of metallic wires made up of copper or aluminium, which are insulated from each other When the medium has only one pair, it is called a simple wire pair as shown in figure 6.1 and when it has several pairs, it can be in two forms- Flat Ribbon connector and Multicore cable. In Flat Ribbon connector, each pair of wires run parallel and are moulded into the form of a flat ribbon case as shown in figure 6.2. However, in Multicore Cable, all wires are enclosed in a single protected cable shown in figure 6.3.

Figure 6.1: Simple wire pair

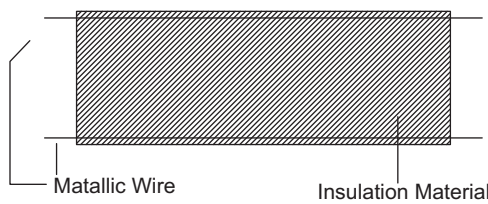


Figure 6.2: Flat ribbon connector

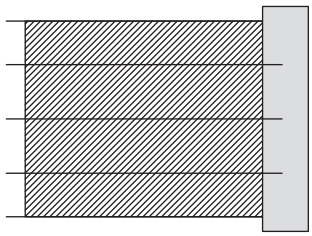
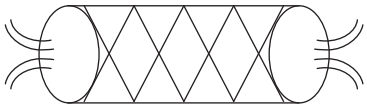


Figure 6.3: Multicore cable

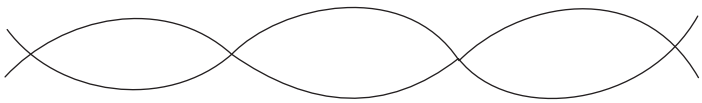


Uses of Two Wire Open Lines. Two wire open lines medium is used for transmitting data to a short distance. This type of media can transmit data up to 50 meters with speed less than 19200 bps (bits per second).

6.5.2 Twisted-pair Cable

This is the oldest and most common medium for connecting computers and other devices. Twisted-pair cable consists of a pair of insulated copper wires (1 mm thick), which are twisted together in helical form as shown in Figure 6.4. The telephone wire is an example of a Twisted-pair cable.

Figure 6.4: Twisted pair cable



Notes

There are two types of Twisted-pair cables—Unshielded and Shielded.

(*i*) **Unshielded Twisted-pair (UTP) Cable.** It consists of a set of twisted pairs with a simple plastic encasement. It is the most popular communication medium and is commonly used in telephone systems.

Advantages of UTP cable—A UTP cable offers the following benefits:

- The cost of UTP is extremely low compared to other communications media.
- The UTP installation equipment is inexpensive and widely available.
- The UTP cables can be adequately installed with very little training.

Drawbacks of UTP cable—A UTP cable has the following drawbacks:

- Though UTP cable is suitable to transmit data at 1-2 Mbps (Megabits per second) over a distance of 1 Km or more, but as speed increases, the maximum transmission distance reduces. So, a large number of repeaters (equipment's for boosting the signals) are needed to send data over a long distances and hence the cost of installation and maintenance of UTP cables (especially for long distance) becomes high.
- Although the twists in UTP cable greatly reduce cross talk (an electromagnetic interference between two copper wires conducting electrical signals in close proximity), a certain amount of interference exists between pairs of wires.

(*ii*) **Shielded Twisted-pair (STP) Cable**. A shielded Twisted-pair cable is an insulated cable, which includes bundled pairs wrapped in a foil shielding. Although UTP cable is commonly used, STP cable (introduced by IBM in the early 1980s) is used in Some IBMJ installations. The differences between UTP and STP cables are described in Table 6.1

Table 6.1: Difference between UTP and STP cable.

Unshielded Twisted-pair Cable	*Shielded Twisted-pair Cable*
1. UTP cable consists of a set of twisted Pairs with a simple plastic encasement.	1. STP cable consists of bundled pairs wrapped in a foil shielding.
2. UTP cable is easier to install.	2. STP cable is more difficult to install thanUTP Cable.
3. It is cheaper than STP cable.	3. It is costlier than UTP cable.
4. UTP cable transmits data at lesser Speed(1-2 Mbps).	4. STP cable transmits data at greater speed(16 Mbps).
5. Cross talk is more in UTP cable.	5. Cross talk is less in STP cables due to foil.

Uses of Twisted-paid Cable. Twisted-pair cable is widely used in the telephone networks. Most PCs were connected to Internet over telephone wires and modems (equipment that convert digital signals to analog and vice-versa). Modem connections that use standard telephone wire provide band widths (transmission capacities of communication channels) ranging from 9600 bps to about 56 Kbps, sufficient for ordinary data communications.

6.5.3 Coaxial Cable

Coaxial cable or coax is an another common transmission medium. It has better shielding than twisted-pair cable, so it can provide higher speed over longer distance. A coaxial cable as shown in Figure 6.5 consists of the following four parts:

(*i*) **Core.** The innermost part of a coaxial cable is the core made up of a stiff copper wire.

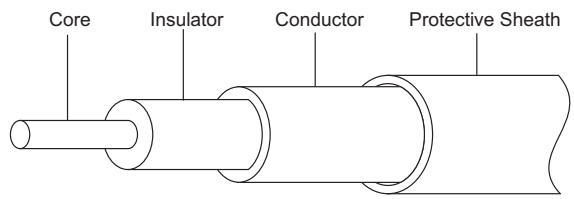
(*ii*) **Insulator.** The core is surrounded by a sheath of insulation. Insulation allows co-axial cable to carry more information than Twisted-pair cable.

(*iii*) **Conductor.** The sheath is surrounded by a cylindrical conductor often as a closely woven braided mesh. The conductor conducts and shields against interference.

(*iv*) **Protective Sheath.** The conductor is covered in a protective plastic sheath.

Notes

Figure 6.5: A coaxial cable



There are two types of coaxial cables—Baseband and Broadband. The differences between these cables are described in table 6.2.

Table 6.2: Differences between baseband and broadband cables

Baseband Coaxial Cable	*Broadband Coaxial Cable*
1. Baseband coaxial cable is a 50-ohm cable.	1. Broadband coaxial cable is a 75-ohm cable.
2. It carries only digital signals.	2. It carries only analog signals.
3. It transmits a singles stream of digital data at a time with a very high speed.	3. It can transmit many signals simultaneously using different frequencies.
4. It transmits digital signals at 10 to 80 Mbps depending upon the cable length. For longer distances, signals need to be amplified periodically.	4. It covers a large area and needs analogamplifiers to straighten the signals periodically.
5. Baseband coaxial cables are often used in local area networks.	5. Broadband coaxial cables are tipically used for cable television transmissions.

6.5.4 Fiber Optic Cable

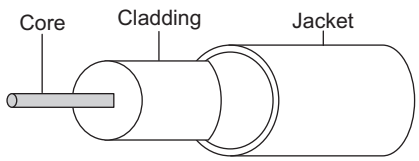
Fiber optic cable is a glass fiber, which transmits information in the form of fluctuating light (i.e., photons-beams of light). It is similar to coaxial cable in structure as shown in Figure 6.6 having the following three parts:

(*i*) **Core.** The innermost part of a glass fiber is the core made up of glass having diameter upto 50 microns. The core is 8-10 microns in single-mode while 50 microns in multimedia fibers. The data in the form of light is propagated through the core.

(*ii*) **Glass Cladding.** The core is surrounded by a glass having lower refractive index known as cladding. The cladding works like a mirror and keep light into the core by a process called internal reflection. Thus, cladding minimises the amount of light leaking from the fibers.

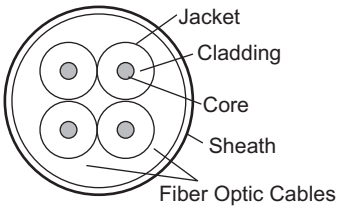
(*iii*) **Jacket.** The glass cladding is protected by a thin plastic jacket. A single glass is thinner than the size of a human hair. Thousands of these fibers are typically grouped together in bundles, protected by an outer sheath as shown in Figure 6.7.

Figure 6.6: Fiber optic cable



Notes

Figure 6.7: A bundle of fiber optic cables (End view)



Transmission of Data through Fiber Optic Cables. Twisted-pair and coaxial cables contain copper conductors and hence data is transmitted through them in the form of electrical signals (streams of electrons). However, through fiber optical cables, data is transmitted in the form of photons by following procedure:

(*i*) Digital electronic pulses at one end of the cable are translated into light pulses either by a laser or a light-emitting diode.

(*ii*) The light pulses travel along the core of the fiber and are kept there by the cladding which reflect the light back to the core.

(*iii*) When light pulses are reached at the other end of cable, a photo detector transforms the light pulses back into electrical pulses.

Advantages of Fiber Optical Cables

Fiber optic cables offer the following advantages over both Twisted-pair and Coaxial cables:

- A signal sent through fiber optic cable can travel to longer distances (about 30 km) without amplification. The coaxial cable, on the other hand, needs repeaters to amplify signals after every 1 Km and so.
- Fiber optic cables are free from interference by electromagnetic fields. Thus they provide better quality transmissions than both Twisted-pair and Coaxial cables.
- Fiber optic cables provide very high hand width (upto 1000 billion bps).
- Fibers do not leak light and are difficult to tap. Hence, they provide excellent security to data against potential wire tappers.

Disadvantages of Fiber Optic Cables

Fiber optic cables also have some disadvantages, which are discussed below:

- Fiber optic cables are more expensive to install than copper wire cables.
- They are difficult to maintain as they are mechanically weaker.
- It is difficult to make joints in fiber optic cable as joining requires special connector units.

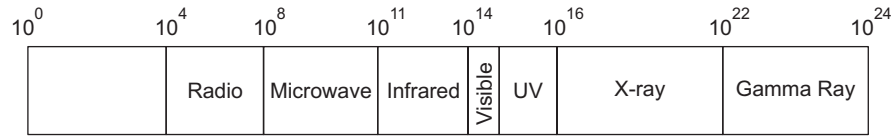
Uses of Fiber Optic Cables. Fiber optic cables are now being used in telephone networks by replacing coaxial cables in the major lines. As fiber optic cables provide high quality transmissions at very high hand width, they are being used for broadband services like thousands of television stations, videoconferencing and on-demand video.

6.6 Wireless Communication

Data can be transmitted between commuters and other electronic devices as electromagnetic signals through the air or empty space. Such transmission using electromagnetic signals such as radio waves microwaves or infrared waves is called Wireless communication. Various types of waves in an electromagnetic spectrum operate at different frequencies of transmission as shown in figure 6.8.

Notes

Figure 6.8: The electromagnetic spectrum



6.6.1 Radio Waves

Radio waves operate at frequencies ranging from 10^4 Hz to 10^8 Hz. They are easy to generate and can travel long distances by penetrating buildings easily. Hence, they are widely used for both indoors and outdoors communication. Another property of radio waves is that they travel in all directions from source, so that the transmitter and receiver do not have to be aligned physically.

Did u know? The properties of radio waves depend on the frequency. At low frequencies, radio waves pass through obstacles. Therefore, radio frequency transmission requires different broadcasting techniques for frequencies below 30 MHz and frequencies above 30 MHz.

In the VLF (Very Low frequency), LF (Low Frequency) and MF (Medium" Frequency) bands, radio waves follow the ground as shown in figure 6.9 while in the HF (High Frequency) and VHF (Very High Frequency) bands they bounced off the ions sphere as shown in figure 6.10. The ionosphere comprises the ionized gases in upper atmosphere caused by ultraviolet and X-ray radiation's is of sun, which are around 50 to 90 km above from earth surface.

Figure 6.9: Radio waves following the curvature of the earth

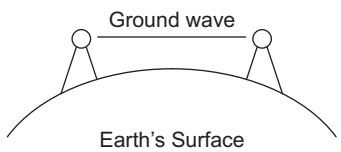
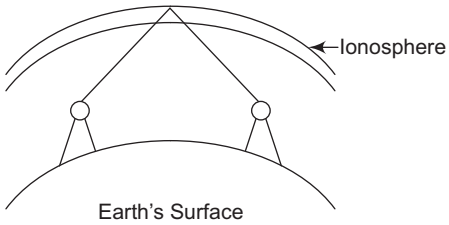


Figure 6.10: Radio waves bouncing off the ionosphere



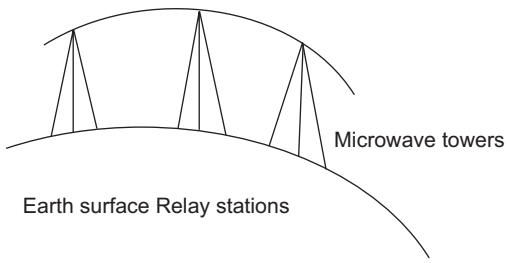
Uses of Radio Waves. Radio waves are mainly used to transmit radio programs. They are sometimes also used for data transmissions in a local area network within those buildings where wiring is difficult to make.

Notes

6.6.2 Microwave Towers

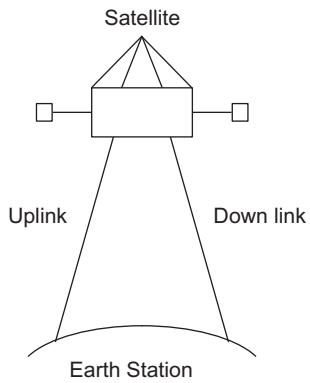
The frequencies of microwave portion of the electromagnetic spectrum range from 10^8 Hz (100 MHz) to 10^{11} Hz. Microwaves travels in straight lines and hence, can be narrowly focussed using a parabolic antenna like a satellite TV dish antenna. In microwave transmission, data is transmitted between remote locations through microwaves by means of receivers and transmitters placed at top of buildings or towers. The transmitting and receiving antennas must be accurately aligned with each other in a row in order to concentrate all the signals into a single beam as shown in figure 6.11. Since the microwaves travel in a straight line, the earth may get in the way if the towers are too far apart (like towers of two far away countries). Therefore, repeaters are required to relay signals at every 100-200 Km distance.

Figure 6.11: Microwave Communication



Satellite links use/microwave frequencies (4-12 GHz) with a satellite as a repeater as shown in figure 6.12. They have similar bandwidths as ground based microwave links. Why do satellite channels need microwaves in 4-12 GHz range? The main reason for this is that the microwaves in this range exhibit characteristics similar to light waves. For instance, the waves can travel in straight lines, can be reflected and can be focussed towards a particular receiving antenna.

Figure 6.12: Satellite Communication



Satellites using microwaves are geostationary. A geostationary satellite appears to be stationary to the earth ground station. This is due to fact that a geostationary satellite circles the earth at the equator at an altitude of 22,300 miles and travels at a speed that allows it to remain in a fixed position relative to the earth. A geostationary satellite is sufficient to provide continuous data communications, telephone and television communications to the entire world. The signals are transmitted to and received from these communications satellites by terrestrially based parabolic antennas.

Now-a-days scientists are planning to use many non-geostationary, low-orbit satellites for data communications instead of a single geo-stationary satellite. These satellites will not maintain the same position relative to earth and will use less power due to placing them in low-earth orbit.

Notes

Advantages of Microwave Communications

Microwave communications offer the following benefits over other media:

- It is relatively similar to set up a microwave communication system by just having a small plot of ground every 50 Km distance and putting a microwave tower on it.
- Microwave is relatively less expensive. The cost of making towers and installing antennas on them is cheaper than installing cables.
- A satellite link using microwave frequencies is the best medium of data transmission in a large geographical area (such as between two countries) for wireless networks.

Uses of Microwave Communications

Microwave communication is widely used in following areas:

- Long-distance telephone
- Cellular Telephones
- Television Distribution
- Wide Area Networks (WANs)

6.6.3 Infrared Waves

Infrared waves operate at frequencies ranging from 10^{11} to 10^{14} Hz. They are relatively directional, cheaper and easier to build. As they do not pass through solid walls, an infrared system in one room of a building do not interfere with similar systems in adjoining rooms.

Uses of Infrared Waves. The remote control used on televisions, VCRs, and stereos use infrared waves. In recent years, infrared wireless transmitters on cable television and remote control devices have gained popularity for exchanging data locally. Some laptops also have infrared devices for exchanging data with desktop PCs and peripherals such as keyboards, printers, etc.

Task Prepare a short note on wireless communication.

Self Assessment

State whether the following statements are true or false:

9. The core is surrounded by a glass having lower refractive index known as core.
10. The frequencies of microwave portion of the electro-magnetic spectrum range from 10^8 Hz to 10^{11} Hz.
11. A geostationary satellite appears to be stationary to the air ground station.
12. Radio waves are mainly used to transmit radio programs.

6.7 Summary

- Information and communications technology is usually called **ICT**.
- With the advent of ICTs, learning has become Web-based.
- The English word '**communication**' is derived from the Latin noun'**communis**' and the Latin verb '**communicare**' that means '**to make common**'.
- Communication is important both for an individual and also for the society. A person's need for communication is as strong and as basic as the need to eat, sleep and love.
- Communication provides knowledge, expertise and skills for smooth functioning by people in the society.

Notes

6.8 Keywords

ICT : Information and communications technology is often used as an extended synonym for information technology(IT), but is usually a more general term that stresses the role ofunified communications and the integration of telecommunications (telephone lines and wireless signals), computers, middleware as well as necessary software, storage- and audio-visual systems, which enable users to create, access, store, transmit, and manipulate information.

IM : Instant messaging (IM) is a form of real-time direct text-based chatting communication in push mode between two or more people using personal computers or other devices, along with shared clients.

Combination : The joining of two or more things or people.

Perception : The ability to see, hear or become aware of something through the senses.

6.9 Review Questions

1. Describe the role of ICT in society and education.
2. Explain briefly about the uses, advantages and disadvantages of ICT.
3. Define communication and its process.
4. Discuss the meaning and importance of communication.
5. Explain in detail the fundamental of communication media and the characteristics of each transmission.
6. What is wireless communication and its various types?

Answers : Self Assessment

1. ICT
2. ICT tools
3. Effective communication
4. The message must be received
5. (a)
6. (b)
7. (c)
8. (a)
9. True
10. True
11. False
12. True

6.10 Further Readings

Books

Best Careers. U.S. News & World Report USnews.com.

BLS Inflation Calculator, BLS.gov.

Occupational Outlook Handbook, 2010-11 Edition.

McCook, Kathleen de la Peña. *Introduction to Public Librarianship*,p. 65. Neal Schuman, 2011.

R. Hoetzlein. *The Organization of Human Knowledge: Systems for Interdisciplinary Research*. 2007.

Online links

http://unesdoc.unesco.org/images/0012/001295/129538e.pdf

http://www.nraismc.com/img/bscmcaj101b.pdf

Unit 7: Features and Scope of Communication

Notes

CONTENTS

Objectives
Introduction
7.1 Features and Scope of Communication
7.2 Techniques of Communication
7.3 Grapevine
7.4 Summary
7.5 Keywords
7.6 Review Questions
7.7 Further Readings

Objectives

After studying this unit, you will be able to:

- Describe the features of communication
- Discuss the scope of communication
- Explain the techniques of communication
- State briefly about Graperine.

Introduction

Communication generally involves two or more persons. It is a process between the two persons. Communication is very useful in communicating things. An effective communication is possible when the receiver gives the feedback. Effective communication has various features and Scope.

Some of the features and scopes are discussed as follows.

7.1 Features and Scope of Communication

Communication of message takes place through spoken or written words, pictures and in many other forms.

Notes In oral communication, the transmitter is the 'voice box' of the speaker.

The receiver of the message may be the human ear, which converts sound waves into a comprehensible form, which can be recognized by the human brain; a television receiver decodes the electromagnetic waves into recognizable visual representation. In the same manner, the reader, who can recognize and understand that particular language, can understand the printed message.

The process of communication involves a procedure consisting of only a few steps. The information source decides to communicate and encodes a message, transmits it through a channel to the receiver, which is then decoded and acted upon. There are noises or distortions in between the whole process. The main functions of communication are information, education, entertainment, enlightenment, and persuasion.

Therefore, the communication process should be designed as such so as to gain the attention of the receiver, use the signals, symbols, or codes that are easily understood by the receiver and it must

Notes

arouse needs in the receiver and suggest some ways out to satisfy these needs. Only then it can create the desired response.

However, communication should not be confused with mass communication, while communication is the activity of sharing, giving, imparting, receiving information, mass communication 'is a process in which professional communicators use communication media to disseminate messages widely, rapidly, simultaneously and continuously to arouse intended meanings in large and diverse audiences in an attempt to influence them in a variety of ways'.

Communication is a required skill at every level of organizational functioning. The effectiveness, with which a person will be able to perform in almost any organization, whether social, governmental or commercial, will depend in large measure upon the ability to communicate effectively.

Communication through Arbitrary Symbols

The civilization is reflected in three priceless possessions of mankind, the first is the human ability to think, the other is his innate capacity to communicate and the third is his species' specific competence to acquire and use the arbitrary symbols system of language. The gifts of civilization and all the branches of human knowledge have their origin from this ability to think in abstract and to communicate these thoughts through symbols of the language. Above all the other media of communication, language is the most significant because the human knowledge and relationships are gathered, stored and imparted through it. The process of communication permits us to use and reuse the experiences and knowledge from the past into the present and make it ready for use in future with the help of the symbols of communication, which stand for some abstract idea.

Task Define the transmitter and receiver in oral communication.

Human Interactions through Communication

Communication is the means by which people can contact with one another. The society in general or an organization of any type cannot exist without the relations that are built and strengthened by communication.

Throughout our lives, we are involved in communication situations.

Notes When we listen to the radio or watch the TV and films, when we buy or sell the products or services, when we manage our business and when we are involved in any other activity, we are invariably involved in communication situation.

When we talk and work with our colleagues, friends, subordinates, superiors, experts, teachers, students, family members and with the people in all walks of life, when we read and /or write the books, pamphlets, periodicals, special journals, reports, letters, memos, newspaper, etc. when we listen to or deliver speeches.

Communication Technology and Media

Human Behaviour is dominated by communication in all aspects of life to such an extent that we can aptly call him as a communicating creature. He has applied advanced science and technology of the tremendous development of communication system. With the help of dramatic inventions like printing press, telephone, telegraph, radar, telephoto, radio, television and many others device; we have made our modern communication instantaneous and effective.

The advanced technology of mass and telecommunication has attracted the attention of the experts and specialists in many fields. The artists, poets, writers, artisans, architects, etc., are exposed to

different subjects of interest by this technology and it helps them to conceive new creative thoughts and ideas. The technology, skills of using media and some concepts of communication are useful to psychologists in order to investigate certain problems of human behaviour and therapy.

The political as well as social traditions, myths, customs, styles of living, morals, etc. are passed from one generation to another or they are changed or destroyed with the help of communication media. The success of any commercial man depends upon his reception and transmission of information regarding the market, production, government laws, banking, innovations in modern technology, etc., computers play a vital role in receiving, storing, translating, analyzing and imparting the information for the mathematicians, chemists, physicists, engineers, etc.

Self Assessment

Fill in the blanks:

1. The process in which professional communicators use communication media to disseminate messages widely, rapidly, simultaneously and continuously to arouse intended meaning in large and diverse audience in an attempt to influence them in a variety of ways is called ..... .
2. In oral communication, the transmitter is the ..... of the speaker.

7.2 Techniques of Communication

Formal and Informal Communication

This differentiation of communication is mainly on the basis of situations. In situations like public speaking, mass communication, official communication, etc., formal communication is used. Here, language is used more precisely, and more attention is paid to grammar. Also we pay attention to our dress, posture, etc., formal communication occurs in the context of status differences.

Notes Informal communication takes place in case of informal and personal situations. Less attention is paid to structure of language and grammar.

Also less attention is pair to nonverbal behaviour like clothing, gait, posture, etc.

To communicate effectively in one has to identify and use both formal and informal communication channels. The channels of communication are the formal and informal ways of communicating with other people.

Formal communication channels relate to the structure of the organization. They include:

- Reporting relationships and policies
- Committee meetings
- Bulletin boards
- Participation in group events
- Internal newsletters.

Task State the role of formal and informal communication in public speaking.

The Benefits of Reporting Relationships

Reporting relationships help to address issues quickly and clearly, and to spread the communication workload. For instance, in most organizations your supervisor or manager will be your first point of contact, rather than the managing director or the head of another department.

Notes

This is useful because:

- The manager may meet with the other departments regularly and be able to answer the query.
- If there is a query the answer may be helpful for the colleagues and the manager can make sure that it can be passed on to everybody.

If most people in a department have the same question it is better that another department only has to answer the query once.

Policies and Procedures

Communication is the flow of information within an organization. It includes:

- Internal newsletters
- Notice boards
- Memos
- The intranet
- Internal customer service.

A **policy** is a statement that outlines how the organization will act on a particular issue. Who can access information? What information can be released internally and externally? When information can be released? What the organization aims to achieve by communicating?

A **procedure** is a step-by-step guide on how to carry out an activity in the workplace. Communication procedures provide guidelines on how to share certain types of information. A procedure on writing internal memos, for example, may include: A style guide, design template or the Instructions for distribution.

Participation in-group Events

Some casual events provide opportunities for arranging social gatherings in different departments of the firm. The informal atmosphere during the sport events, picnics, and parties offer spontaneous information from the employees to the firm.

Informal communication channels are those that develop through social interaction. They include:

- Conversations at break times
- Grapevines
- Consensus.

Conversations at Break Times

The telephone conversation and face-to-face conversation are the primary means of horizontal communication, which facilitate the coordinating activities of the organization. Today, the modern business houses on telephone services spend thousands of rupees. The telephonic communication cannot be as effective as the face-to-face communication because people cannot use facial expressions and gestures in telephone conversations. But it is possible to make it effective through modulations of voice.

Self Assessment

Multiple choice questions:

3. The statement that outlines, how the organization will act on a particular issue is called:
   (*a*) Memos (*b*) Procedures
   (*c*) Policy (*d*) Both (a) and (b).
4. Informal communication channel include:
   (*a*) Internal news letters (*b*) Notice boards
   (*c*) Grapevine (*d*) Policy.

Notes

7.3 Grapevine

Grapevine is an informal communication network, which ignores formal channels of communication and spreads rumors and gossips at all levels of the organization. Although, every business organization has its formal channels of communication, the informal channel of communication called grapevine also operates in it. It can be easily found that a large portion of the communication in almost every business house is not formal or pre-planned. The employees communicate through informal channels as they do their jobs. It is neither pre-planned nor deliberately motivated by the management. It is neither written nor documented or recorded. Therefore, it refers to any communication that takes place outside the prescribed and pre- planned channels of formal communication. It is not set with the lines of organizational hierarchy. As it has no set rules and regulations, it is not confined to a particular direction. It just spreads like a grapevine.

Importance of Grapevine

Though, the structure of the grapevine is not so well-defined, as that of the formal channels, it should not be taken for its weakness.

Notes The messages flowing through grapevine have greater speed than that of the messages flowing through the formal channels.

The grapevine may carry equally vital message through it for the achievement and success of the organization. It is not correct to underestimate the grapevine by saying that the vital messages pass only through the authorized, formal channels. On the other hand, though the formal channels are systematic, pre-planned and documented, it is authority-laden. It can never be as speedy and spontaneous as the grapevine. The employees communicate through grapevine, not because they are compelled to communicate but because they earnestly want to communicate with their associates.

The method of formal written communication is slow and expensive method of information transmission. The grapevine, on the other hand, is non-expensive method and most rapid oral method of transmitting the information to the maximum number of the communication receivers. The grapevine can flow wherever the participants wish it to flow; therefore, the manager can use the properly cultivated grapevine in dealing with the problems that require crossing the boundaries between the departments.

Task How Grapevine is non-expensive and most rapid oral method of information transmission?

Self Assessment

State whether the following statements are true or false:

5. Grapevine is an informal communication network which ignores formal channels of communication and spreads rumors and gossips at all levels of the organization.
6. The messages flowing through grapevine have greater speed than that of the messages flowing through formal channels.
7. Grapevine is the expensive and slow oral method of transmitting the information to the maximum number of the new communication receivers.

7.4 Summary

- Communication is a required skill at every level of organizational functioning.
- Communication is the means by which people can contact with one another.

Notes

- In situations like public speaking, mass communication, official communication, etc. formal communication is used.
- The telephone conversation and face-to-face conversation are the primary means of horizontal communication, which facilitate the coordinating activities of the organization.
- Grapevine is an informal communication network, which ignores formal channels of communication and spreads rumors and gossips at all levels of the organization.
- The method of formal written communication is slow and expensive method of information transmission.

7.5 Keywords

Communication : It is the activity of conveying information. It requires a sender, a message, and an intended recipient, although the receiver need not be present or aware of the sender's intent to communicate at the time of communication; thus communication can occur across vast distances in time and space. The communication process is complete once the receiver has understood the message of the sender.

Tremendous : Very great in size, amount, or intensity

Consensus : It refers to the primary way decisions are made on Wikipedia, and it is accepted as the best method to achieve our goals. General agreement about matter of opinion.

Grapevine : The term grapevine communication is often used interchangeably with the term informal communication.

7.6 Review Questions

1. Discuss the meaning of communication.
2. Analyze the features and scope of communication.
3. Explain the techniques of communication and uses.
4. Write a short note on Grapevine and its importance.

Answers : Self Assessment

1. Mass communication	2. voice box	3. (c)
4. (c)	5. True	6. True
7. False		

7.7 Further Readings

Books

Caperna A., *Integrating ICT into Sustainable Local Policies*.

Carnoy, Martin. *ICT in Education: Possibilities and Challenges*. Universitat Oberta de Catalunya, 2005.

Good Practice in Information and Communication Technology for Education. Asian Development Bank, 2009.

Grossman, G. and E. Helpman (2005), *Outsourcing in a global economy*, *Review of Economic Studies*.

Oliver, Ron. *The Role of ICT in Higher Education for the 21st Century: ICT as a Change Agent for Education*. University, Perth, Western Australia, 2002.

Online links

http://download.nos.org/srsec335new/ch1.pdf

http://www.skills2lead.com/techniques-for-effective-communication.html

http://www.managementstudyguide.com/grapevine_communication.html

Notes

Unit 8: Network Media

CONTENTS

Objectives
Introduction
8.1 Local Area Network
8.1.1 Advantages and Disadvantages of Local Area Network
8.2 Metropolitan Area Network
8.2.1 The Benefits of Metropolitan Area Network
8.3 Wide Area Network
8.3.1 Advantages and Disadvantages of Wide Area Network
8.4 Summary
8.5 Keywords
8.6 Review Questions
8.7 Further Readings

Objectives

After studying this unit, you will be able to:

- Discuss about the local area network
- Describe the metropolitan area network and its benefits
- Explain the wide area network
- State about the advantages and disadvantages of Wide Area Network.

Introduction

Network media (sometimes referred to as **networked media**) refers to media mainly used in computer networks such as the **Internet**.

Network media is essentially driven by technological development, emerging from the internet as a non-centralized medium in the late nineties; the term has more recently begun to be applied to both the arts and industry. The following features distinguish Network Media from classical media, such as broadcast media and the printed press:

- Network Media is typically democratic and decentralized. The audience can also be the contributors.
- Network Media often requires the involvement of computers as an input/output device.
- Network media requires a community to participate and consume.

With the rapidly increasing digital era, new aspects of digital networking are becoming more important. Essentially, network media is about co-operative/collaborative practice in which many can contribute to the production of "media".

The benefits of the development of inter-networking ultimately has allowed for greater political, social comment and discussion but is also widely thought of in a much broader context of globalization and the fragmentation of the world.

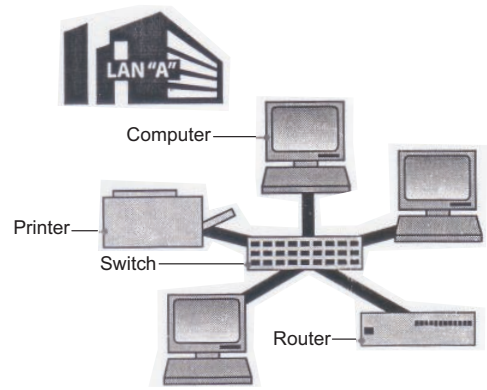
8.1 Local Area Network

A **local area network (LAN)** is a computer network that connects computers and devices in a limited geographical area such as home, school, computer laboratory or office building. The defining

Notes

characteristics of LANs, in contrast to wide area networks (WANs), include their usually higher data-transfer rates, smaller geographic area, and lack of a need for leased telecommunication lines.

Figure 8.1: LAN Network-Linking individual work-stations, usually less than a mile apart



ARCNET, Token Ring and other technology standards have been used in the past, but Ethernet over twisted pair cabling and Wi-Fi are the two most common technologies currently in use.

As larger universities and research labs obtained more computers during the late 1960s, there was an increasing pressure to provide high-speed interconnections. A report in 1970 from the Lawrence Radiation Laboratory detailing the growth of their "Octopus" network gives a good indication of the situation.

Did u know? Cambridge Ring was developed at Cambridge University in 1974 but was never developed into a successful commercial product.

Ethernet was developed at Xerox PARC in 1973-1975, and filed as U.S. Patent 4,063,220. In 1976, after the system was deployed at PARC, Metcalfe and Boggs published a seminal paper, "Ethernet: Distributed Packet-Switching for Local Computer Networks."

ARCNET was developed by Data point Corporation in 1976 and announced in 1977. It had the first commercial installation in December 1977 at Chase Manhattan Bank in New York.

Standards Evolution

The development and proliferation of CP/M-based personal computers from the late 1970s and then DOS-based personal computers from 1981 meant that a single site began to have dozens or even hundreds of computers. The initial attraction of networking these was generally to share disk space and laser printers, which were both very expensive at the time. There was much enthusiasm for the concept and for several years, from about 1983 onward, computer industry pundits would regularly declare the coming year to be "the year of the LAN".

In practice, the concept was marred by proliferation of incompatible physical Layer and network protocol implementations, and a plethora of methods of sharing resources. Typically, each vendor would have its own type of network card, cabling, protocol, and network operating system. A solution appeared with the advent of Novell NetWare which provided even-handed support for dozens of competing card/cable types, and a much more sophisticated operating system than most of its competitors. Netware dominant in the personal computer LAN business from early after its introduction in 1983 until the mid 1990s when Microsoft introduced Windows NT Advanced Server and Windows for Workgroups.

Banyan Vines had comparable technical strengths, but Banyan never gained a secure base. Microsoft and 3Com worked together to create a simple network operating system which formed the base of

Notes

3Com's 3+Share, Microsoft's LAN Manager and IBM's LAN Server- but none of these were particularly successful.

During the same period, Unix computer workstations from vendors such as Sun Microsystems, Hewlett-Packard, Silicon Graphics, Intergraph, NeXT and Apollo were using TCP/IP based network. Although, this market segment is now much reduced, the technologies developed in this area continue to be influential on the Internet and in both Linux and Apple Mac OS X networking-and the TCP/IP protocol have now almost completely replaced IPX, AppleTalk, NBF, and other protocols used by the early PC LANs.

Cabling

Early LAN cabling had always been based on various grades of coaxial cable. However, shielded twisted pair was used in IBM's Token Ring implementation, and in 1984 Star LAN showed the potential of simple unshielded twisted pair by using Cat3-the same simple cable used for telephone systems. This led to the development of 10Base-T (and its successors) and structured cabling which is still the basis of most commercial LANs today. In addition, fiber-optic cabling is increasingly used in commercial applications.

As cabling is not always possible, wireless Wi-Fi is now the most common technology in residential premises, as the cabling required is minimal and it is well suited to mobile laptops and smart phones.

Technical Aspects

Network topology describes the layout pattern of interconnections between devices and network segments. Switched Ethernet has been for some time the most common Data Link Layer and Physical Layer implementation for local area networks. At the higher layers, the Internet Protocol (TCP/IP) has become the standard. Smaller LANs generally consist of one or more switches linked to each other, often at least one is connected to a router, cable modem, or ADSL modem for Internet access.

Larger LANs are characterized by their use of redundant links with switches using the spanning tree protocol to prevent loops, their ability to manage differing traffic types via quality of service (QoS), and to segregate traffic with VLANs. Larger LANs also contain a wide variety of network devices such as switches, firewalls, routers, load balancers, and sensors.

Task Write short note on LAN.

LANs may have connections with other LANs via leased lines, leased services, or by tunneling across the Internet using virtual private network technologies. Depending on how the connections are established and secured in a LAN, and the distance involved, a LAN may also be classified as metropolitan area network (MAN) or wide area networks (WAN).

8.1.1 Advantages and Disadvantages of Local Area Network

Advantages

1. Easier to maintain than a WAN
2. More secure
3. Better connectivity
4. Often easier to configure than a WAN.

Disadvantages

1. You often only have 1(one) access point.
2. It limits the Area.

Notes

Self Assessment

Fill in the blanks:

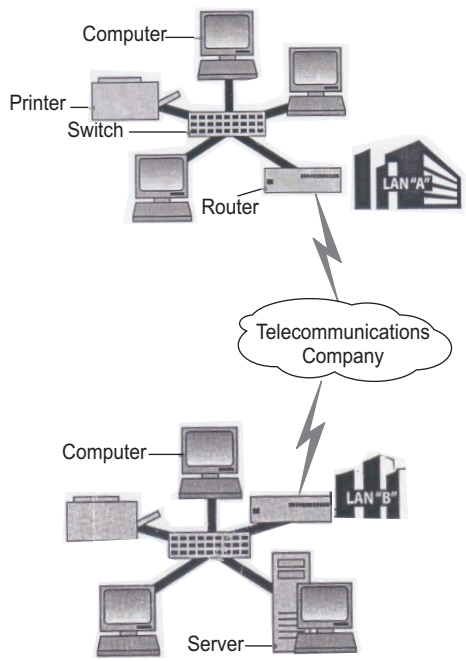
1. A ..... is a computer network that connects computers and devices in a limited geographical area such as home, school, computer, laboratory or office building.
2. Ethernet was developed at xerox PARC in the year ..... .
3. ARCNET was developed by Data point corporation in 1976 and announced in the year ..... .

8.2 Metropolitan Area Network

A **metropolitan area network** (**MAN**) is a computer network that usually spans a city or a large campus. A MAN usually interconnects a number of local area networks (LANs) using a high-capacity backbone technology, such as fiber-optical links, and provides up-link services to wide area networks (or WAN) and the Internet.

The IEEE 802-2002 standard describes a MAN as being:

Figure 8.2: MAN Network-typically linking LANs across a city/campus



A MAN is optimized for a larger geographical area than a LAN, ranging from several blocks of buildings to entire cities. MANs can also depend on communications channels of moderate-to-high data rates. A MAN might be owned and operated by a single organization, but it usually will be used by many individuals and organizations. MANs might also be owned and operated as public utilities. They will often provide means for internetworking of local networks.

Task Define the uses of MAN.

A Metropolitan Area Network (MAN) is a large computer network that spans a metropolitan area or campus.

Notes

Notes MANs geographic scope falls between a WAN and LAN. MANs provide Internet connectivity for LANs in a metropolitan region, and connect them to wider area networks like the Internet. It can also be used in cable television.

Implementation

Some technologies used for this purpose are Asynchronous Transfer Mode (ATM), FDDI, and SMDS. These technologies are in the process of being displaced by Ethernet-based connections (*e.g.*, Metro Ethernet) in most areas. MAN links between local area networks have been built without cables using microwave, radio, or infrared laser links.

Did u know? Most companies rent or lease circuits from common carriers due to the fact that laying long stretches of cable can be expensive.

DQDB, Distributed-queue dual-bus, is the metropolitan area network standard for data communication. It is specified in the IEEE 802.6 standard. Using DQDB, networks can be up to 20 miles (30 km) long and operate at speeds of 34 to 155 Mbit/s.

8.2.1 The Benefits of Metropolitan Area Network

Technology is continually advancing in this modern world and almost everyday, new technologies are innovated and released out of the market. Advancement of technology is visible in the field of computer networking. If Local Area Network was the only invention yesterday, it has already progressed to a higher version which is the Wide Area Network. To bridge the two types of network, one of the newest technologies today is MAN - Metropolitan Area Network.

The Metropolitan Area Network is designed to connect networks in a metropolitan area, city, campus, community, etc. It is wider than the Local Area Network which can only be used in one building, floor or wide room. But, it is not as big as the Wide Area Network which goes beyond one area or city to another location. The coverage of Metropolitan area network in terms of geography is between LAN and WAN.

MAN can cover several blocks and buildings depending on the communication channels of an area. It can reach from 5 to 50 kilometers in one area. The MAN may be used to connect several LAN in order to create a big network. That is why it is often used in business establishment that has several branches near each other. Universities and large campus also use the Metropolitan Area Network nowadays.

To connect several Local Area Networks, MAN uses backbone line usually made up of fiber optic. Fiber optic runs in subway tunnels in order to connect the networks in an area using MAN. The advantage of using fiber optic is it can be replaceable with other types of fiber with higher quality. Fiber will be replaced once in a while as needed or there is need to upgrade to another advance type of network in the future.

Some Metropolitan Area Network owners use infrared or radio laser links. It is because using cables may be expensive especially that it has to cover a couple of kilometers to link networks. The maximum distance that MAN can handle is 50 kilometers and a fiber optic cable this long will be very expensive to install. Those organizations or campuses using MAN with just few distances in between networks can use the cables.

Using MAN is an advantage because it has high speed network access. It serves several protocols such as IEEE 802.6 Distributed Queue Dual Bus Defined (DQDB), IEEE 802.16 Broadband Wireless MAN Standard (WIMAX), Asynchronous Transfer Mode Protocol (ATM) and many more. Among all protocols, the standard one used in MAN is the DQDB where it allows up to 30 kilometer distance between networks with speed of 34-155 Megabytes per second.

Notes

Many companies, campuses and local governments are slowly switching to MAN - Metropolitan Area Network. This is because of the advantages that MAN offers and the convenience it brings to clients. Having small networks compounded into a large network such as in MAN provides security for the communication shared in between the networks.

Self Assessment

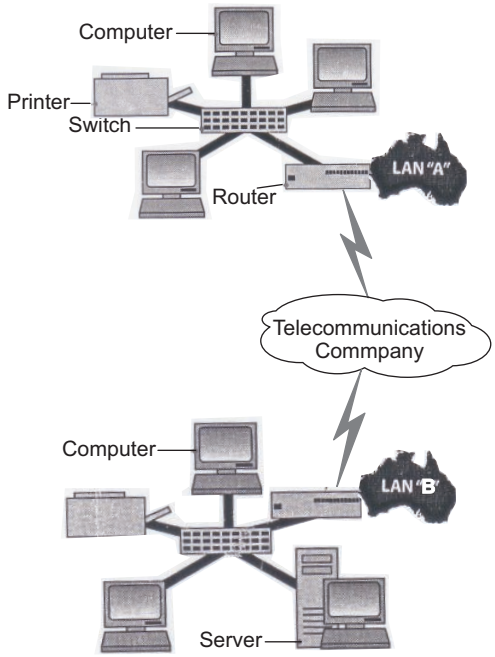
Multiple choice questions:

4. A computer network that usually spans a city or a large campus is known as:
   (*a*) LAN (*b*) MAN (*c*) WAN (*d*) TAN.
5. The geographical scope of metropolitan area network falls between:
   (*a*) WAN and LAN (*b*) MAN and LAN
   (*c*) WAN and MAN (*d*) All of these.

8.3 Wide Area Network

A **wide area network** (**WAN**) is a computer network that covers a broad area (*i.e.*, any network whose communications links cross metropolitan, regional, or national boundaries). This is in contrast with personal area networks (PANs), local area networks (LANs), campus area networks (CANs), or metropolitan area networks (MANs) which are usually limited to a room, building, campus or specific metropolitan area (*e.g.*, a city) respectively.

Figure 8.3: WAN Network-linking LANs and other networks over large areas



Design Options

WANs are used to connect LANs and other types of networks together, so that users and computers in one location can communicate with users and computers in other locations. Many WANs are built for one particular organization and are private. Others, built by Internet service providers, provide connections from an organization's LAN to the Internet. WANs are often built using

Notes

leased lines. At each end of the leased line, a router connects to the LAN on one side and a hub within the WAN on the other. Leased lines can be very expensive. Instead of using leased lines, WANs can also be built using less costly circuit switching or packet switching methods. Network protocols including TCP/IP deliver transport and addressing functions. Protocols including Packet over SONET/SDH, MPLS, ATM and Frame relay are often used by service providers to deliver the links that are used in WANs. X.25 was an important early WAN protocol, and is often considered to be the "grandfather" of Frame Relay as many of the underlying protocols and functions of X.25 are still in use today (with upgrades) by Frame Relay.

Academic research into wide area networks can be broken down into three areas: mathematical models, network emulation and network simulation.

Performance improvements are sometimes delivered via wide area file services or WAN optimization.

Connection Technology Options

Several options are available for WAN connectivity:

Option:	*Description*	*Advant-ages*	*Disadvan-tages*	*Band-width range*	*Sample protocols used*
Leased line	Point-to-Point connection between two computers or Local Area Networks (LANs)	Most secure	Expensive		PPP, HDLC, SDLC, HNAS
Circuit switching	A dedicated circuit path is created between end points. Best example is dialup connections	Less Expensive	Call Set-up	28 - 144 kbit/s	PPP, ISDN
Packet switching	Devices transport packets via a shared single point-to-point or point-to-multipoint link across a carrier internetwork. Variable length packets are transmitted over Permanent Virtual Circuits (PVC) or Switched Virtual Circuits (SVC)		Shared media across link		X.25 Frame-Relay
Cell relay	Similar to packet switching, but uses fixed length cells instead of variable length packets. Data is divided into fixed-length cells and then transported across virtual circuits	Best for simulta-neous use of voice and data	Overhead can be consider-able		ATM

Transmission rates usually range from 1200 bit/s to 24 Mbit/s, although some connections such as ATM and Leased lines can reach speeds greater than 156 Mbit/s. typical communication links used in WANs are telephone lines, microwave links & satellite channels.

Recently with the proliferation of low cost of Internet connectivity many companies and organizations have turned to VPN to interconnect their networks, creating a WAN in that way. Companies such as Cisco, New Edge Networks and Check Point offer solutions to create VPN networks.

8.3.1 Advantages and Disadvantages of Wide Area Network

Advantages

1. Broader reception area.
2. More recievable connections available
3. Portablility (if you use a laptop)

Notes

Disadvantages

1. Not as much security as a LAN
2. If the Hub goes down your network goes down
3. Less reception with a WAN than a LAN

Self Assessment

State whether the following statements are true or false:

6. A local area network is a computer network that covers a broad area i.e., any network whose communication links cross metropolitan, regional, or national boundaries.
7. CANs stands for campus area networks.
8. WANs are used to connect LANs and other types of networks together so that users and computers in one location can communicate with users and computers in other locations.

8.4 Summary

- A local area network (LAN) is a computer network that connects computers and devices in a limited geographical area such as home, school, computer laboratory or office building.
- ARCNET was developed by Data point Corporation in 1976 and announced in 1977.
- A metropolitan area network (MAN) is a computer network that usually spans a city or a large campus.
- A wide area network (WAN) is a computer network that covers a broad area (*i.e.*, any network whose communications links cross metropolitan, regional, or national boundaries).
- WANs are used to connect LANs and other types of networks together, so that users and computers in one location can communicate with users and computers in other locations

8.5 Keywords

Implementation : It is the realization of an application, or execution of a plan, idea, model, design, specification, standard, algorithm, or policy. In computer science, an implementation is a realization of a technical specification or algorithm as a program, software component, or other computer system through programming and deployment.

Enthusiasm : A strong feeling of excitement or interest.

WAN : A wide area network (WAN) is a telecommunication network that covers a broad area (*i.e.*, any network that links across metropolitan, regional, or national boundaries).

LAN : A local area network (LAN) is a computer network that interconnects computers in a limited area such as a home, school, computer laboratory, or office building.

MAN : A metropolitan area network (MAN) is a computer network that usually spans a city or a large campus.

8.6 Review Questions

1. Describe the Local area network in detail.
2. Discuss the meaning of MAN and its implementation.
3. What is wide area Network? Explain its design options and connection technology options.
4. Differentiate between LAN and MAN.
5. Explain the benefits of Metropolitan area network.

7. true

Answers : Self Assessment

Notes

1. Local area network
2. 1973 - 1975
3. 1977
4. (b)
5. (a)
6. False
7. True
8. True

8.7 Further Readings

Books

Best Careers. U.S. News & World Report USnews.com.

BLS Inflation Calculator, BLS.gov.

Occupational Outlook Handbook, 2010-11 Edition.

McCook, Kathleen de la Peña. *Introduction to Public Librarianship*, p. 65. Neal Schuman, 2011.

R. Hoetzlein. *The Organization of Human Knowledge: Systems for Interdisciplinary Research. 2007.*

Online links

http://compnetworking.about.com/cs/lanvlanwan/g/bldef_lan.htm

http://www.erg.abdn.ac.uk/~gorry/eg3561/intro-pages/man.html

http://www.erg.abdn.ac.uk/~gorry/eg3561/intro-pages/wan.html

Notes

Unit 9: Intranet

CONTENTS

Objectives
Introduction
9.1 Intranet
9.2 Uses of Intranet
9.3 Benefits of Intranet
9.4 Planning and Creation of Intranet
9.5 Summary
9.6 Keywords
9.7 Review Questions
9.8 Further Readings

Objectives

After studying this unit, you will be able to:

- Discuss an intranet in a computer network
- State the uses of intranet
- Explain benefits of Intranet
- Describe the planning and creation of Intranet.

Introduction

In this unit, we will discuss about intranet and their uses benefits of Intranet, planning and creation of Internet. Some of them are discussed as follows.

9.1 Intranet

An **intranet** is a computer network that uses Internet Protocol technology to securely share any part of an organization's information or network operating system within that organization. The term is used in contrast to internet, a network between organizations, and instead refers to a network within an organization. Sometimes, the term refers only to the organization's internal website, but may be a more extensive part of the organization's information technology infrastructure. It may host multiple private websites and constitute an important component and focal point of internal communication and collaboration. Any of the well known Internet protocols may be found in an intranet, such as HTTP (web services), SMTP (e-mail), and FTP (file transfer protocol). Internet technologies are often deployed to provide modern interfaces to legacy information systems hosting corporate data.

An intranet can be understood as a private analog of the Internet, or as a private extension of the Internet confined to an organization.

Did u know? The first intranet websites and home pages began to appear in organizations in 1996-1997.

Although, not officially noted, the term intranet first became common-place among early adopters, such as universities and technology corporations, in 1992.

Notes

Intranets have also contrasted with extranets. While intranets are generally restricted to employees of the organization, extranets may also be accessed by customers, suppliers, or other approved parties. Extranets extend a private network onto the Internet with special provisions for authentication, authorization and accounting (AAA protocol).

In many organizations, intranets are protected from unauthorized external access by means of a network gateway and firewall. For smaller companies, intranets may be created simply by using private IP ranges, such as 192.168.*.*. In these cases, the intranet can only be directly accessed from a computer in the local network; however, companies may provide access to off-site employees by using a virtual private network. Other security measures may be used, such as user authentication and encryption.

Alternatively, the intranet domain may be publicly accessible, but users would need to log in before they could view most of the content.

Self Assessment

Fill in the blanks:

1. An ..... is a computer network that uses internet protocol technology to securely share any part of an organizations information or network operating system within that organization.
2. The first intranet websites and home pages began to appar in organisations in the year ..... .
3. FTP stands for ..... .

9.2 Uses of Intranet

Intranets are being used to deliver tools and applications, *e.g.*, collaboration (to facilitate working in groups and teleconferencing) or sophisticated corporate directories, sales and customer relationship management tools, project management etc., to advance productivity.

Intranets are also being used as corporate culture-change platforms. For example, large numbers of employees discussing key issues in an intranet forum application could lead to new ideas in management, productivity, quality, and other corporate issues.

In large intranets, website traffic is often similar to public website traffic and can be better understood by using web metrics software to track overall activity. User surveys also improve intranet website effectiveness. Larger businesses allow users within their intranet to access public internet through firewall servers. They have the ability to screen messages coming and going keeping security intact.

Task Define role of intranet in corporate culture.

When part of an intranet is made accessible to customers and others outside the business, that part becomes part of an extranet. Businesses can send private messages through the public network, using special encryption/decryption and other security safeguards to connect one part of their intranet to another.

Intranet user-experience, editorial, and technology go together to produce in-house sites, or some combination of these.

Notes Most commonly, intranets are managed by the communications, HR or CIO departments of large organizations.

Notes

Because of the scope and variety of content and the number of system interfaces, intranets of many organizations are much more complex than their respective public websites. Intranets and their use are growing rapidly. According to the Intranet design annual 2007 from Nielsen Norman Group, the number of pages on participants' intranets averaged 200,000 over the years 2001 to 2003 and has grown to an average of 6 million pages over 2005-2007.

Self Assessment

Multiple choice questions:

4. Choose which one is correct:
   (*a*) Intranets are used to deliver tools and application in sales and customer relationship management tools to advance productivity.
   (*b*) Internets are used in factory for advance productivity.
   (*c*) Internets are used company worksers to get more productivity.
   (*d*) None of these.
5. Most commonly intranets are managed by the communications ..... departments of large organizations.
   (*a*) HR or CIO
   (*b*) Manager or receptionist
   (*c*) HR or Accounts
   (*d*) Accounts or CRM.

9.3 Benefits of Intranet

- **Workforce productivity:** Intranets can help users to locate and view information faster and use applications relevant to their roles and responsibilities. With the help of a web browser <http://en.wikipedia.org/wiki/Web_browser> interface, users can access data held in any database the organization wants to make available, anytime and subject to security provisions - from anywhere within the company workstations, increasing employees' ability to perform their jobs faster, more accurately, and with confidence that they have the right information. It also helps to improve the services provided to the users.
- **Time:** Intranets allow organizations to distribute information to employees on an as needed basis; Employees may link to relevant information at their convenience, rather than being distracted indiscriminately by electronic mail.
- **Communication:** Intranets can serve as powerful tools for communication within an organization, vertically and horizontally. From a communications standpoint, intranets are useful to communicate strategic initiatives that have a global reach throughout the organization. The type of information that can easily be conveyed is the purpose of the initiative and what the initiative is aiming to achieve. Some examples of communication would be chat, email, and or blogs. A great real world example of where an intranet helped a company communicate is when Nestle had a number of food processing plants in Scandinavia. Their central support system had to deal with a number of queries everyday. When Nestle decided to invest in an intranet, they quickly realized the savings. McGovern says the savings from the reduction in query calls was substantially greater than the investment in the intranet.

Notes Web publishing allows cumbersome corporate knowledge to be maintained and easily accessed throughout the company using hypermedia and Web technologies.

- **Examples include:** employee manuals, benefits documents, company policies, business standards, news feeds, and even training, can be accessed using common Internet standards (Acrobat files, Flash files, CGI applications). Because each business unit can update the online copy of a document, the most recent version is usually available to employees using the intranet.

Notes

- **Business operations and management:** Intranets are also being used as a platform for developing and deploying applications to support business operations and decisions across the internet worked enterprise.
- **Cost-effective:** Users can view information and data via web-browser rather than maintaining physical documents such as procedure manuals, internal phone list and requisition forms. This can potentially save the business money on printing, duplicating documents, and the environment as well as document maintenance overhead. For example, People soft "derived significant cost savings by shifting HR processes to the intranet". McGovern goes on to say the manual cost of enrolling in benefits was found to be USD109.48 per enrollment.

  "Shifting this process to the intranet reduced the cost per enrollment to $21.79; a saving of 80 percent". Another company that saved money on expense reports was Cisco.

Did u know? In 1996, Cisco processed 54,000 reports and the amount of dollars processed was USD19 million.

- **Enhance collaboration:** Information is easily accessible by all authorized users, which enables teamwork.
- **Cross-platform capability:** Standards-compliant web browsers are available for Windows, Mac, and UNIX.
- **Built for one audience:** Many companies dictate computer specifications which, in turn, may allow Intranet developers to write applications that only have to work on one browser (no cross-browser compatibility issues). Being able to specifically address your "viewer" is a great advantage. Since Intranets are user-specific (requiring database/network authentication prior to access), you know exactly who you are interfacing with and can personalize your Intranet based on role (job title, department) or individual.
- **Promote common corporate culture:** Every user has the ability to view the same information within the Intranet.
- **Immediate updates:** When dealing with the public in any capacity, laws, specifications, and parameters can change. Intranets make it possible to provide your audience with "live" changes so they are kept up-to-date, which can limit a company's liability.
- **Supports a distributed computing architecture:** The intranet can also be linked to a company's management information system, for example, a time keeping system.

Task Explain how intranet helps to increase workforce productivity.

9.4 Planning and Creation of Intranet

Most organizations devote considerable resources into the planning and implementation of their intranet as it is of strategic importance to the organization's success. Some of the planning would include topics such as:

- The purpose and goals of the intranet
- Persons or departments responsible for implementation and management
- Functional plans, information architecture, page layouts, design
- Implementation schedules and phase-out of existing systems
- Defining and implementing security of the intranet
- How to ensure it is within legal boundaries and other constraints
- Level of interactivity (*e.g.*, wikis, on-line forms) desired
- Is the input of new data and updating of existing data to be centrally controlled or developed.

Notes

These are in addition to the hardware and software decisions (like content management systems), participation issues (like good taste, harassment, confidentiality), and features to be supported.

Intranets are often static sites. Essentially they are a shared drive, serving up centrally stored documents alongside internal articles or communications (often one-way communication). However, organizations are now starting to think of how their intranets can become a 'communication hub' for their team by using companies specializing in 'socialising' intranets. The actual implementation would include steps such as:

- Securing senior management support and funding.
- Business requirements analysis.
- Identify users' information needs.
- Installation of web server and user access network.
- Installing required user applications on computers.
- Creation of document framework for the content to be hosted.
- Users' involvement in testing and promoting the use of intranet.
- Ongoing measurement and evaluation, through benchmarking against other intranets.

Another useful component in an intranet structure is to maintain the Intranet. For feedback on the intranet, social networking can be done through a forum for users to indicate what they want and what they do not like.

Self Assessment

State whether the following statements are true or false:

6. Intranets can serve as powerful tools for communication within an organization vertically and horizontally.
7. Intranets does not promote common corporate culture.
8. Most organizations devote considerable resources into the planning and implementation of their intranet as it is of strategic importance to the organizations success.

9.5 Summary

- An intranet is a computer network that uses Internet Protocol technology to securely share any part of an organization's information or network operating system within that organization.
- Intranets are being used to deliver tools and applications, *e.g.*, collaboration (to facilitate working in groups and teleconferencing) or sophisticated corporate directories, sales and customer relationship management tools, project management etc., to advance productivity.
- Intranets can serve as powerful tools for communication within an organization, vertically and horizontally.
- Users can view information and data via web-browser rather than maintaining physical documents such as procedure manuals, internal phone list and requisition forms.
- The intranet can also be linked to a company's management information system, for example a time keeping system.

9.6 Keywords

Intranet : An intranet is a computer network that uses Internet Protocol technology to securely share any part of an organization's information or network operating system within that organization. It is the connection of computer networks in a local area.

Fragmentation : In computer storage, fragmentation is a phenomenon in which storage space is used inefficiently, reducing storage capacity and in most cases reducing the performance.

Notes

HTTP : The Hypertext Transfer Protocol (HTTP) is an application protocol for distributed, collaborative, hypermedia information systems. HTTP is the foundation of data communication for the World Wide Web.

Productivity : The state or quality of producing something.

9.7 Review Questions

1. Write briefly on Intranet.
2. Explain in detail about intranet.
3. Explain the uses of intranet.
4. Describe the benefits of intranet.
5. Discuss the planning and creation of intranet.

Answers : Self Assessment

1. Intranet	2. 1996-1997	3. File transfer protocols
4. (a)	5. (a)	6. True
7. False	8. True	

9.8 Further Readings

Books

Shelly, Gary, et al. *Discovering Computers* 2003 Edition.

Cisco Systems, Inc., (2003, March 14). *CCNA: network media types*. Retrieved from ciscopress.com.

Wendell Odom,Rus Healy, Denise Donohue. (2010) *CCIE Routing and Switching*. Indianapolis, IN: Cisco Press

Andrew S. Tanenbaum, *Computer Networks*.

Online links

http://compnetworking.about.com/cs/intranets/g/bldef_intranet.htm

http://www.freewimaxinfo.com/intranet-uses.html

http://www.freewimaxinfo.com/intranet-advantages-disadvantages.html

Notes

Unit 10: Classification of Libraries

CONTENTS

Objectives
Introduction
10.1 Digital Library
10.1.1 Digital Library: Concept and Definition
10.1.2 Characteristics of Digital Libraries
10.1.3 Scope of Digital Libraries
10.1.4 Recent Development
10.2 Construction and Organization of Digital Library
10.3 Challenges of Digital Library
10.4 World Wide Web Virtual Library
10.5 Hybrid Library
10.6 Recent Library Developments
10.7 Summary
10.8 Keywords
10.9 Review Questions
10.10 Further Readings

Objectives

After studying this unit, you will be able to:

- Discuss digital library
- Explain construction and organization of digital library
- Describe challenges of digital library
- Explain World Wide Web Virtual Library
- Define hybrid Library
- Discuss recent library developments.

Introduction

Library science (or Library and Information science) is an interdisciplinary field that applies the practices, perspectives, and tools of management, information technology, education, and other areas to libraries; the collection, organization, preservation, and dissemination of information resources; and the political economy of information.

Did u know? The first school for library science was founded by Melvil Dewey at Columbia University in 1887.

Historically, library science has also included archival science. This includes how information resources are organized to serve the needs of selected user groups, how people interact with classification systems and technology, how information is acquired, evaluated and applied by people in and outside of libraries as well as cross-culturally, how people are trained and educated for careers in libraries, the ethics that guide library service and organization, the legal status of libraries and information resources, and the applied science of computer technology used in documentation and records management.

Notes

There is no generally agreed-upon distinction between the terms library science, librarianship, and library and information science, and to a certain extent they are interchangeable, perhaps differing most significantly in connotation. The term **library and information science** (LIS) is most often used; most librarians consider it as only a terminological variation, intended to emphasize the scientific and technical foundations of the subject and its relationship with information science. LIS should not be confused with information theory, the mathematical study of the concept of information. LIS can also be seen as an integration of the two fields' library science and information science, which were separate at one point.

Notes Library philosophy has been contrasted with library science as the study of the aims and justifications of librarianship as opposed to the development and refinement of techniques.

Task Define library science.

10.1 Digital Library

The term digital library has a variety of meanings ranging from a digital collection of material that one might find in a traditional library to the collection of all digital information along with the services that make that information useful to all possible users. Digital libraries have evolved as a result of fast technological development in order to cater to the needs of individuals with varying interests in various fields. Although the term digital library has gained popularity in recent years, such libraries they have evolved along the technological ladder for the past 30 years. There is lot of interest in digital libraries today. This is reflected in the fact that an advanced Altar Vista search conducted in early July 1996, on "digital library" or "digital libraries" retrieved about 20000 entries.

In spite of the plethora of literature it is not clear what we mean by the term "digital library". The term is rarely defined, or even characterized. It has been applied to an extraordinary range of applications from digital collaboratories to collection of electronic journals, software agents that support inquiry based education, collection of e-mail and similar objects, electronic version of a public library, personal library collection and the entire internet among others. It is not easy to see what these have in common except for their digitization. A digital library contains digital representation of the object found in it.

Most understanding of "digital library" probably also assume that it will be accessible via the internet, though not necessarily to everyone. But the idea of digitization is perhaps the only characteristic of a digital library on which there is universal agreement. Digital library is popularly viewed as an electronic version of a library. The term digital library evokes a different impression in various groups. To some it simply means computerization of traditional libraries. But to others who have studied library science, it indicates carrying out the function of libraries in a new way, encompassing new types of information resources, new approaches to acquisition, new methods of storage and preservation, more reliance on electronic systems and networks. But to a computer professional, a digital library is simply a distributed text-based information system, a collection of distributed information service, etc. A digital library is a library of digital documents, artifacts and records. The advantage of having library material in digital form are: (*i*) the content occupies less space and can be replicated and used electronically, *(ii)* the content can be made available on networks, *(iii)* the search for content can be automated.

10.1.1 Digital Library: Concept and Definition

The working group of the US Government's Information infrastructure Technology and Applications defined the digital library as 'system' providing user with a coherent access to a very large organised depository of information and knowledge. R.R. Larson defined digital

Notes

library as a global virtual library—the libraries of thousands of "networked electronic libraries". The digital library need not be networked. A digital library is a library which has all the information in electronic form and having electronic devices to have access to the digitized information. Thus digital library is a library which has number of machine-readable publications and facilities for remote access to several databases.

The American Digital Library Federation has defined the digital library as "Digital libraries are organizations that provide the resources, including the specialized staff, to select, structure, offer intellectual access to, interpret, distribute, preserve the integrity of, and ensure the persistence overtime of collection of digital works so that they are readily and economically available for use by a defined community or set of communities." The definition of a digital library can be given as a set of characteristics as follows:

The digital library is:

- a collection of services
- a collection of information objects
- a supporting users with information objects
- organization and presentation of those objects
- available directly or indirectly
- electronic/digital availability

A digital library is much more than just the collection of material in its depositories. It provides a variety of services to all of its users. The basis of the digital library is the information objects that provide the content in the form of digital resource. The goal of the digital library is to satisfy user needs for management, access, storage and manipulation of the variety of information stored in the collection of material that represents the holding of the library. The information objects may be digital objects or they may be in other media but represented in the library via digital means *e.g.,* metadata). They may be available directly over the network or indirectly. Although the object may not even be electronic, and although the objects themselves may not be available directly over the network, they must be represented electronically in some manner.

There are many definitions of a digital library. The terms such as "electronic library" and virtual library are often used synonymously. The elements that have been identified as common to these definitions 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 service are transparent to the end user.
- 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 cannot be represented or distributed in printed formats.

The aim of a digital library may be to expedite the systematic development of digital resources collection; the means to collect, store and organise information and knowledge in digital form.

A **digital library** is a library in which collections are stored in digital formats (as opposed to print, microform, or other media) and accessible by computers. The digital content may be stored locally, or accessed remotely via computer networks. A digital library is a type of information retrieval system.

In the context of the DELOS, a Network of Excellence on Digital Libraries, and DL.org, a Coordination Action on Digital Library Interoperability, Best Practices and Modeling Foundations, Digital Library researchers and practitioners produced a **Digital Library Reference Model** which defines a digital library as:

A potentially virtual **organization**, that comprehensively collects, manages and preserves for the long depth of time rich digital **content**, and offers to its targeted **user** communities specialized **functionality** on that content, of defined **quality** and according to comprehensive codified **policies**.

Notes

Actually, this document contains a **Digital Library Manifesto** which introduces the three types of relevant 'systems', *i.e.*, Digital Library, Digital Library System, and Digital Library Management System. It describes the main concepts characterizing these systems, *i.e.*, organization, content, user, functionality, quality, policy and architecture. It introduces the main roles that actors may play within digital libraries, *i.e.*, end-user, manager and software developer. Finally, it describes the reference frameworks needed to clarify the DL universe at different levels of abstraction, *i.e.*, the Digital Library Reference Model and the Digital Library Reference Architecture.

The first use of the term digital library in print may have been in a 1988 report to the Corporation for National Research Initiatives.

Notes The term digital libraries was first popularized by the NSF/DARPA/NASA Digital Libraries Initiative in 1994.

These draw heavily on As We May Think by Vannevar Bush in 1945, which set out a vision not in terms of technology, but user experience. The term virtual library was initially used interchangeably with digital library, but is now primarily used for libraries that are virtual in other senses (such as libraries which aggregate distributed content).

A distinction is often made between content that was created in a digital format, known as born-digital, and information that has been converted from a physical medium, *e.g.*, paper, by digitizing. The term hybrid library is sometimes used for libraries that have both physical collections and digital collections. For example, American Memory is a digital library within the Library of Congress. Some important digital libraries also serve as long term archives, for example, the Eprint arXiv, and the Internet Archive.
Some of the Examples of digital libraries (DLs) are given below:

ACM DL Science Direct	Many professional associations (here the Association of Computing Machinery) and publishers (here Elsevier) have a DL of their journals, books, and reference works. Free access to bibliographic data, paid access to full text. portal.acm.org/dl.cfm sciencedirect.com
ICDL	International Children's Digital Library Focuses on digitizing children's books from around the world, making them findable through child-centered criteria, and facilitating online reading. icdlbooks.org.
The Shoah VHA	52,000 videotaped interviews with Holocaust survivors, thesaurus of 4,000 subjects and 45,000 names of places, periods, people, etc. usc.edu/-schools/college/vhi click Archive > About The Archive > The Visual History Archive.
NSDL	National Science Digital Library (US). Support for education & collaboration. nsdl.org
Connexion	A user-created DL of educational material; small knowledge chunks (modules) that can be organized as courses, books, reports. cnx.org
Wikipedia	Collaboratively constructed collection of anonymous encyclopedia articles. wikipedia.org
Louvre	A museum Web site seen as a digital library containing both images and text, often with interactive features. louvre.fr
Perseus	A rich network interconnecting places and sites, buildings, art objects (all represented by images), people, texts, words, ... Virtual walks through historical places. perseus.tufts.edu
Tufts University	An interesting array of DL-related tools uit.tufts.edu/at/?pid=24, uit.tufts.edu/at/? pid=24, dca.tufts.edu/tdr,/pr/index.html

Notes

10.1.2 Characteristics of Digital Libraries

The structured information in the digital library is called digital object which includes text, audio, video, image, computer programmes, graphics, and multimedia components in digital form. The digital library requires lots of digital technologies. The digital library;

- Provides access to a very large information collection, both primary and secondary
- Support multimedia components
- Provides links to different digital objects
- Supports and provides search and retrieval interface
- Supports the traditional library mission of collection, development, organization, access and preservation.

Important characteristics of a digital library are:

(*i*) **Digital collection**—In the digital environment a digital library is expected to develop document collection in a digital format.

(*ii*) **Technology**—It is understood that a digital library will have digital material in its collection. But in the present day context, both digital and non-digital information belonging to a digital library are to be handled using digital technologies.

(*iii*) **Work and Service**—The professionals supposed to work in a digital library should have necessary training in handling digital information in order to provide the optimum level of effective service.

The most important component of a digital library is the digital collection it holds or has access to. A digital library can have a wide range of resources. It may contain both paper based conventional documents or information contained in computer-processible form. The collection of a digital library may include—a combination of structured/unstructured texts, numerical data, scanned images, graphics, audio and video recordings.

With the assumption that digital libraries are libraries first, some of the important characteristics of a digital library are:

1. Digital libraries are the digital face of traditional libraries that include both the digital collection and the traditional, fixed media collection, so they encompass both electronic and paper materials.
2. Digital libraries will also include digital material that exists outside the physical and administrative bounds of any one digital library.
3. Digital libraries will also include all the processes and .services that are the backbone and nervous system of libraries. However, such traditional processes, though forming the basic digital library work, will have to be revised and enhanced to accommodate the differences between new digital media and traditional fixed media.
4. Digital libraries will serve particular communities or constituencies as traditional libraries do now, though these communities may-be widely dispersed throughout the network.
5. Digital libraries will require the skills of both librarians as well as computer professional to be viable.

Academic Repositories

Many academic libraries are actively involved in building institutional repositories of the institution's books, papers, thesis, and other works which can be digitized or were 'born digital'. Many of these repositories are made available to the general public with few restrictions, in accordance with the goals of open access, in contrast to the publication of research in commercial journals, where the publishers often limit access rights. Institutional, truly free, and corporate repositories are sometimes referred to as digital libraries.

Notes

Digital Archives

Physical archives differ from physical libraries in several ways. Traditionally, archives were defined as:

1. Containing primary sources of information (typically letters and papers directly produced by an individual or organization) rather than the secondary sources found in a library (books, periodicals, etc.).
2. Having their contents organized in groups rather than individual items.
3. Having unique contents.

The technology used to create digital libraries has been even more revolutionary for archives since it breaks down the second and third of these general rules. In other words, "digital archives" or "online archives" will still generally contain primary sources, but they are likely to be described individually rather than (or in addition to) in groups or collections, and because they are digital their contents are easily reproducible and may indeed have been reproduced from elsewhere.

Did u know? The Oxford Text Archive is generally considered to be the oldest digital archive of academic physical primary source materials.

Searching

Most digital libraries provide a search interface which allows resources to be found. These resources are typically deep web (or invisible web) resources since they frequently cannot be located by search engine crawlers. Some digital libraries create special pages or sitemaps to allow search engines to find all their resources. Digital libraries frequently use the Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH) to expose their metadata to other digital libraries, and search engines like Google Scholar, Yahoo! and Scirus can also use OAI-PMH to find these deep web resources.

There are two general strategies for searching a **federation** of digital libraries.

They are:

1. Distributed searching, and
2. Searching previously harvested metadata.

Distributed searching typically involves a client sending multiple search requests in parallel to a number of servers in the federation. The results are gathered, duplicates are eliminated or clustered, and the remaining items are sorted and presented back to the client. Protocols like Z39.50 are frequently used in distributed searching. A benefit to this approach is that the resource-intensive tasks of indexing and storage are left to the respective servers in the federation. A drawback to this approach is that the search mechanism is limited by the different indexing and ranking capabilities of each database, making it difficult to assemble a combined result consisting of the most relevant found items.

Searching over previously harvested metadata involves searching a locally stored index of information that has previously been collected from the libraries in the federation. When a search is performed, the search mechanism does not need to make connections with the digital libraries it is searching - it already has a local representation of the information. This approach requires the creation of an indexing and harvesting mechanism which operates regularly, connecting to all the digital libraries and querying the whole collection in order to discover new and updated resources. OAI-PMH is frequently used by digital libraries for allowing metadata to be harvested. A benefit to this approach is that the search mechanism has full control over indexing and ranking algorithms, possibly allowing more consistent results. A drawback is that harvesting and indexing systems are more resource-intensive and therefore expensive.

Notes

Frameworks

The formal reference models include the DELOS Digital Library Reference Model (Agosti, et al., 2006) and the Streams, Structures, Spaces, Scenarios, Societies (5S) formal framework. The Reference Model for an Open Archival Information System (OAIS) provides a framework to address digital preservation.

10.1.3 Scope of Digital Libraries

The scope, which is enjoyed by traditional library, is extended and enriched by the digital library system in every sector. In each function of library, digital library systems add efficiency. If we give the status of checklist for the five laws of library science propounded by Dr. S.R. Ranganathan, for the time being, digital library system can prove itself as the best instrument to fulfill the five laws of library science Digital library has to promote the economical and efficient delivery of information to all sector of the society and to take an important role in the generation and dissemination of knowledge in areas of strategic importance to the society. Digital library should contribute to the lifelong learning, opportunities and education in our country as well as around the world. The scope of user's collections service expands beyond the walls of library.

10.1.4 Recent Development

It is well recognized that libraries all over the world are undergoing transformation, especially owing to the development in information and communication technologies. Traditional libraries are changing to digital libraries and new libraries that are being set up are increasingly of the digital kind. As a result, there is widespread interest and consequently, a lot of research and development activities are being carried out in this area world over. In India a number of institutions are also in the process of setting up digital libraries and many scholars and practitioners are conducting research on digital libraries.

In recent years, quite a few conferences on digital libraries and their various facets have been organized in India. In addition to many national conferences, international conferences such as the International Conference of Asian Digital Libraries (ICADL) 2001, International Conferences on Digital Libraries (ICDL) 2004 and 2006 gave necessary impetus to digital library awareness and developments in India. Both ICADL 2001 and ICDL 2004 were reported as widely attended (Kar & Seadle 2004; Urs & Raghavan 2002).

Although conference proceedings are a vital primary source of information, marginal papers get included in proceedings many times as papers may not go through the peer-reviewing process.

On the other hand, scholarly journals with their peer-reviewing mechanism have better quality papers and further, and more importantly, owing to their coverage in abstracting and indexing databases, the visibility and readership of papers published in scholarly journals are much greater than conference proceedings.

India publishes about 20 scholarly journals in the field of library and information science. Articles on digital libraries in India have been published in Indian and foreign journals. A review of Indian and foreign periodicals literature published on digital libraries in India would be useful to assess and understand the state of digital library research and development in India.

Digital library development in India has been skewed. Most developments have been in S&T libraries. Even among these libraries, focus has been on developing digital libraries without focus on issues such as education and training, copyright, management and promotion (marketing). There is a need to amend copyright legislation to suit the electronic environment. Few institutions have taken initiatives to hold workshops on digital libraries and digital technologies. Other important areas on which Indian studies have been few or totally missing are digital rights management, digital library security, content management, business and pricing model and policy studies. At present, a pricing model does not exist in India.

Notes

With several digital library initiatives reported, it will be useful to have a survey of the digital libraries in India to understand the present status of the digital library initiatives. This assumes importance because the few studies on Indian digital library initiatives are primarily based on information available on websites or from other published sources. A survey would help not only in understanding the present situation but will help in drawing up an action plan for focused digital library development in India. Further, use and user studies of digital libraries in India are lacking. This area is also of paramount importance for assessing the existing digital libraries and creating highly user-centric digital libraries in India.

Task Discuss digital library is a type of information retrival system.

10.2 Construction and Organization of Digital Library

Software

There are a number of software packages for use in general digital libraries. Institutional repository software, which focuses primarily on ingest, preservation and access of locally produced documents, particularly locally produced academic outputs, can be found in Institutional repository software.

Digitization

In the past few years, procedures for digitizing books at high speed and comparatively low cost have improved considerably with the result that it is now possible to plan the digitization of millions of books per year for creating digital libraries.

Advantages

The advantages of digital libraries are by means of easily and rapidly accessing books, archives and images of various types are now widely recognized by commercial interests and public bodies alike.

Notes Traditional libraries are limited by storage space; digital libraries have the potential to store much more information, simply because digital information requires very little physical space to contain it. As such, the cost of maintaining a digital library is much lower than that of a traditional library.

A traditional library must spend large sums of money paying for staff, book maintenance, rent, and additional books. Digital libraries may reduce or, in some instances, do away with these fees. Both types of library require cataloguing input to allow users to locate and retrieve material. Digital libraries may be more willing to adopt innovations in technology providing users with improvements in electronic and audio book technology as well as presenting new forms of communication such as wikis and blogs; conventional libraries may consider that providing online access to their OPAC catalogue is sufficient. An important advantage to digital conversion is increased accessibility to users. They also increase availability to individuals who may not be traditional patrons of a library, due to geographic location or organizational affiliation.

- **No physical boundary**. The user of a digital library need not go to the library physically; people from all over the world can gain access to the same information, as long as an Internet connection is available.
- **Round the clock availability**. A major advantage of digital libraries is that people can gain access 24/7 to the information.

Notes

- **Multiple accesses**. The same resources can be used simultaneously by a number of institutions and patrons. This may not be the case for copyrighted material: a library may have a license for "lending out" only one copy at a time; this is achieved with a system of digital rights management where a resource can become inaccessible after expiration of the lending period or after the lender chooses to make it inaccessible (equivalent to returning the resource).
- **Information retrieval**. The user is able to use any search term (word, phrase, title, name, and subject) to search the entire collection. Digital libraries can provide very user-friendly interfaces, giving clickable access to its resources.
- **Preservation and conservation**. Digitization is not a long-term preservation solution for physical collections, but does succeed in providing access copies for materials that would otherwise fall to degradation from repeated use. Digitized collections and born-digital objects pose many preservation and conservation concerns that analog materials do not. Please see the following "Problems" section of this page for examples.
- **Space**. Traditional libraries are limited by storage space, digital libraries have the potential to store much more information; simply because digital information requires very little physical space to contain them and media storage technologies are more affordable than ever before.
- **Added value**. Certain characteristics of objects, primarily the quality of images, may be improved. Digitization can enhance legibility and remove visible flaws such as stains and discoloration.

Task Digital libraries have the potential to store much information. Justify.

Self Assessment

Fill in the blanks:

1. A ..... is a library in which collections are stored in digital formats and accessible by computers.
2. The term digital libraries was first popularized by the NSF/DARPA/NASA Digital libraries initiative in ..... .
3. OAI-PMH stands for ..... .
4. ICDL stands for ..... .

10.3 Challenges of Digital Library

Digital Preservation

Digital preservation aims to ensure that digital media and information systems are still interpretable into the indefinite future. Each necessary component of the must be migrated, preserved or emulated. Typically lower levels of systems (floppy disks for example) are emulated, bit-streams (the actual files stored in the disks) are preserved and operating systems are emulated as a virtual machine. Only where the meaning and content of digital media and information systems are well understood is migration possible, as is the case for office documents.

Copyright and Licensing

Some people have criticized that digital libraries are hampered by copyright law, because works cannot be shared over different periods of time in the manner of a traditional library. The republication of material on the Web by libraries may require permission from rights holders,

Notes

and there is a conflict of interest between them and publishers who may wish to create online versions of their acquired content for commercial purposes.

There is a dilution of responsibility that occurs as a result of the spread-out nature of digital resources. Complex intellectual property matters may become involved since digital material is not always owned by a library. The content is, in many cases, public domain or self-generated content only.

The Fair Use Provisions (17 USC § 107) under copyright law provide specific guidelines under which circumstances libraries are allowed to copy digital resources. Four factors that constitute fair use are purpose of use, nature of the work, market impact, and amount or substantiality used.

Some digital libraries acquire a license to "lend out" their resources. This may involve the restriction of lending out only one copy at a time for each license, and applying a system of digital rights management for this purpose.

Metadata Creation

In traditional libraries, the ability to find works of interest was directly related to how well they were catalogued. While cataloguing electronic works digitized from a library's existing holding may be as simple as copying moving a record for the print to the electronic item, with complex and born-digital works requiring substantially more effort. To handle the growing volume of electronic publications, new tools and technologies have to be designed to allow effective automated semantic classification and searching. While full text search can be used for some searches, there are many common catalog searches which cannot be performed using full text, including:

- finding texts which are translations of other texts.
- linking texts published under pseudonyms to the real authors (Samuel Clemens and Mark Twain, for example).
- differentiating non-fiction from parody (The Onion from The New York Times, for example).

10.4 World Wide Web Virtual Library

The World Wide Web Virtual Library was the first index of content on the World Wide Web and still operates as a directory of e-texts and information sources on the web. It was started by Tim Berners-Lee, the creator of HTML and the World Wide Web itself, in 1991 at CERN in Geneva. Unlike commercial index sites, it is run by a loose confederation of volunteers, who compile pages of key links for particular areas in which they are expert. It is sometimes informally referred to as the "WWWVL", the "Virtual Library" or just "the VL".

Notes World Wide Web virtual library was started by Tim Berners-Lee.

The individual indices or virtual libraries live on hundreds of different servers around the world. A set of index pages linking these individual libraries is maintained at, in Geneva only a few kilometers from where the VL began life. A VL specific search engine has operated for some years and is now (VL search) located on its own server at vlsearch.org.

The central affairs of the Virtual Library are co-ordinated by an elected Council. A central index (the 'Catalog') is maintained and joint services provided by the Council on behalf of the association.

Notes The Virtual Library was first conceived and run by Tim Berners-Lee, and later expanded, organized and managed for several years by Arthur Secret, before it became a formally established association with Gerard Manning as its Council's first chairman.

Notes

The Virtual Library was incorporated as an association sans but lucratif (not for profit association) in the Republic and Canton of Geneva, Switzerland. Major decisions, including a set of bylaws are decided by the membership at large.

The main Virtual Library website was redesigned in 2005 and many old or dead individual Virtual Libraries were removed from the index.

Some illustrative examples of virtual libraries with brief descriptions are given below:

Virtual Libraries for Professional Learning	**Ask ERIC:** Ask ERIC is an example of a virtual library devoted to professional learning for educators. It supports professional learning as well as formal and informal learning.
Virtual Libraries-- General Interest (Collections of Web Sites)	**Awesome Library:** Awesome Library organizes the Web with 18,000 carefully reviewed resources, including the top five percent in the field of education. **Libraryspot:** Libraryspot, published by StartSpot Mediaworks, Inc. in Northwestern University/Evanston Research Park, Evanston, Ill. , has received many awards. It was intended to bring the best of the Web in one site and cut through the information overload involved in Web searching. The Web sites are reviewed by an editorial team for quality, content, and usefulness. **Virtual LRC:** Some virtual libraries are the work of a dedicated individual with a passion for enabling learners. The virtual LRC is the creation of Dr. Michael Bell, former state chair of the Texas Association of School Librarians. It is a useful library with access to e-texts, news, sounds, magazines searches, information portals and more.
Virtual Libraries -- Reference (Collections of Web Sites)	**Research It :** This list of reference sites makes a good reference center for just-in-time learning.
University Virtual Libraries	**NovaNet:** Novanet is a consortium of academic libraries in Nova Scotia who cooperate to provide access to information and knowledge for the benefit of their user communities.

10.5 Hybrid Library

Hybrid library is a term used by librarians to describe libraries containing a mix of traditional print library resources and the growing number of electronic resources.

Hybrid libraries are mixes of traditional print material such as books and magazines, as well as electronic based material such as downloadable audio books, electronic journals, e-books, etc.

Notes Hybrid libraries are the new norm in most public and academic libraries.

Did u know? It seems that the term "hybrid library" was first coined in 1998 by Chris Rusbridge in an article for D-Lib Magazine.

Hybrid libraries evolved in the 1990s when electronic resources became more easily available for libraries to acquire for public use. Initially these electronic resources were typically access to material distributed on media such as CD-ROM or searches of specialized databases. OCLC helped to push libraries towards acquiring digital resources by providing a centralized technology resource. Now, with the widespread availability of digital content, it includes Internet resources and documents which are online, such as eprints.

Hybrid libraries are the new norm for many archivists as well. Digitization has changed the way archivists have gone about preserving historical items. Archivists are now using digital technology to preserve items that were once only preserved by things like microfiche. Archivists now use things like digital imaging which make it possible for researchers to see historical items online.

Notes

The emergence of the hybrid library has put a new emphasis on copyright issues for many libraries. The complicated and changing copyright laws in both the United States and the European Union have made it a challenge for many libraries to make sure their patrons are using the digital items lawfully.

Hybrid libraries need staffs that are trained in helping patrons navigate the vast amount of information available in the digital age. Librarians working in hybrid libraries have training in electronic media as well as the traditional print forms.

Purpose and Scope of Hybrid Library

Hybrid Library is where traditional resources and electronic resources are brought together to work in an integrated way. The ultimate aim of the Hybrid Library is to give the user seamless access to the most appropriate resource whatever the medium, whether it's print, sound, digital, etc.. Advances in web technology have made it more of a possibility that we will be able to provide users with a single interface to explore all resources.

The concept of the 'hybrid library' has emerged within the higher education Electronic Libraries Programme (eLib) in the UK, although it is reflected in some practice in other countries (the California Digital Library being an example). It recognises that both 'traditional' (i.e. print-based) and electronic services have disadvantages. For example:

In the traditional model

- Each item must be used serially (i.e. one user at a time)
- Libraries can only stock a very restricted range of items
- Publication processes mean material is dated even when added to stock
- The cost of stocking little used items is very high
- There are high cost associated with handling physical objects
- Heavily used items wear out.

In the electronic model

- The quality of sources is often uncertain or unknown
- Browsing is difficult at the detailed item level
- The economic model is uncertain, resulting in severe restrictions on accessing valuable content
- There is no consensus on achieving preservation
- The library is poor at encouraging social interaction.

As far as accessibility is concerned these two approaches have also to intersect with a blend of accessibility tools (for accessing 'standard' resources) and transcription (for changing the mode of presentation of standard resources). The accessible hybrid library thus presents even greater challenges than the straight forward hybrid model.

Most real-world library services will have to cope with the provision of information in both traditional (e.g. print) and electronic formats. Furthermore it is likely that the same information will be available in different formats, perhaps with different terms, conditions and prices attached to them. Managing integrated services will be a matter of very considerable complexity.

The range of services offered by libraries is of course far wider than the supply of information, even defining that term widely. Libraries also offer information skills training, expert enquiry and reference services, accommodation for study and reading, equipment and a portal to the national and international library network. The integrated, hybrid library should be able to provide all of these services, but to do so within the new networked information paradigm.

Notes

There are five hybrid library projects. The main features of each project are summarized as follows:

HyLiFe: (Hybrid Library of the Future) is concentrating on the design and evaluation of six different hybrid library user interfaces. The six interfaces are being designed in different institutions for different user groups. The project is being co-ordinated and evaluated by staff at Centre for Research in Library and Information Management (CERLIM) at Manchester Metropolitan University, and the Department of Information and Library Management at the University of Northumbria at Newcastle.

MALIBU: (Managing the hybrid Library for the Benefit of Users) has a subject area focus. It is developing a number of hybrid library prototypes particularly in the area of the Humanities. It is also investigating the organisational and managerial implications of the hybrid library. Once again this is a multi-site project, the key sites being Kings College London, and the Universities of Oxford and Southampton.

HeadLine: (Hybrid Electronic Access and Delivery in the Library Networked Environment) is focused on Economics and Business Studies. It is based at the London School of Economics, London Business School and the University of Hertfordshire. The project is building models of the hybrid library including a wide variety of different formats of material.

BUILDER (Birmingham University Integrated Library Development and Electronic Resource) has an institutional focus. It is based at a single site, the University of Birmingham, although partner sites are involved in evaluation activities. The project is developing a model of an institutional hybrid library incorporating various technologies.

AGORA is system led. It is an implementation of the MODELS Information Architecture which is constructing a hybrid library management system. The system will include facilities for search, locate, request and delivery services. The project is being led by the University of East Anglia in partnership with the UK Office for Library Networking (UKOLN), CERLIM and Fretwell-Downing Informatics.

Issues in Hybrid Library

Some of the issues facing the hybrid libraries are the digital divide, collection development, ownership of electronic resources and preservation of digital media.

Any advancement in information technology will be useful only when you know how to use it. The term digital divide is used to describe the gap between those with information technology knowledge and those who do not.

Majority of the libraries in these days are hybrid libraries. The libraries own and subscribe to different resources in different formats. Some of the common formats are ejournals, serials, print monographs, CD and DVD. The main components of digital library framework are user interfaces, repository, handles system, and search system. The handle system and search system are the major components that should be designed with interoperability features to search across different repositories owned by different vendors. The user interface should be designed in a generic way that it helps library patrons develop a common knowledge to do advanced searches across all repositories.

Collection development

Collection development is another challenge facing the hybrid libraries. The process of collection management in a hybrid library is similar to that of a traditional library. Hybrid libraries follow the same policies and procedures followed in traditional library collection development.

Ownership of Electronic Resources

Ownership of electronic resources is another issue facing the hybrid libraries. Ownership of electronic materials is virtual and not physical. There are no clear policies about the ownership of electronic materials once the subscription is cancelled or expired. Libraries have to pay attention to the legal

Notes

contracts from the database vendors. If the libraries plan on archiving the electronic resources, then there are legal issues related to it. The most prominent legal issues are intellectual property and authenticity of digital information.

Task Define Issues in Hybrid library.

Preservation of Digital Media

With any new advanced technology related to digital information storage, the main question to be answered is its durability. Digital storage media like disc or tapes deteriorate over time. The main question related to digital preservation is what and how much should be preserved. To make the preservation of digital media cost effective, standardization of different media format is required. Following are the three possible approaches.

Technology Preservation, Emulation, and Migration

In technology preservation, both hardware and software related to digital information are preserved. This may not be cost effective because changes to hardware and different versions of software need to be either maintained or constantly upgraded.

In emulation, some emulator software programmes will mimic the hardware and software of the original data and display in the original format. In migration, digital information is converted to a standard media with standard format.

Self Assessment

Multiple choice questions:

5. ..... is the creator of HTML.
   (*a*) Bertrand Ibrahim (*b*) Tim Berners-Lee
   (*c*) Gerard Manning (*d*) Vannevar Bush
6. The term used by librarians to describe libraries containing a mix of tradition a print library resources is:
   (*a*) Hybrid library (*b*) Virtual library
   (*c*) Digital library (*d*) None of these.
7. The term is used to describe the gap between those with information technology knowledge and those who do not is:
   (*a*) Digital divide (*b*) Collection development
   (*c*) Ownership of electronic resources (*d*) Preservation of digital media.

10.6 Recent Library Developments

FINFO - Information for Ethnic Minorities in Denmark

FINFO is a web service provided by the Danish State and University Library/ The Danish Central Library for Immigrant Literature. The service is maintained jointly by the Immigrant Library and 68 regional and municipal libraries.

As a service to participating libraries there is a guide to proper handling of multilingual support on web browsers, and the guide links to download sites for multilingual programmes, plug-ins and true type fonts.

Notes

FINFO is developed with financial support from the Development Pool for Public and School libraries and the web site can be located at: www.finfo.dk.

The Generator—An Experimental Library in the Starting Block

In Sweden the town of Vasteras is planning to initiate a activity library. Besides offering the user the possibility of seeking information, it also intends to create experiences, arouse curiosity and inspire the users to instigate their own personal creative efforts. It is meant to be an experimental library where new work methods, for both visitors and staff, will be on offer.

Experimental Library

An established forum is needed within CuLTUREN, (Culturen is an exciting and, in many respects, a pioneering building for cultural activities and has in a short time made notable inroads into the cultural life of Vasteras) whose terms should be dictated by the visitor and developing an individual profile. The intention is to create an experimental library, known as The Generator. The experiment will be administered as a library branch of Vasteras Public Town Library. Its content will be contemporary, appealing to a younger audience and the library should be easily accessible from CuLTUREN's main entrance.

The aim is not to build a library in the traditional sense adhering to the accepted use of media, equipment and staff, but rather to encourage a fresh approach and complement to other library activities. It will not be a lending library where books are borrowed and returned. Instead, it should be seen as a multimedia library allowing the visitor to try his hand at new approaches involving work processes as well as other forms of media. The contemplated content of The Generator might be to offer the visitors access to computers, periodicals, newspapers, poetry, comics and certain books. The library should also be an open forum for all kinds of debates, instigating discussion evenings, activities and workshops in cooperation with Kopparlund senior high school and youth organisations active within CuLTUREN.

Method of Development and Recruitment

The intention of The Generator is to create a stimulating and thought-provoking environment to develop library activity methods targeting young people and young adults. The Generator is not only the concern of the town of Vasteras, but also a collaborative effort for further education in conjunction with the County Library of Vastmanland as co-ordinator. The experimental library, The Generator, intends to strategically develop recruitment issues. By means of contacts with the Department for Library and Information Science in Uppsala, a number of trainee postings will be made available to deal with the alternation of generations. The matter of recruitment, and the readiness to incorporate new incentives from the educational/research community, is important to the development of regional library activity.

The Seamless Library

As part of the ABM-development, the Norwegian Directorate for Public Libraries and the National Office for Research Documentation, Academic and Special Libraries co-operate on a pre-project in Oppl and that started this summer. In accordance with the idea of the seamless library, the aim of the project is to improve the availability of information resources for the inhabitants in the region, as well as examine its necessity. It will be done through the establishment of a regional library network, working independently of existing sectors and institutions.

Notes

Self Assessment

State whether the following statements are true or false:

8. FINFO is a web service provided by the Danish state and university library/The Danish central library for Immigrant Literature.
9. In swedan the town of vasteras is planning to initiate a active library.

10.7 Summary

- Library science (or Library and Information science) is an interdisciplinary field that applies the practices, perspectives, and tools of management, information technology, education, and other areas to libraries; the collection, organization, preservation, and dissemination of information resources; and the political economy of information.
- A digital library is a library in which collections are stored in digital formats (as opposed to print, microform, or other media) and accessible by computers.
- The advantages of digital libraries are by means of easily and rapidly accessing books, archives and images of various types are now widely recognized by commercial interests and public bodies alike.
- Digital preservation aims to ensure that digital media and information systems are still interpretable into the indefinite future.
- The World Wide Web Virtual Library was the first index of content on the World Wide Web and still operates as a directory of e-texts and information sources on the web.
- Hybrid library is a term used by librarians to describe libraries containing a mix of traditional print library resources and the growing number of electronic resources.

10.8 Keywords

LIS : Library and information science (LIS) is a merging of the two fields library science and information science. It is associated with schools of library and information science (abbreviated to "SLIS"), which generally developed from professional schools to research based university institutions during the second half of the twentieth century.

Digital library : A digital library is a library in which collections are stored in digital formats (as opposed to print, microform, or other media) and accessible by computers. The digital content may be stored locally, or accessed remotely via computer networks. A digital library is a type of information retrieval system.

HTML : HyperText Markup Language (HTML) is the main markup language for web pages. HTML elements are the basic building-blocks of webpages.

Hybrid library : It is a term used by librarians to describe libraries containing a mix of traditional print library resources and the growing number of electronic resources Hybrid libraries are mixes of traditional print material such as books and magazines, as well as electronic based material such as downloadable audio books, electronic journals, e-books, etc.

10.9 Review Questions

1. Write a note on the digital library.
2. Explain concept and characteristics of digital library.
3. Write a paragraph on World Wide Web virtual library.
4. Explain the construction and organization of digital library.

Notes

5. State the challenges of digital library.
6. Analyze the hybrid library.
7. Explain in detail the recent library developments.

Answers : Self Assessment

1. Digital library
2. 1994
3. Open Archives initiative protocol for Metadata Harvesting
4. International Conferences on Digital Libraries
5. (b)
6. (a)
7. (a)
8. True
9. True

10.10 Further Readings

Books

Lynch, Sarah N., and Eugene Mulero. "Dewey? *At This Library With a Very Different Outlook, They Don't*" The New York Times, July 14, 2007.

BISAC to replace Dewey in the future

Chan, Lois Mai. *Cataloging and Classification: An Introduction*, second ed. New York.

Online links

http://www.drtc.isibang.ac.in:8080/bitstream/handle/1849/400/

http://www.is.informatik.uni-duisburg.de/courses/dl_ss04/folien/

http://vlib.org/admin/AboutVL

Notes

Unit 11: Library and Information Networks in India

CONTENTS

Objectives
Introduction
11.1 Network Development in India
11.2 Limitations of Network Development
11.3 Types of Networks
11.4 General Networks in India
11.5 Summary
11.6 Keywords
11.7 Review Questions
11.8 Further Readings

Objectives

After studying this unit, you will be able to:

- Discuss the network Development in India
- State the limitations in Network Development
- Explain types of Networks
- State about the general Networks in India.

Introduction

The explosion in the amount of literature that is available, increases among the number of users and their different needs, and the application of electronic media are forcing libraries to construct and participate in networks. Magnetic tapes, floppy disks, and CD-ROMs provide enough data storage capacity. Retrieval through telecommunications networks and access to international databases are available for searching for information on various subjects. With the advent of networks, remote transmission of texts and graphics, video clips and animated clips are also possible.

Definitions

- A library network is broadly described as a group of libraries coming together with some agreement of understanding to help each other with a view to satisfying the information needs of their clientele.
- UNISIST II working document defines Information Network as a set of inter-related information systems associated with communication facilities, which are cooperating through more or less formal agreements in order to implement information handling operations to offer better services to the users.
- The National Commission on Libraries and Information Science in its National.

Notes Programme Document (1975) defines a network as two or more libraries engaged in a common pattern of information exchange, through communications for some functional purpose.

Notes

Objectives

- To promote and support adoption of standards in library operations.
- To create databases for projects, specialists and institutions to provide online Information services.
- To improve the efficiency of housekeeping operations
- To coordinate with other regional, national and international network for exchange of information and documents.
- To generate new services and to improve the efficiency of existing ones.

11.1 Network Development in India

Some factors that are responsible for the development of library and information networks in India are:

- The report of the working group of the planning commission on modernization of library services and informatics for the seventh five year plan, 1985-90.
- The National Policy on Library and Information systems document (1986) accepted by the ministry of HRD, Government of India.

Notes The report on national policy on university libraries prepared by the Association of Indian Universities (1987).

- The UGC report on information systems for science and technology under the Department of Science and Industrial Research (DSIR) Government of India has been vigorously promoting an integrated approach to library automation and networking.

Self Assessment

Fill in the blanks:

1. ..... defines a network as two or more libraries engaged in a common pattern of information exchange, through communications for some functional a purpose.
2. The report on national policy on university libraries prepared by ..... .
3. A ..... is broadly described as a group of libraries coming together with some agreement of understanding to help each other with a view to satisfying the information needs of their clientele.

11.2 Limitations of Network Development

A network may fail in the early stages if there is not proper planning or if adequate funds are not available. Moreover, a common memorandum of agreement signed by the participating libraries at the institutional level is essential for the success of a network venture. On a more practical level, catalog data must be in a standard, machine readable form for it to be shared and exchanged. And, finally, a continuous flow of external assistance is crucial for the network's survival.

11.3 Types of Networks

Presently, there are three types of computer networks:

- LAN
- MAN
- WAN

Local Area Network (LAN): A LAN is a number of related computers and electronic devices that share information over a transmission media.

Notes

A typical use of LAN is to tie together personal computers in an office so that they can all use a single printer and a file server. The LAN can be within a building or a campus wide network.

Metropolitan Area Network (MAN): Attempts are being made to develop this type of network in metropolitan areas such as Delhi, Calcutta, Bangalore, Madras, etc.

Wide Area Network (WAN): A large-scale network, involving offices in different cities and countries is referred to as WAN, which is specially designed to interconnect data transmission devices over wide geographical areas.

Task Define how LAN is different from MAN.

Categories of Network

Library networks have been divided into two categories: general network and specialized network. The latter can further be divided into metropolitan network and countrywide network.

Self Assessment

Multiple choice questions:

4. There are ..... types of computer networks.
   (*a*) 3 (*b*) 4 (*c*) 2 (*d*) 5.
5. LAN stands for:
   (*a*) Local area network (*b*) Logic area network
   (*c*) Large area network (*d*) Light area network.

11.4 General Networks in India

NICNET (www.mylibnet.org)

Title: National Information Center Network

Sponsor: Planning Commission, Govt. of India

Membership: Four national and regional nodes, 32 state and union territory nodes;

Seventy cities and towns

Services: Bulk files transfer; teleconferencing; full text and bibliographic retrieval services Application: ICMRNIC Center; MEDLARS in India; Chemical Abstracts database.

INDONET

Title: INDONET data Network

Sponsor: CMC Ltd (1986) = Informatics India Ltd (1989)

Membership: Commercial computer network

Services: Database services such as DIALOG, COMPUSERVE; IP; SHARP Applications: ACME; file transfer; international gateway.

I - NET (VIKRAM)

Title: I - NET

Sponsor: Dept. of Telecommunications, Govt. of India

Connectivity: Packet switched public data network covering nine cities Services: Information exchange through e-mail / FTP; Bibliographic databases Specialized Networks.

Notes

Metropolitan Networks

CALIBNET

Title: Calcutta Libraries Network

Sponsor: NISSAT - Govt. of India

Applications: Cataloging; serials control; acquisitions; circulation

Services: CAS; SDI; union catalog; partial database; editing and retrieval of records; global information; search; full-text document delivery; library automation; CALIBNET INFO Services.

BONET

Title: Bombay Library Network

Sponsor: NISSAT & NCST (1994)

Objective: To promote cooperation among libraries in Bombay

Services: online catalog; online document delivery; IRS; interlibrary loan; dissemination of information.

DELNET (delnet.nic.in/)

Title: Developing Library Network

Sponsor: NISSAT & NIC (1988)

Objective: To promote resource sharing; develop a network of libraries; collect, store, disseminate information.

Members: 165 Institutions, 600 Libraries, 15 States in India, 5 from outside India

Services: resource sharing; free Software; ICE online facility; books database; thesis database; Indian specialists; database.

ADINET (http://www.alibnet.org/)

Title: Ahmedabad Library Network

Sponsor: NISSAT, DSIR (1994) & INFLIBNET

Objective: To bring cooperation among its regional libraries; to develop databases; to integrate scientific and technical information systems.

Members: nine libraries

Services: library automation; library holdings; database in progress

MYLIBNET: Title: Mysore Library Network Sponsor: NISSAT (1994)

Objective: Developing software tools; conducting seminar; workshops/training programs;

Conduct surveys

Host Site: CFTRI, Mysore

Members: 116 Institutions

Services: MYLIB Database; E-journals; food patents; CFTRI Library Bulletin; public services.

Countrywide Area Network: DESINET

Title: Defence Science Information Network

Sponsor: DESIDOC, Delhi

Activity: Focus on scientific, research and defense communities.

ERNET

Title: Educational and Research Network

Sponsor: Dept. of Electronics, Govt. of India; UNESCO (Financial assistance from UNDP)

Notes

Members: eight institutions (5 IITs, IISc., National Centre for Software Technology - Bombay, CCI wing of Dept. of Electronics)

Services: Communication services such as e-mail, file transfer, remote log on, database access, bulletin board etc.,

SIRNET

Title: Scientific and Industrial Research Network

Sponsor: CSIR (Commissioned Agency- NCST, Bombay) Members: 40 labs and R&D Institutions

Applications: scientific communication; leather technology; natural products; food technology; medicinal Plants.

VIDYANET

Title: VIDYANET (Dedicated Communication Computer Net) Sponsor: TATA Institute of Fundamental Research, Bombay

Objectives: To provide rapid means of communications by linking computers at various institutions in India to similar networks outside the country; to stimulate corporate research, the day-to-day exchange of research information and the execution of joint projects and publications.

Services: File transfer facility; sharing of computer resources and access to remote applications, databases, libraries, etc.

BTISNET (www.btisnet.nic.in/)

Title: BTISNET (Specialized Information Network) Sponsor: Dept. of Biotechnology, Govt. of India.

Connectivity: 10 Specialized Information Centres in genetic engineering, plant tissue culture; photosynthesis and plant molecular biology; cell transformation; bio-process engineering.

Services: Data processing using applications software; online communication access; facsimile facility.

INFLIBNET (www.inflibnet.ac.in/index.jsp)

Title: Information Library Network

Sponsor: UGC (1991)

Connectivity: computer communication network of universities and R&D; libraries and bibliographic information centers throughout the country.

Members: 200 Universities; 400 College libraries; 200 R&D libraries

Services: catalog service; database Services; document supply services; e-mail; BBS:

audio and video conferencing, etc. BALNET:

Title: Bangalore Library Network

Sponsor: JRD;. Tata Memorial Library (1995) Members: 100 Libraries

MALIBNET:

Title: Madras Library Network Sponsor: INSDOC & NISSAT (1993) Members: 15 Libraries

Activity: Two important databases, a directory database of current serials in Madras and a contents database covering articles published in 300 journals available in Madras libraries.

During the recent period quite a large number of libraries and information centers are forming networks. The advent of computer networking as an accepted part of the library and information infrastructure has had a very significant impact on the way in which library and information systems are perceived. India is thus on the threshold to a new era of computer communication networks both for general purposes and for library and information purposes.

Notes

Self Assessment

State whether the following statements are true or false:

6. The sponsor of I-NET is Dept. of Telecommunications, Govt. of India.
7. The sponsor of INDONET is planning commission, Govt. of India.
8. MYLIBNET stands for Mysore library Network sponsor.

11.5 Summary

- A library network is broadly described as a group of libraries coming together with some agreement of understanding to help each other with a view to satisfying the information needs of their clientele.
- Library network to improve the efficiency of housekeeping operations.
- A network may fail in the early stages if there is not proper planning or if adequate funds are not available.

11.6 Keywords

DSIR : The Department of Scientific and Industrial Research (DSIR) is a part of the Ministry of Science and Technology. It has a mandate to carry out the activities relating to indigenous technology promotion, development, utilization and transfer.

WAN : Wide Area Network is a large scale network involving offices in different cities.

ERNET : It is largest nationwide terrestrial and satellite network with point of presence located at the premiere educational and research institutions in major cities of the country.

NICNET : It has now become an integral part of a large number of Government and Corporate sector organizations, providing information exchange services.

11.7 Review Questions

1. Describe the concept of the networks of India.
2. Discuss in details about the types of networks.
3. Write five general networks in India. Explain their sponsors, objectives and services.
4. Explain the limitations of network development.

Answers : Self Assessment

1. Programme document (1975)	2. the Association of Indian universities (1987)	
3. library network	4. (a)	5. (a)
6. True	7. False	8. True

11.8 Further Readings

Books

Shelly, Gary, et al. *Discovering Computers* 2003 Edition.

Cisco Systems, Inc., (2003, March 14). *CCNA: network media types*. Retrieved from ciscopress.com.

Wendell Odom,Rus Healy, Denise Donohue. (2010) *CCIE Routing and Switching*. Indianapolis, IN: Cisco Press

Online links

http://www.wifinotes.com/types-of-networks.html

http://eprints.rclis.org/bitstream/10760/14210/1/Network_Nagbhid_ Shalini-1.pdf

Notes

Unit 12: Libraries and Information Centers in India

CONTENTS

Objectives
Introduction
12.1 Libraries and Information Centers in India
12.2 DELNET
12.2.1 Objectives of DELNET
12.2.2 Membership
12.2.3 DELNET Activities/Services
12.2.4 The Future of DELNET
12.3 INFLIBNET
12.3.1 Objectives of INFLIBNET
12.3.2 Functions of INFLIBNET
12.4 ERNET
12.4.1 History of ERNET
12.4.2 ERNET Backbone
12.4.3 The Objectives of ERNET
12.5 NICNET
12.5.1 Achievements
12.5.2 NICNET Facilities
12.6 Summary
12.7 Keywords
12.8 Review Questions
12.9 Further Readings

Objectives

After studying this unit, you will be able to:

- Discuss the libraries and Information centres in India
- Describe about INFLIBNET
- State about ERNET.

Introduction

During the recent period quite a large number of libraries and information centres are forming networks. As computer networking is an integral part of the library and information infrastructure has a very important role in the way in which library and Information systems perceived. Thus India has to play a very important role for library and information purposes. So India has many libraries and information centres for the purpose of libraries and information. Some of them are discussed as follows.

12.1 Libraries and Information Centers in India

- Ahmedabad Library Network (ADINET)
- Bombay Science Librarian's Association (BOSLA)
- Calcutta Library Network (CALIBNET)

Notes

- Central Reference Library, Kolkata
- Defence Scientific Information and Documenation Centre (DESIDOC)
- Delhi Library Association
- Delhi Public Library
- Developing Library Network (DELNET)
- Documentation Research and Training Centre (DRTC), Bangalore
- Health Education Library for People
- Indian Association of Special Libraries and Information Centers (IASLIC)
- Indian Library Association (ILA)
- Information and Library Network (INFLIBNET, Ahmedabad
- Kerala Library Association
- Kesavan Institute of Information and Knowledge Management
- Madras Library Association
- Medical Library Association of India (MLAI)
- Mysore Library Network (MYLIBNET), Mysore
- National Center for Science Information (NCSI), Bangalore
- National Information System for Science and Technology (NISSAT), New Delhi
- National Institute of Science Communication and Information Resources, New Delhi (Formerly INSDOC)
- National Library of India
- National Medical Library
- National Social Science Documentation Centre (NASSDOC), New Delhi
- Pune Library Network
- Raja Rammohun Roy Library Foundation
- SAARC Documentation Centre
- Satinder Kaur Ramdev Memorial Trust for Advancement of Librarianship (SATKAL)
- Small Enterprises National Documentation Center (SENDOC)
- Society for Advancement of Library and Information Science (SALIS)
- Society for Information Science (SIS)
- Special Libraries Association, Asian Chapter
- Uttar Pradesh Library Association
- Virtual Information Center

12.2 DELNET

Delhi is growing as a major centre of information resources in India. These resources cater both to the specialized and the general users. They are located in activities, information and documentation centres, institutional libraries, research libraries, government libraries, public libraries, department libraries besides the libraries of the universities, colleges and schools. During the recent years, increase in information has led to increase in the demands of the users. It has been noticed that in this area of information explosion, libraries in India are generally ill-equipped to handle and retrieve information effectively, the financial resources and the space requirement for housing library collection are limited in almost all of the libraries. Not a single library can afford to house every necessary document even in the area of its interest. Resource sharing, thus assumes great importance at this juncture the option left with the forward looking librarians has been to promote the sharing of resources by automation and networking.

Notes With this objective, in January 1988, the India International Centre initiated efforts for the establishment of Delhi Library Network **(Now Developing Library Network)**.

Notes

DELNET is the first operational library network in India. It was started as a project of the India International Centre in January 1988 with the initial, financial and technical assistance by National Information System for Science and Technology (NISSAT), Department of Scientific and Industrial Research, Govt. of India. It was registered as a society in June 1992 under the Societies Registration Act of 1860 and is currently being promoted by the National Informatics Centre (NIC), Planning Commission, Govt. of India and India International Centre, New Delhi.

12.2.1 Objectives of DELNET

The following are DELNET's main objectives:

- 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 offer guidance to the member libraries on cataloguing database services, circulation, acquisition, serials control, online services, selection of hardware and software, etc.
- to coordinate efforts for suitable collection development and reduce unnecessary duplication wherever possible.
- to establish a referral centre, to monitor and/or facilitate catalogue search 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 and mechanically.
- to develop specialist bibliographic database of books, serials and non-book materials.
- to develop a database of projects, specialists and institutions.
- to possess and maintain electronic and mechanical equipment for fast communication of information and delivery of electronic mail.
- to coordinate with other regional, national and international networks for exchange of information and documents.
- To undertake facilitate and provide for the publication of newsletters/journals devoted to networking and sharing of resources.

12.2.2 Membership

At present, DELNET has Two Hundred and Forty Three libraries as its members, including both institutional and associate-institutional members: in India 235 and outside India 8.

The membership is progressively increasing and includes universities, diplomatic missions, college, government department, institutions and public libraries. Some institutions from far off places like Shimla, Bhopal, Punjab, Andhra Pradesh, Lucknow and Pondicherry in India have also joined DELNET as members.

12.2.3 DELNET Activities/Services

(I) Promotion of Database Creation

For effective networking, standard bibliographic data should be available in machine readable form with the libraries. So, efforts were made from the very beginning to promote the standardization of databases in the DELNET libraries. Experts were sent to the libraries to solves day-to-day problems. A panel of experts was seeing maintained for this purpose. Regular meetings of the librarians and computer specialists were organized to discuss mutual problems and the areas of cooperation. Nevertheless, there have been some libraries in Delhi that took keen interest in database creation on their own. But the practice of regular meetings for database creation and resource sharing continue. DELNET provides technical assistance to member libraries in the following areas:

Notes

- creation and maintenance of bibliographic databases
- serials controls
- user services
- hardware and software requirements
- union catalogue preparation
- current awareness and SDI services
- authority data compilation
- subject profiles construction
- abstracting services
- inter-library loan and user services
- document transfer/copying facilities
- access to local, national and international databases.

II. Resource Sharing

This was mainly achieved in the fields of physical science, medical science and agricultural sciences. It is hoped that in the years to come, DELNET would be able to save more foreign exchange for India through sharing of periodical resources. In 1991, a courier service was started on contract basis will a private agency for inter library lending among the participating libraries but it was not very effective. Later, DELNET has introduced its own courier service with the financial help of NIC. The service is well used.

Did u know? DELNET saved foreign exchange worth ₹ 10 million by rationalizing subscriptions to foreign periodicals during 1991, 1992 and 1993 through resource sharing.

III. Standardization

A standardization committee of DELNET has been meeting from time to time. The standardization committee takes into account the following areas:

- Communication format for interchanging bibliographic data
- Input output format
- Bibliographic description: Mandatory and optional data elements
- Classification scheme and subject headings
- Thesaurus
- Authority files
- Language scripts into roman script
- Forms of heading
- Identification numbers, codes and abbreviations
- Data input for abstracting and indexing
- Search/command language

It was noticed that colon classification, universal Decimal classification and Dewey Decimal classification were mostly used in Indian libraries and therefore, it would be almost impossible to impose a standard classification scheme on all libraries. It was decided to use Dewey Class Number. As searching by class numbers was done by very few librarians, it was decided that the participating libraries could search by the classification numbers or they could pass on such requests to DELNET central office for necessary action. With regard to the standardization of subject headings and to usage DELNET recommends the use of LCSM. Specialized libraries may use additional thesauri that are available in each major discipline such as social sciences, humanities and science and technology.

Notes

IV. Online databases

DELNET has around twenty databases available online for its users. These are:

- Union Catalogue of Books: UCF
- Union Catalogue of Books: MARC Format
- Union List of Current Periodicals
- Union Catalogue of Periodicals
- Database of Periodic Articles
- Indian Specialists Database
- CD-ROM database
- Union list of Video recordings
- Union List of Sound Recordings
- Union List of Newspapers
- Union List of Serials of Management Libraries
- Union Catalogue of Hindi Books
- Multilingual Books : Sample database
- Urdu Manuscripts Database
- Database of Theses and Dissertations
- DEVINSA Database
- Serials: Petroleum and Natural Gas
- Books in-Print Database
- Jain Database
- Directory of Libraries

V. The Other Services

ILL Online

DELNET members can place their inter-library loan requests through our ILL online facility, which is available on the union catalogue of books database. The member requests appear on the main server, which are monitored by DELNET staff at regular intervals and the books are acquired and supplied to the requesting library through the courier. Photocopying charges for journal articles etc. and courier charges for sending books to member libraries outside Delhi are extra.

DEL-LISTSERV DELNET has created a Listserv service called DEL-LISTSERV to provide the current awareness service to users and allow the member libraries to receive the latest daily information from the INTERNET automatically in the form of electronic mail. The following listservs have been created and are available online through DELNET:

- Net-happenings – This Listserv appraises the users about the latest new sites along with their web addresses on the INTERNET and has proved to be a major source of information for the users on the INTERNET.
- Med-clips – This medical clippings listing discusses the various topics of medical interest like AIDI, cancer, etc. and is informative in nature.
- IFLA – This Listserv allows the users to get the latest information from the International Federation of Library Associations and Institutions, which includes the issues of concern to library and information professionals.
- LIBJOBS – Through this Listserv, the library professionals are able to find out daily, the jobs/ vacancies available throughout the world.

12.2.4 The Future of DELNET

The future of DELNET is very promising. Its membership with India and outside India is going to take a quantum jump. The DELNET databases are growing in number and size and as a variety of information on South Asia is becoming available through DELNET, it is expected that all institutions

Notes

outside India specializing in South Asian studies to take DELNET membership. DELNET databases are going to be accessible through INTERNET which will made accessibility very fast. INTERNET users in India are increasing and it will increase DELNET presence in different parts of India. DELNET has already created software, viz. DELDOS and DEL-WINDOWS for creating MARC records .These software will so on be developed to perform library operations as well. There developments are likely to give more revenue to DELNET and provide justification for more and more libraries to join DELNET. As resource, it is hoped the DELNET will grow faster as a service based resource sharing model in India.

Task Write short notes on
(*i*) Objectives of DELNET (*ii*) Services and activites of DELNET (*iii*) Future of DELNET

Self Assessment

Fill in the blanks:

1. DELNET stands for ..... .
2. ..... is the first operational library network in India.
3. DELNET has ..... . members including both institutional and associate-institutional members.

12.3 INFLIBNET

Information and Library Network (INFLIBNET) Centre is an Autonomous Inter-University Centre (IUC) of University Grants Commission, Government of India, involved in creating infrastructure for sharing of library and information resources and services among Academic and Research Institutions.

Notes INFLIBNET works collaboratively with Indian university libraries to shape the future of the academic libraries in the evolving information environment.

Information and Library Network (INFLIBNET) Centre is an autonomous Inter-University Centre of the University Grants Commission (UGC) of India. It is a major National Programme initiated by the UGC in 1991 with its Head Quarters at Gujarat University Campus, Ahmedabad. Initially started as a project under the IUCAA, it became an independent Inter-University Centre in 1996.

INFLIBNET is involved in modernizing university libraries in India and connecting them as well as information centers in the country through a nation-wide high speed data network using the state-of-art technologies for the optimum utilization of information. INFLIBNET is set out to be a major player in promoting scholarly communication among academicians and researchers in India.

12.3.1 Objectives of INFLIBNET

The primary objectives of INFLIBNET are:

- To promote and establish communication facilities to improve capability in information transfer and access, that provide support to scholarship, learning, research and academic pursuit through cooperation and involvement of agencies concerned.
- To establish INFLIBNET: Information and Library Network a computer communication network for linking libraries and information centres in universities, deemed to be universities, colleges, UGC information centres, institutions of national importance and R & D institutions, etc., avoiding duplication of efforts.

Notes

12.3.2 Functions of INFLIBNET

In order to fulfil the broad objectives, INFLIBNET will do the following:

- Promote and implement computerization of operations and services in the libraries and information centres of the country, following a uniform standard.
- Evolve standards and uniform guidelines in techniques, methods, procedures, computer hardware and software, services and promote their adoption in actual practice by all libraries, in order to facilitate pooling, sharing and exchange of information towards optimal use of resources and facilities.
- Evolve a national network interconnecting various libraries and information centres in the country and to improve capability in information handling and service.
- Provide reliable access to document collection of libraries by creating on-line union catalogue of serials, theses/dissertations, books, monographs and non-book materials (manuscripts, audio-visuals, computer data, multimedia, etc.) in various libraries in India.
- Provide access to bibliographic information sources with citations, abstracts etc. through indigenously created databases of the Sectoral Information Centres of NISSAT, UGC Information Centres, City Networks and such others and by establishing gateways for on-line accessing of national and international databases held by national and international information networks and centres respectively.
- Develop new methods and techniques for archival of valuable information available as manuscripts and information documents in different Indian Languages, in the form of digital images using high density storage media.
- Optimize information resource utilization through shared cataloguing, inter-library loan service, catalogue production, collection development and thus avoiding duplication in acquisition to the extent possible.
- Enable the users dispersed all over the country, irrespective of location and distance, to have access to information regarding serials, theses/dissertations, books, monographs and non-book materials by locating the sources wherefrom available and to obtain it through the facilities of INFLIBNET and union catalogue of documents.
- Create databases of projects, institutions, specialists, etc. for providing on-line information service.
- Encourage co-operation among libraries, documentation centres and information centres in the country, so that the resources can be pooled for the benefit of helping the weaker resource centres by stronger ones.
- Train and develop human resources in the field of computerized library operations and networking to establish, manage and sustain INFLIBNET.
- Facilitate academic communication amongst scientists, engineers, social scientists, academics, faculties, researchers and students through electronic mail, file transfer, computer/audio/video conferencing, etc.
- Undertake system design and studies in the field of communications, computer networking, information handling and data management.
- Establish appropriate control and monitoring system for the communication network and organize maintenance.
- Collaborate with institutions, libraries, information centres and other organizations in India and abroad in the field relevant to the objectives of the Centre.
- Create and promote R&D and other facilities and technical positions for realizing the objectives of the Centre.
- Generate revenue by providing consultancies and information services.

Do all other such things as may be necessary, incidental or conducive to the attainment of all or any of the above objectives.

Notes

Did u know? Education and Research Network (ERNET), India is an autonomous scientific society of Ministry of Communication & information technology (Govt. of India).

ERNET has made a significant contribution to the emergence of networking in the country. It practically brought the Internet to India and has built up national capabilities in the area of net-working, especially in protocol software engineering. It has not only succeeded in building a large network that provides various facilities to the intellectual segment of Indian society-the research and education community, it has over the years become a trendsetter in the field of networking.

Task Define functions of INFLIBNET.

12.4 ERNET

ERNET (Education and Research Network) has made a significant contribution to the emergence of networking in the country. It practically brought the Internet to India and has built up national capabilities in the area of net-working, especially in protocol software engineering. It has not only succeeded in building a large network that provides various facilities to the intellectual segment of Indian society—the research and education community, it has over the years become a trendsetter in the field of networking. UNDP has lauded ERNET as one of the most successful programmers it has funded. The Govt, of India has committed itself to further strengthen the project by including it in the 9th Plan with the allocation of funds and by creation of a new organizational set-up in the form of a Society. The Science community of the country has also recognized ERNET's contribution—both for infrastructure services as well as for R&D. The Scientific Advisory Committee to the Cabinet has adopted ERNET as the platform for launching an S&T network in the country.

ERNET is largest nationwide terrestrial and satellite network with point of presence located at the premiere educational and research institutions in major cities of the country.

Notes Focus of ERNET is not limited to just providing connectivity, but to meet the entire needs of the educational and research institutions by hosting and providing relevant information to their users.

Research and Development and Training are integral parts of ERNET activities. The activities at ERNET India are organized around five technology focus areas:

- National Academic and Research Network
- Research and Development in the area of Data Communication and its Application
- Human Resource Development in the area of High-end Networking
- Educational Content
- Campus-wide High Speed Local Area Network.

Beginning

ERNET was initiated in 1986 by the Department of Electronics (DoE), with funding support from the Government of India and United Nations Development Program (UNDP), involving eight premier institutions as participating agencies-NCST (National Centre for Software Technology) Bombay, IISc (Indian Institute of Science) Bangalore, five IITs (Indian Institutes of Technology) at Delhi, Bombay, Kanpur, Kharagpur and Madras, and the DoE, New Delhi. ERNET began as a multi protocol network with both the TCP/IP and the OSI-IP protocol stacks running over the leased-line portion of the backbone. Since 1995, however, almost all traffic is carried over TCP/IP.

Notes

Did u know? ERNET was initiated in 1986 by the Department of Electronics.

12.4.1 History of ERNET

- ERNET started with Dial-up network in 1986-87
- Initially UUCP mail was only service started by ERNET.
- First leased line of 9.6 kbit/s was installed in Jan'1991 between Delhi and Mumbai.
- ERNET was alloted Class B IP address 144.16.0.0 by InterNIC in 1990. Subsequently Class C addresses were alloted to ERNET by APNIC.
- In 1992, 64 kbit/s Internet gateway link was commissioned from NCST Mumbai to UUNet in Virginia near Washington DC.
- In 1998 ERNET India was registered as Autonomous Society.
- In 1999-2000 new terrestrial high speed backbone was setup.
- In 2000 POP infrastructure was upgraded.
- Satellite WAN was setup in 1993.
- Today, 1100 institutes are ERNET users under different schemes.

Did u know? All IITs, IISc Bangalore, DOE Delhi and NCST Mumbai were connected by 9.6 kbit/s leased line by 1992.

12.4.2 ERNET Backbone

ERNET backbone is a sophisticated link of terrestrial and satellite-based wide area networks. The satellite WAN using VSAT technology. The VSAT network acts as an overlay for the terrestrial WAN by providing backup links between the backbone sites. International connectivity is achieved through gateways at New Delhi, Mumbai, Bangalore and Kolkata, with a total capacity of 6.64 Mb. Daily traffic over ERNET exceeds 20 GB. ERNET architecture is based on industry standard TCP/IP protocol.

ERNET backbone is being enabled to support IPv6.

ERNET international gateway and PoP sites

The ERNET is supported by the following backbone sites which enable organizations located at different geographical locations to access various services.

- ERNET Head Quarter, New Delhi
- Center for Development of Advance Software Computing, Mumbai
- Indian Institute of Science, Bangalore
- Indian Institute of Technology, Chennai
- Inter University Centre for Astronomy and Astrophysics, Pune
- Variable Energy Cyclotron Centre, Kolkatta
- Indian Institute of Technology, Kanpur
- Indian Institute of Technology, Roorkee
- University of Hyderabad
- Center for Advance Technology, Indore
- Orissa Computer Application Centre, Bhubaneswar
- Indian Institute of Information Technology and Management, Thiruvananthapuram, Kerala

Notes

- DOEACC Center, Gorakhpur
- Indian Institute of Technology , Guwahati
- ERNET VSAT HUB, Bangalore
- Tezpur University

12.4.3 The Objectives of ERNET

- ERNET operations, *i.e.,* providing state-of-the-art communication infrastructure and services to academic and research institutions, Govt, organisations, NGOs, private sector R&D organisations, and various other non-commercial organisations;
- Research and development;
- Training and consultancy;
- Content development.

Achievements

- Foundation of a national capability building in the area of computer networking laid through:
- Setting up of a chain of core groups as the participating agencies with a minimal set of lab facilities and creation of skilled manpower to carry out R&D
- Generating manpower at different levels
- Making the world of standards (TCP/IP, OSI etc.) well understood
- Providing an insight into emerging issues such as ATM networks, networked multimedia, and information infrastructure
- **Net-work infrastructure and services set up, including**
- Installation, maintenance and operation of large **campus** LANs
- Design, commissioning and testing of **SATWAN hub** and the **installation** of VSATs
- Seamless interconnection of LAN-WAN segments and multi-protocol capability provided
- Provision of the whole range of Internet services
- Deployment of TDM/TDMA based VSAT network for Internet access
- **Research and Development**
- Research and development in the area of computer networking has been the forte of ERNET.

Task How research and development and training are integral parts of ERNET activities? Justify.

Self Assessment

Multiple choice questions:

4. Information and library network is a major national programme initiated by UGC in ..... .
   (*a*) 1988 (*b*) 2002
   (*c*) 1991 (*d*) 1992
5. The head quarters of Information and library network is situated at ..... .
   (*a*) Delhi (*b*) Mumbai
   (*c*) Mysore (*d*) Ahamedabad
6. ERNET practically brought the internet to India and has built of national capabilities in the area of:
   (*a*) Computer (*b*) Networking
   (*c*) Internet (*d*) Technology

Notes

7. The headquarter of ERNET is situated in:
   (*a*) New Delhi (*b*) Mumbai
   (*c*) Chennai (*d*) Kolkata
8. ERNET stands for:
   (*a*) Employment and research network. (*b*) Education and Research Network
   (*c*) Education and Reserve Network (*d*) Education and Research National.
9. ERNET was initiated in:
   (*a*) 1985 (*b*) 1970 (*c*) 1986 (*d*) 1960.

12.5 NICNET

In 1975, the Government of India strategically decided to take effective steps for the development of information systems and utilization of information resources and also for introducing computer based decision support system (informatics-led development) in government ministries and departments to facilitate planning and programme implementation to further the growth of economic and social development. Following this, the Central Government nucleated a high priority plan project "National Informatics Centre (NIC)" in 1976, and later on with the financial assistance of the United Nations Development Programme (UNDP) to the tune of US$4.4 million.

NIC was set up initially under the purview of Information, Planning and Analysis Group (IPAG) of the then Electronics Commission/the Department of Electronics (DOE). In 1987, it was shifted to the Union Planning Commission and in October 1999, to the newly formed Central Ministry of Information Technology, which later became Department of Information Technology of the Ministry of Communications and Information Technology.

The Government of India's resolution on the NIC's mandate has been published in the Gazette of India dated 2 September 1995. Major thrust areas of projects are given below:

- NIC is permitted to utilize its services, expertise and infrastructure including NICNET for supporting, on a charging basis, promotional activities/projects/programmes of national importance.
- Informatics and Network support of NIC/NICNET can be made available to public and private organizations engaged in specified promotional activities/projects/programmes.
- The specified categories of access are permitted for giving access to the services, technologies, expertise and infrastructure of NIC/NICNET to specified organizations and promotional applications.
- NIC/NICNET is given the enabling facilities for supporting promotional activities/projects/programmes in the identified work-areas.

The District is the basic administrative unit at the sub-state level in India. NICNET, with nodes in all the district of the Country, is in consonance with the decentralized planning concepts of the Government of India. It is a facilitator of information flow from the implementation level, to the planners at macro (national), macro-meso (region covering more than one state), meso(state), and micro (district, block and village)levels.

Did u know? NIC has innovated the concept of distributed databases, relevant to the specific requirements in India, and implemented the same over NICNET.

Recognising the importance of information as a vital resource, with applications in rural development, agricultural development, NIC launched its District Information System (DISNIC) programme in 1987. Although the district administration encompasses General Administration, Revenue Collection, Treasury, Judiciary and Development Activities, the focus has shifted in

Notes

recent times to the latter with the result that information Management has become very import. DISNIC programme attempts to server the needs of the administrators in a co-ordinated and uniform manner. Its specific objectives are to

- develop necessary databases in various sectors of the economy for planning and decision making at the district level.
- promote informatics culture at the district level through appropriate training programmes.
- improve the analysis capacity and presentation of statistics utilized for National, Regional and District Planning.
- develop modelling and forecasting techniques that are required for decision making for socio-economic development.
- promote Geographic Information System (GIS) techniques for planning and also remote data applications for Natural Resources Management at grass-root level.

12.5.1 Achievements

NIC has emerged as a "prime builder" of e-government / e-Governance applications in government sector (national, state and local districts) as well as promoter of digital opportunities for sustainable development, during more than a quarter century period. NIC has institutional linkages through its ICT Network "NICNET", with all the Departments/Ministries of the Central Government, 28 State Governments, 1 National Capital Territory of Delhi, 6 Union Territories, and about 600 District administrations of India. NIC has been instrumental in steering e-Government/ e-Governance applications in Government Ministries/Departments at Centre, States, District and Blocks, facilitating improvement in government services, wider transparency, promoting decentralized planning and management, resulting in better efficiency and accountability to people. NIC has been an active catalyst and facilitator in "informatics-led-development" programme of the government (could also be termed as an e-Government programme, an e-Governance Programme), enabling it to derive competitive advantage as well as to 'reach out into India' by implementing ICT applications in Social & public Administrations which are discernable from the following:

- Central Government Informatics Development Programme in the Fifth Plan Period (i.e. 1972-77)
- "NICNET" a gateway for Internet/Intranet Access and Resources Sharing in Central Government Ministries and Departments during 1980s and 1990s;
- State Government Informatics Development Programme in the Seventh Plan Period (i.e.1985-1990);
- DISNIC A NICNET based District Government Informatics programme for District Administration;
- Reaching out into India during 1985-90, even before the arrival of "Internet" Technology, to all the districts of the Country with different types of terrain, Agro- climatic conditions varied Regional and Socio-economic developments.
- iNOC Integrated Network Operations Centre, equipped with the state-of-the-art technology for managing the NICNET operations.
- Integrated Data Centre A world class Data Centre with state-of-the art infrastructure having the capacity to house more than 1000 high-end servers, supporting a wide range of technologies.
- Establishment of Digital Certification Authority and Public Key Infrastructure (PKI).
- Establishment of Disaster Recovery Centre (DRC) at Hyderabad.

During the last 27 years, NIC has implemented many "network centric" applications software for Programme implementation in various ministries and departments, using state-of-the-art software tools. "Reaching-Out-Into" and "Reaching- the-Unreached" Concepts were experimented and made operational by NIC through its various ICT Diffusion Projects through its 600 NICNET nodes located in district headquarters, even before the INTERNET Technology was introduced in this

Country. During 1980s and early part of 1990s, the policy thrust was on creating a "decision support system" for development planning and responsive administration in governments (i.e. an earlier version of the present day "e-Governance" / "e-Government"). NIC has vast core expertise and experience in the design, development and operationalisation of various e-Government projects in the areas of Public Administration and Governance viz., Agriculture & Food, Animal Husbandry, Fisheries, Forestry & Environment, Industry, Health, Education, Budget and Treasury, Fiscal Resources, Transport, Water Resources, Court Management, Rural Development, Land Records and Property registration, Culture & Tourism, Import & Exports facilitation, Social Welfare Services, Micro-level Planning etc.

Government of India Initiatives

After the war with China in 1962, the Government of India realised the importance and felt the need of a strong indigenous electronics base for security and national development and accordingly set up the Electronics Committee (also known as the Bhabha Committee) under the Chairmanship of the renowned nuclear scientist Dr. Homi J Bhabha. The Committee in its report in 1966 focused on computers as tools "to the development of a new outlook and a new scientific culture" and suggested the establishment of a National Computer Centre and five regional centres.

The Electronics Committee convened a National Conference on Electronics in 1968 wherein Dr. Vikram Sarabhai, the then Chairman of the Committee, suggested the formation of National Informatics Organisation towards fulfilling the goal of a self-reliant electronics industry.

Recognising the need for rapid progress in this regard, the Government of India set up a separate Department of Electronics (DOE) with effect from 26th June 1970 with Professor M.G.K. Menon as the Secretary of the Department. The department functioned directly under Prime Minister as a scientific department. The Government constituted the Electronics Commission in February 1971 under the Chairmanship of Professor M.G.K. Menon.

For policy formulation and implementation through meaningful, effective and in-depth studies in the field of electronics including computer industry, an Information, Planning and Analysis Group (IPAG) of the Electronics Commission was constituted in October 1971 with Dr. N. Seshagiri as its Director.

The Headquarters of the Department of Electronics were at Delhi and those of the Electronics Commission at Mumbai (then Bombay). The IPAG as part of the Electronics Commission was centered at Mumbai.

GENESIS

The Electronics Commission and the DOE put forward a proposal to UNDP for assistance to set up a National Computer Centre in Delhi for building up national data bases, developing the methodologies for utilising these, and for defining the various options and paths in decision-making at the national level. A UNDP team visited Delhi in March 1975 to study the proposal. The UNDP agreed to fund the National Informatics Centre to the extent of US $4.4 million for the purchase of a large computer system (costing approximately US $3.3 million), other hardware, training, the services of experts, etc.

The 1976-77 Annual Report of the DOE noted:

In view of this, action has been taken to proceed with the preliminary work relating to the National Informatics Centre so that when UNDP financial assistance becomes available and the major hardware is commissioned (in 1978 on the basis of current information), the Centre can get on with its work on an expeditious basis. NIC is a plan project administered by the Information, Planning and Analysis Group (IPAG) of the Electronics Commission in its initial stages.

The Advisory Council set up for the NIC in 1976-1977 had the following composition.

1. Prof. M. G. K. Menon, Chairman, Electronics Commission Chairman
2. Shri M. Satyapal, Advisor (I&M;), Planning Commission Member
3. Shri C.S. Swaminathan, Controller General of Accounts, Ministry of Finance Member

Notes

4. Prof. V. S. Rajamani, Professor, Indian Institute of Technology, Delhi Member
5. Col. A. Balasubramanian, Officer on Special Duty, Department of Electronics Member
6. Dr. N. Seshagiri, Director (IPAG) and Executive Director (Protem), NIC Member

The long-term objective of the National Informatics Centre, as approved by the Planning Commission, Ministry of Finance and the Electronics Commission, is 'to establish the feasibility of a system for the provision of detailed information to government ministries and agencies to assist them in making decisions relating to the country's economic and social development planning and programme implementation'. (Annual Report of the Department of Electronics, Government of India, 1977-78,p172.)

NIC was set up with the objective to promote economic, social, scientific and technological activities, and also for macro-economic adjustment programme of the Government, through the applications of IT.

As laid down in the Annual Reports of DOE 1976-77 and 1977-78, NIC was given the mandate to

- provide this informatics service to various user agencies in Government
- play a promotional role in creating appropriate information systems in Government
- act as a focal point for developing, managing and operating information system in Government
- act as a focal point for development of methodologies for designing and implementing national information systems and data management techniques
- act as a focal point for maintaining inventories of primary data and computer-based systems for data collection and dissemination
- train users in information systems, data management and computing techniques

Ten information systems were planned for development by NIC in the following sectors:

- Agriculture
- Construction and Transport
- Education and Manpower
- Energy
- Finance
- Industry
- Small-Scale Industries
- Socio-Economic Index
- Trade and Media
- Government Archival Information

With this, NIC embarked on a grandiose mission to develop various national data bases for use in planning and decision making by the government.

Starting as a small programme under an external stimulus by an UNDP project in early 1970s, NIC started functioning in 1977 and since then it has grown incrementally and later exponentially as one of India's major S&T; Organisations promoting Informatics-led Development, which has helped to usher in the required transformation to cope with the trends in the new millennium.

NICNET Facilities at LEH

The DISNIC programme is operational in 440 districts throughout the Country. Many states have taken up the implementation of this programme on priority basis, and have used it successfully in the sectors of Industry, Agriculture, Education, Transport, Treasury, Revenue, Administration, Civil Supplies, Animal Husbandry, Decentralized planning and Project detailing for sectorial programmes (Fisheries, Water Resources, Cooperation etc.).

A special decision-support system, using GISNIC software for educational planning and administration at district level, has been initiated. GISNIC has also been used to prepare the 1991 Population Census Atlas.

NIC has implemented Land Records computerisation using GIST terminals in 15 Pilot districts (Burdwan, Rewari, Ropar, Bishnupur, Sonitpur, Thiruvananthapuram, Gulberga, Salem, Wardha, Durgapur, Kangra, Deoria,Tripura, Imphal and Thoubal) selected by DRD; and also at Port Blair, Kanpur(Dehat), and Ghaziabad. The Project has also been initiated by NIC State Units in the states of Maharashtra, Sikkim and Uttar Pradesh with fund allocation by the respective State Governments.

NIC is working towards informatics programme development at the block level to strengthen micro-level Planning, Rural Development, Land Records Management, Panchayati Raj Institutions etc., and to facilitate block development and tehsil revenue administrations at the sub-district level.

12.5.2 NICNET Facilities

NICNET was designed and implemented by NIC using state-of-the-satellite-based computer-communication technology. Keeping in view the wide geographic spread of the country, ranging from islands in Indian ocean to the highest Himalayan ranges, in design of NICNET, which is one of the largest VSAT networks of its kind in the world, ensures extremely cost effective and reliable implementation.

NICNET has now become an integral part of a large number of Government and Corporate sector organizations, providing information exchange services. NICNET services include File Transfer, Electronic Mail, Remote Database Access, Data broadcast and EDI. In times of natural calamities like cyclones. NICNET has served as the basic message communication facility in the calamity-affected areas.

A large number of users including banks, financial institutions, exporters, ports and custom houses are targeted for provision of EDI services on NICNET.

Notes NICNET provides gateway to International Networks for Electronic Mail, Database Access and EDI services.

Self Assessment

State whether the following statements are true or false:

10. NIC launched its district information system programme in 1987.
11. NIC has implemented land records computerisation in 16 pilot districts.
12. The DISNIC programme is operational in 500 districts throughout the Country.
13. NICNET was designed and implemented by NIC using state-of the satellite-based computer communication technology.

12.6 Summary

- Information and Library Network (INFLIBNET) Centre is an Autonomous Inter-University Centre (IUC) of University Grants Commission, Government of India, involved in creating infrastructure for sharing of library and information resources and services among Academic and Research Institutions.
- Centre is an autonomous Inter-University Centre of the University Grants Commission (UGC) of India.
- To promote and establish communication facilities to improve capability in information transfer and access, that provide support to scholarship, learning, research and academic pursuit through cooperation and involvement of agencies concerned.
- ERNET is largest nationwide terrestrial and satellite network with point of presence located at the premiere educational and research institutions in major cities of the country.
- ERNET was initiated in 1986 by the Department of Electronics (DoE), with funding support from the Government of India and United Nations Development Program (UNDP), involving eight premier institutions as participating agencies-NCST (National Centre for Software Technology) Bombay, IISc (Indian Institute of Science) Bangalore, five IITs (Indian Institutes of Technology) at Delhi, Bombay, Kanpur, Kharagpur and Madras, and the DoE, New Delhi.
- The DISNIC programme is operational in 440 districts throughout the Country.

Notes

12.7 Keywords

CALIBNET : Calcutta Library Network (CALIBNET) is an organisation, sponsored by central government agency, like DSIR. It collects information on educational facilities in West Bengal, research projects carried out by various institutions and facilities available with them and put them on their web site, www.calibnet.in for all.

DELNET : Developing Library Network (DELNET) has been established with the prime objective of promoting resource sharing among the libraries through the development of a network of libraries.

INFLIBNET : Information and Library Network (INFLIBNET) Centre is an Autonomous Inter-University Centre (IUC) of University Grants Commission, Government of India, involved in creating infrastructure for sharing of library and information resources and services among Academic and Research Institutions.

UGC : The University Grants Commission (UGC) of India is a statutory organisation set up by Union government in 1956, for the coordination, determination and maintenance of standards of university education. It provides recognition for universities in India, and provides funds for government-recognised universities and colleges.

12.8 Review Questions

1. What is DELNET? Write down its activities and services.
2. Discuss NICNET and its facilities and achievements.
3. What do you mean by INFLIBNET and its functions?
4. Define the word ERNET and its history.
5. Discuss in detail the Libraries and Information Centers in India.

Answers : Self Assessment

1. Developing library network
2. DELNET
3. 243
4. (c)
5. (d)
6. (b)
7. (a)
8. (b)
9. (a)
10. True
11. False
12. False
13. True

12.9 Further Readings

Books

Malwad (N.M), et al, eds. *Digital Libraries: Dynamic Storehouse of Digitized Information:* Papers Presented at the SIS '96 15th Annual Convention and Conference 18-20 January, 1996. Bangalore, New Age International Publishers, 1996.

Aswal, R.S., ed. (2003). *Information Networks in India*, New Delhi: Ess Ess Publication. Baruah, A. (2002). *Computer Networking in Libraries*, Delhi; Kalpaz, 2002.

Jain, N.K, ed. (1998). 50 Years: *Library and Information services in India*.

Online links

http://www.spiritus-temporis.com/inflibnet/introduction.html

http://www.iiitmk.ac.in/iiitmk-services/network-services/ernet-services

http://sonbhadra.nic.in/nic/newpage2.htm

Notes

Unit 13: Internet Based Resources and Service Browsers

CONTENTS

Objectives
Introduction
13.1 Internet Based Resources
13.1.1 World Wide Web
13.1.2 Web Browser
13.2 Web Application
13.3 Web Search Engine
13.3.1 List of Search Engines
13.4 Summary
13.5 Keywords
13.6 Review Questions
13.7 Further Readings

Objectives

After studying this unit, you will be able to:

- State the internet based resources
- Discuss about Web application
- Describe the Web search engine
- Explain about the list of search engines.

Introduction

The Internet has spread technological literacy and given people all over the world fast access to vast resources. Internet use is directly affecting people, ideas, and behavior. Internet has an impact in many areas, including higher education, where it heralds the development and implementation of new and innovative strategies. Scholars can communicate with each other, as well as they can have access with library catalogues, bibliographic databases, and other academic resources.

13.1 Internet Based Resources

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

Most traditional communications media including telephone, music, film, and television are reshaped or redefined by the Internet, giving birth to new services such as Voice over Internet Protocol (VoIP) and IPTV. Newspaper, book and other print publishing are adapting to Web site technology, or are reshaped into blogging and web feeds. The Internet has enabled or accelerated new forms of human interactions through instant messaging, Internet forums, and social

Notes

networking. Online shopping has boomed both for major retail outlets and small artisans and traders. Business-to-business and financial services on the Internet affect supply chains across entire industries.

The origins of the Internet reach back to research of the 1960s, commissioned by the United States government in collaboration with private commercial interests to build robust, fault-tolerant, and distributed computer networks. The funding of a new U.S. backbone by the National Science Foundation in the 1980s, as well as private funding for other commercial backbones, led to worldwide participation in the development of new networking technologies, and the merger of many networks. The commercialization of what was by the 1990s an international network resulted in its popularization and incorporation into virtually every aspect of modern human life. As of 2011, more than 2.1 billion people – nearly a third of Earth's population – use the services of the Internet.

The Internet has no centralized governance in either technological implementation or policies for access and usage; each constituent network sets its own standards. Only the overreaching definitions of the two principal name spaces in the Internet, the Internet Protocol address space and the Domain Name System, are directed by a maintainer organization, the Internet Corporation for Assigned Names and Numbers (ICANN). The technical underpinning and standardization of the core protocols (IPv4 and IPv6) is an activity of the Internet Engineering Task Force (IETF), a non-profit organization of loosely affiliated international participants that anyone may associate with by contributing technical expertis.

13.1.1 World Wide Web

The World Wide Web (or the proper World-Wide Web; abbreviated as WWW or W3, and commonly known as the Web) is a system of interlinked hypertext documents accessed via the Internet. With a web browser, one can view web pages that may contain text, images, videos, and other multimedia and navigate between them via hyperlinks.

Using concepts from earlier hypertext systems, British engineer and computer scientist Sir Tim Berners-Lee, now Director of the World Wide Web Consortium (W3C), wrote a proposal in March 1989 for what would eventually become the World Wide Web. At CERN in Geneva, Switzerland, Berners-Lee and Belgian computer scientist Robert Cailliau proposed in 1990 to use hypertext "... to link and access information of various kinds as a web of nodes in which the user can browse at will", and they publicly introduced the project in December. "The World-Wide Web was developed to be a pool of human knowledge, and human culture, which would allow collaborators in remote sites to share their ideas and all aspects of a common project.

13.1.2 Web Browser

A web browser is a software application for retrieving, presenting, and traversing information resources on the World Wide Web. An information resource is identified by a Uniform Resource Identifier (URI) and may be a web page, image, video, or other piece of content. Hyperlinks present in resources enable users easily to navigate their browsers to related resources. A web browser can also be defined as an application software or program designed to enable users to access, retrieve and view documents and other resources on the Internet.

Although browsers are primarily intended to access the World Wide Web, they can also be used to access information provided by web servers in private networks or files in file systems. The major web browsers are Firefox, Google Chrome, Internet Explorer, Opera, and Safari.

13.2 Web Application

1. Google Calendar is a contact-and time-management web application offered by Google.
2. Horde groupware is an open source web application.

Notes

Figure 13.1

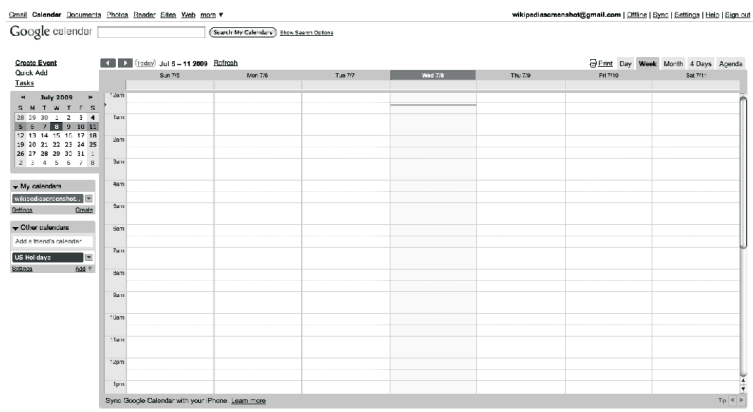
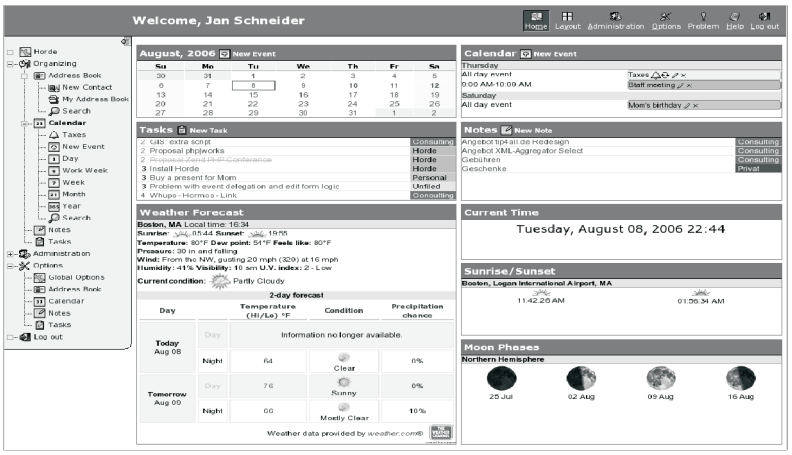


Figure 13.2



A **web application** is an application that is accessed over a network such as the Internet or an intranet. The term may also mean a computer software application that is hosted in a browser-controlled environment (*e.g.* a Java applet) or coded in a browser-supported language (such as JavaScript, combined with a browser-rendered markup language like HTML) and reliant on a common web browser to render the application executable.

Web applications are popular due to the ubiquity of web browsers, and the convenience of using a web browser as a client, sometimes called a thin client. The ability to update and maintain web applications without distributing and installing software on potentially thousands of client computers is a key reason for their popularity, as is the inherent support for cross-platform compatibility.

Notes Common web applications include web mail, online retail sales, online auctions, wikis and many other functions.

In earlier computing models, *e.g.*, in client-server, the load for the application was shared between code on the server and code installed on each client locally. In other words, an application had its own client programme which served as its user interface and had to be separately installed on each user's personal computer. An upgraded server-side code of the application would typically require an upgrade client-side code installed on each user workstation, adding to the support cost and decreasing productivity.

Notes

In contrast, web applications use web documents written in a standard format such as HTML (and more recently XHTML), which are supported by a variety of web browsers.

Generally, each individual web page is delivered to the client as a static document, but the sequence of pages can provide an interactive experience, as user input is returned through web form elements embedded in the page markup. During the session, the web browser interprets and displays the pages, and acts as the universal client for any web application.

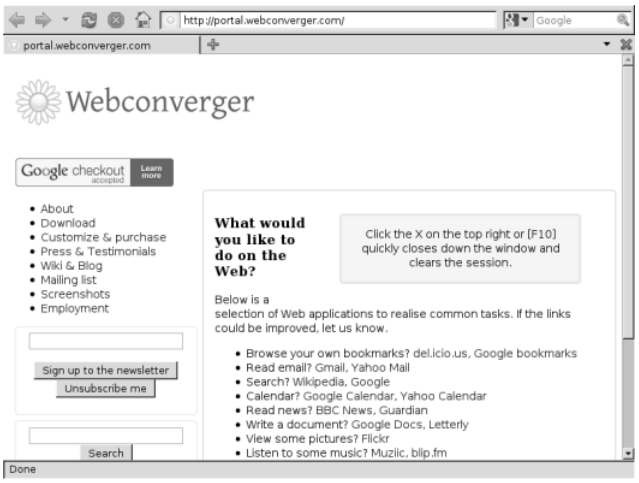
Did u know? In 1999, the "web application" concept was introduced in the Java language in the Servlet Specification version 2.2. [2.1?].

At that time both JavaScript and XML had already been developed, but Ajax had still not yet been coined and the XML Http Request object had only been recently introduced on Internet Explorer 5 as an ActiveX object.

In 2005, the term Ajax was coined, and applications like Gmail started to make their client sides more and more interactive.

Interface

Figure 13.3



Webconverger operating system provides an interface for web applications.

Through Java, JavaScript, DHTML, Flash, Silver light and other technologies, application-specific methods such as drawing on the screen, playing audio, and access to the keyboard and mouse are all possible. Many services have worked to combine all of these into a more familiar interface that adopts the appearance of an operating system. General purpose techniques such as drag and drop are also supported by these technologies. Web developers often use client-side scripting to add functionality, especially to create an interactive experience that does not require page reloading. Recently, technologies have been developed to coordinate client-side scripting with server-side technologies such as PHP. Ajax, a web development technique using a combination of various technologies, is an example of technology which creates a more interactive experience.

Structure

Applications are usually broken into logical chunks called "tiers", where every tier is assigned a role. Traditional applications consist only of 1 tier, which resides on the client machine, but web applications lend themselves to a *n*-tiered approach by nature. Though many variations are possible,

Notes

the most common structure is the three-tiered application. In its most common form, the three tiers are called presentation, application and storage, in this order. A web browser is the first tier (presentation), an engine using some dynamic Web content technology (such as ASP, ASP.NET, CGI, ColdFusion, JSP/Java, PHP, Perl, Python, Ruby on Rails or Struts2) is the middle tier (application logic), and a database is the third tier (storage). The web browser sends requests to the middle tier, which services them by making queries and updates against the database and generates a user interface.

For more complex applications, a 3-tier solution may fall short, and it may be beneficial to use an *n*-tiered approach, where the greatest benefit is breaking the business logic, which resides on the application tier, into a more fine-grained model. Another benefit may be adding an integration tier that separates the data tier from the rest of tiers by providing an easy-to-use interface to access the data. For example, the client data would be accessed by calling a "list clients ()" function instead of making a SQL query directly against the client table on the database. This allows the underlying database to be replaced without making any change to the other tiers.

There are some who view a web application as two-tier architecture. This can be a "smart" client that performs all the work and queries a "dumb" server, or a "dumb" client that relies on a "smart" server. The client would handle the presentation tier, the server would have the database (storage tier), and the business logic (application tier) would be on one of them or on both. While this increases the scalability of the applications and separates the display and the database, it still doesn't allow for true specialization of layers, so most applications will outgrow this model.

Business Use

An emerging strategy for application software companies is to provide web access to software previously distributed as local applications. Depending on the type of application, it may require the development of an entirely different browser-based interface, or merely adapting an existing application to use different presentation technology. These programs allow the user to pay a monthly or yearly fee for use of a software application without having to install it on a local hard drive. A company which follows this strategy is known as an application service provider (ASP), and ASPs are currently receiving much attention in the software industry.

Task Explain your own idea how web application is useful in business.

Writing Web Applications

There are many web application frameworks which facilitate rapid application development by allowing the programmer to define a high-level description of the program. In addition, there is potential for the development of applications on Internet operating systems, although currently there are not many viable platforms that fit this model.

The use of web application frameworks can often reduce the number of errors in a program, both by making the code simpler, and by allowing one team to concentrate just on the framework. In applications which are exposed to constant hacking attempts on the Internet, security-related problems can be caused by errors in the program. Frameworks can also promote the use of best practices such as GET after POST.

Applications

Examples of browser applications are simple office software (word processors, online spreadsheets, and presentation tools), but can also include more advanced applications such as project management, computer-aided design, video editing and point-of-sale.

Notes

Benefits

- Web applications do not require any complex "roll out" procedure to deploy in large organizations. A compatible web browser is all that is needed;
- Browser applications typically require little or no disk space on the client;
- Companies require no upgrade procedure since all new features are implemented on the server and automatically delivered to the users;
- Web applications integrate easily into other server-side web procedures, such as email and searching.
- Companies also provide cross-platform compatibility in most cases (*i.e.*, Windows, Mac, Linux, etc.) because they operate within a web browser window.

Drawbacks

- In practice, web interfaces, compared to thick clients, typically force significant sacrifice to user experience and basic usability.
- Web applications absolutely require compatible web browsers. If a browser vendor decides not to implement a certain feature, or abandons a particular platform or operating system version, this may affect a huge number of users;
- Standards compliance is an issue with any non-typical office document creator, which causes problems when file sharing and collaboration becomes critical;
- Browser applications rely on application files accessed on remote servers through the Internet. Therefore, when connection is interrupted, the application is no longer usable. However, if it uses HTML5 API's such as Offline Web application caching, it can be downloaded and installed locally, for offline use. Google Gears, although no longer in active development, is a good example of a third party plug in for web browsers that provides additional functionality for creating web applications;
- Since many web applications are not open source, there is also a loss of flexibility, making users dependent on third-party servers, not allowing customizations on the software and preventing users from running applications offline (in most cases). However, if licensed, proprietary software can be customized and run on the preferred server of the rights owner;
- They depend entirely on the availability of the server delivering the application. If a company goes bankrupt and the server is shut down, the users have little recourse. Traditional installed software keeps functioning even after the demise of the company that produced it (though there will be no updates or customer service);
- Likewise, the company has much greater control over the software and functionality. They can roll out new features whenever they wish, even if the users would like to wait until the bugs have been worked out before upgrading. The option of simply skipping a weak software version is often not available. The company can foist unwanted features on the users or cut costs by reducing bandwidth. Of course, companies will try to keep the good will of their customers, but the users of web applications have fewer options in such cases unless a competitor steps in and offers a better product and easy migration;
- The company can theoretically track anything the users do. This can cause privacy problems.

Self Assessment

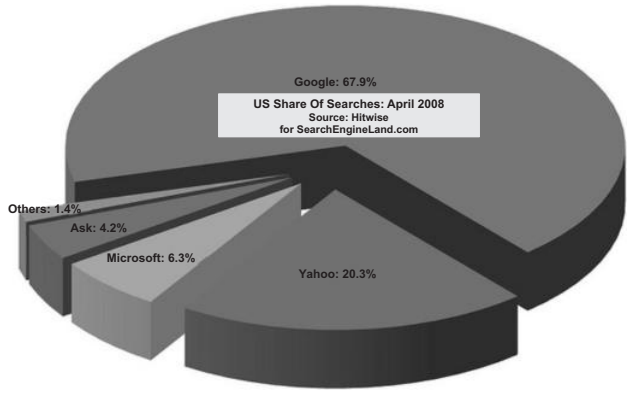
Fill in the blanks:

1. A ..... is an application that is accessed over a network such as the internet or an intranet.
2. In ..... the web application, concept was introduced in the Java language in the servlet specification version 2.2.
3. In ....., the term Ajex was coined, and applications like Gmail started to make their client sides more and more interactive.
4. ..... is the director of the world wide web consortium.

Notes

13.3 Web Search Engine

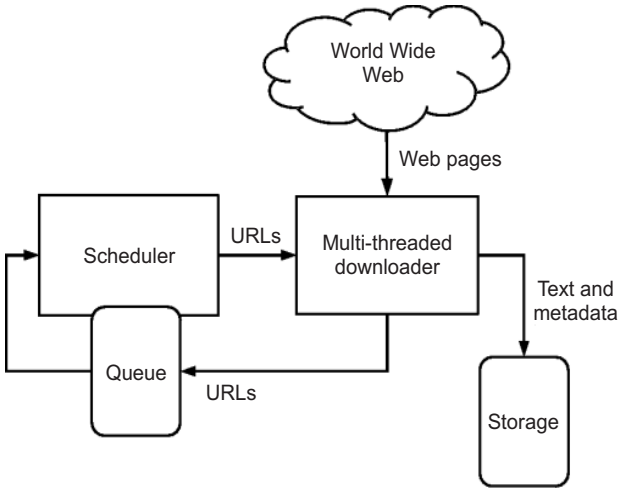
Figure 13.4: Search engine market share in the US, as of 2008.



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

Web search engines work

Figure 13.5: High-level architecture of a standard Web crawler



A search engine operates in the following order:

1. Web crawling
2. Indexing
3. Searching.

Notes Web search engines work by storing information about many web pages, which they retrieve from the html itself.

Notes

These pages are retrieved by a Web crawler (sometimes also known as a spider) — an automated Web browser who follows every link on the site. Exclusions can be made by the use of robots.txt. The contents of each page are then analyzed to determine how it should be indexed (for example, words are extracted from the titles, headings, or special fields called meta tags). Data about web pages are stored in an index database for use in later queries. A query can be a single word. The purpose of an index is to allow information to be found as quickly as possible. Some search engines, such as Google, store all or part of the source page (referred to as a cache) as well as information about the web pages, whereas others, such as AltaVista, store every word of every page they find. This cached page always holds the actual search text since it is the one that was actually indexed, so it can be very useful when the content of the current page has been updated and the search terms are no longer in it. This problem might be considered to be a mild form of linkrot, and Google's handling of it increases usability by satisfying user expectations that the search terms will be on the returned webpage. This satisfies the principle of least astonishment since the user normally expects the search terms to be on the returned pages. Increased search relevance makes these cached pages very useful, even beyond the fact that they may contain data that may no longer be available elsewhere.

When a user enters a query into a search engine (typically by using key words), the engine examines its index and provides a listing of best-matching web pages according to its criteria, usually with a short summary containing the document's title and sometimes parts of the text. The index is built from the information stored with the data and the method by which the information is indexed. Unfortunately, there are currently no known public search engines that allow documents to be searched by date. Most search engines support the use of the boolean operators AND, OR and NOT to further specify the search query. Boolean operators are for literal searches that allow the user to refine and extend the terms of the search. The engine looks for the words or phrases exactly as entered. Some search engines provide an advanced feature called proximity search which allows users to define the distance between keywords. There is also concept-based searching where the research involves using statistical analysis on pages containing the words or phrases you search for. As well, natural language queries allow the user to type a question in the same form one would ask it to a human. A site like this would be ask.com.

Task Discuss how web search engine works.

The usefulness of a search engine depends on the relevance of the **result set** it gives back. While there may be millions of web pages that include a particular word or phrase, some pages may be more relevant, popular, or authoritative than others. Most search engines employ methods to rank the results to provide the "best" results first. How a search engine decides which pages are the best matches, and what order the results should be shown in, varies widely from one engine to another. The methods also change over time as Internet usage changes and new techniques evolve. There are two main types of search engine that have evolved: one is a system of predefined and hierarchically ordered keywords that humans have programmed extensively. The other is a system that generates an "inverted index" by analyzing texts it locates. This second form relies much more heavily on the computer itself to do the bulk of the work.

Most Web search engines are commercial ventures supported by advertising revenue and, as a result, some employ the practice of allowing advertisers to pay money to have their listings ranked higher in search results. Those search engines which do not accept money for their search engine results make money by running search related ads alongside the regular search engine results. The search engines make money everytime if someone clicks on one of these ads.

Notes

Market share and wars

Search engine	Market share in May 2011	Market share in December 2010
Google	82.80%	84.65%
Yahoo!	6.42%	6.69%
Baidu	4.89%	3.39%
Bing	3.91%	3.29%
Ask	0.52%	0.56%
AOL	0.36%	0.42%

Self Assessment

Multiple choice questions:

5. A ..... is designed to search for information on the World Wide Web and FTP servers.
   (*a*) Web search engine (*b*) Web application
   (*c*) Web portal (*d*) Web master.
6. When a user enters a query into a search engine, the engine examines its ..... and provides a listing of best-matching web pages according to its criteria.
   (*a*) User ID (*b*) Password (*c*) Index (*d*) None of these.

Search Engine Bias

Although search engines are programmed to rank websites based on their popularity and relevancy, empirical studies indicate various political, economic, and social biases in the information they provide. These biases could be a direct result of economic and commercial processes (*e.g.*, companies that advertise with a search engine can become also more popular in its organic search results), and political processes (*e.g.*, the removal of search results in order to comply with local laws).

Did u know? Google Bombing is one example of an attempt to manipulate search results for political, social or commercial reasons.

13.3.1 List of Search Engines

Search engines are the list of Wikipedia articles about **search engines**, including web search engines, selection-based search engines, meta search engines, desktop search tools, and web portals and vertical market websites that have a search facility for online databases.

By content/topic

General

- Baidu (Chinese, Japanese)
- Bing
- Blekko
- Duck Duck Go
- Google
- Sogou (Chinese)
- Soso.com (Chinese)
- Yahoo!
- Yandex (Russian)
- Yebol
- Yodao (Chinese)

Notes

Desktop Search Engines

Name	*Platform*	*Remarks*	*License*
Autonomy	Windows	IDOL Enterprise Desktop Search.	Proprietary, commercial
Beagle	Linux	Open source desktop search tool for Linux based on Lucene	A mix of the X11/MIT License and the Apache License
Copernic Desktop Search	Windows	Considered best overall search engine in 2005 UW benchmark study.	Free for home use
Docco	cross-platform (Java)	Based on Apache's indexing and search engine Lucene, and it requires a Java Runtime Environment.	BSD License
Docfetcher	Cross-platform	Open source desktop search tool for Windows and Linux, based on Apache Lucene	Eclipse Public License
InSight Desktop Search	Windows	Metadata-based search utility	Freeware
ISYS Search Software	Windows	ISYS:desktop search software.	Proprietary (14-day trial)
Likasoft Archivarius 3000	Windows	-	Proprietary 30-day trial)
Meta Tracker	Linux, Unix	Open Source desktop search tool for Unix/Linux	GPL v2
Recoll	Linux, Unix	Open Source desktop search tool for Unix/Linux	GPL
Spotlight	Mac OS	Found in Apple Mac OS X "Tiger" and later OS X releases.	Proprietary
Strigi	Linux, Unix, Solaris, Mac OS X and Windows	Cross-platform open source desktop search engine	LGPL v2
Terrier Search Engine	Linux, Mac OS, Unix	Desktop search for Windows, Mac OS X (Tiger), Unix/Linux.	MPL
Tropes Zoom	Windows	Semantic Search Engine.	Freeware and commercial
Windows Search	Windows	Part of Windows Vista and later OSs. Available as Windows Desktop Search for Windows XP and Server 2003. Does not support indexing UNC paths on x64 systems.	Proprietary, freeware

Usenet

- Google Groups (formerly Deja News)

Based on

Google

- AOL Search
- CompuServe Search

Notes

- Groovle
- MySpace Search
- Netscape
- Ripple

Yahoo

- AltaVista
- Ecocho
- Everyclick (formerly based on Ask.com)
- Forestle (an ecologically motivated site supporting sustainable rain forests - formerly based on Google)
- GoodSearch
- Rectifi

Bing

- A9.com
- Alexa Internet
- Ciao!
- Facebook
- Tafiti
- Ms. Dewey
- Yahoo! Search

Ask.com

- Hakia (semantic search)
- iWon
- Lycos

Self Assessment

State whether the following statements are true or false:

7. Search engines are list of wikipedia.
8. Google searching is not one example of an attempt to manipulate search results for political, social or commercial reasons.

13.4 Summary

- A web application is an application that is accessed over a network such as the Internet or an intranet.
- In 1999, the "web application" concept was introduced in the Java language in the Servlet Specification version 2.2.
- In 2005, the term Ajax was coined, and applications like Gmail started to make their client sides more and more interactive.
- In practice, web interfaces, compared to thick clients, typically force significant sacrifice to user experience and basic usability.
- A web search engine is designed to search for information on the World Wide Web and FTP servers. The search results are generally presented in a list of results and are often called hits.

Notes

13.5 Keywords

Web Broser : A web browser is a software application for retrieving, presenting, and traversing information resources on the World Wide Web. It can also be defined as an application software or program designed to enable users to access, retrieve and view documents and other resources on the Internet.

Astonishment : Very great surprise or amazement.

Interface : In the field of computer science, an interface is a tool and concept that refers to a point of interaction between components, and is applicable at the level of both hardware and software. This allows a component, whether a piece of hardware such as a graphics card or a piece of software such as an Internet browser, to function independently while using interfaces to communicate with other components via an input/output system and an associated protocol.

WWW : The World Wide Web is a system of interlinked hypertext documents accessed via the Internet.

Web Application : A web application is an application that is accessed over a network such as the Internet or an intranet .

13.6 Review Questions

1. Write in detail about Internet based resources.
2. Discuss web application and its structure.
3. Describe the drawbacks of web application.
4. Write a brief note on web search engine.

Answers : Self Assessment

1. web application	2. 1999	3. 2005
4. Sir Time Berners-Lee	5. (*a*)	6. (*c*)
7. True	8. True	

13.7 Further Readings

Books

Malwad (N.M), et al, eds.. *Digital Libraries: Dynamic Storehouse of Digitized Information* : Papers Presented at the SIS '96 15th Annual Convention and Conference *18-20 January, 1996*. Bangalore: New Age International Publishers, 1996.

Aswal, R.S., ed. (2003). *Information Networks in India*. NewDelhi, Ess Ess Publication. Baruah, A. (2002). *Computer Networking in Libraries*. Delhi; Kalpaz, 2002.

Jain, N.K, ed. (1998). 50 Years: *Library and Information services in India*.

Nair, R. Raman. *Internet for Library and Information Services*.

Online links

http://knol.google.com/k/introduction-to-web-search-engines#

www.wikipedia.com

Notes

Unit 14: Web Portal

CONTENTS

Objectives
Introduction
14.1 Web Portal
14.1.1 Types of Portals
14.2 Gateway (Telecommunications)
14.3 Electronic Journal
14.4 Mailing List
14.4.1 Types of Mailing Lists
14.4.2 List Washing
14.5 Bulletin Board
14.6 Computer Conference and Virtual Seminar
14.6.1 Early Conferencing Systems
14.6.2 Current Technologies
14.6.3 Group Lists and Listservers
14.6.4 Chat Tools
14.6.5 Whiteboards
14.6.6 Audio and Video Conferencing
14.6.7 Collaboration Suites and Groupware
14.6.8 Privacy, Access, and Security
14.6.9 Future Trends
14.7 Summary
14.8 Keywords
14.9 Review Questions
14.10 Further Readings

Objectives

After studying this unit, you will be able to:

- Describe about web portal and its types
- Discuss the meaning of Gateway
- Explain the term electronic journal
- State about the bulletin board
- Explain thoroughly about computer conference.

Introduction

With so many portals out there and so many vendors hawking protalware, one might think that there is at least a firm agreement on what portals are. In fact, there are many confusing and often contradictory definitions. Some people even believe that just putting the work portal prominently on their home page makes it a portal. After all, with enough links, and especially a link to a search engine, any home page can give you access to much of the Web.

Notes

14.1 Web Portal

A **web portal** or **links page** is a web site that functions as a point of access to information on the World Wide Web. A portal presents information from diverse sources in a unified way.

Apart from the standard search engine feature, web portals offer other services such as e-mail, news, stock prices, information, databases and entertainment. Portals provide a way for enterprises to provide a consistent look and feel with access control and procedures for multiple applications and databases, which otherwise would have been different entities altogether.

Examples of public web portals are AOL, Excite, iGoogle, MSN, Netvibes, and Yahoo!.

14.1.1 Type of portals

Horizontal vs. vertical portal (Vortals)

Two broad categorizations of portals are horizontal portals, which cover many areas, and vertical portals, which are focused on one functional area. Another definition for a horizontal portal is that it is used as a platform to several companies in the same economic sector or to the same type of manufacturers or distributors. A vertical portal consequently is a specialized entry point to a specific market or industry niche, subject area, or interest, also called vortal.

Vertical information portal

A vertical information portal (VIP) is a specialized entry point to a specific marketplace and or industry niche. VIP's provide news, editorial content, digital publications, and e-commerce capabilities. Separate from traditional vertical portals, VIP's provide dynamic multimedia applications including social networking, video posting, and blogging.

Task State your own views how vertical information portal differ from horizontal portal.

Personal portals

A personal portal is a site on the World Wide Web that typically provides personalized capabilities to its visitors, providing a pathway to other content. It is designed to use distributed applications, different numbers and types of middleware and hardware to provide services from a number of different sources. In addition, business portals are designed for sharing and collaboration in workplaces. A further business-driven requirement of portals is that the content be able to work on multiple platforms such as personal computers, personal digital assistants (PDAs), and cell phones / mobile phones. Information, news, and updates are examples of content that would be delivered through such a portal. Personal portals can be related to any specific topic such as providing friend information on a social network or providing links to outside content that may help others beyond your reach of services. Portals are not limited to simply providing links. Information or content that you are putting on the internet may create a portal in the sense of a path to new knowledge and/or capabilities.

News Portals

The traditional media rooms all around the world are fast adapting to the new age technologies. This marks the beginning of news portals by media houses across the globe. This new media channels give them the opportunity to reach the viewers in a shorter span of time than their print media counter parts.

Government Web Portals

At the end of the dot-com boom in the 1990s, many governments had already committed to creating portal sites for their citizens. These included primary portals to the Governments as well as portals developed for specific audiences. Examples of Government web portals include;

- australia.gov.au for Australia.

Notes

- Bangladesh.gov.bd for Bangladesh.
- USA.gov for the United States (in English) & GobiernoUSA.gov (in Spanish).
- Disability.gov for citizens with disabilities in the United States.
- Directgov for citizens & businesslink.gov.uk for businesses in the United Kingdom.
- india.gov.in for India.
- Europa (web portal) links to all EU agencies and institutions in addition to press releases and audiovisual content from press conferences.
- Health-EU portal gathers all relevant health topics from across Europe.
- National Resource Directory links to resources for United States Service Members, Veterans and their families (NRD.gov).

Corporate Web Portals

Corporate intranets became common during the 1990s. As intranets grew in size and complexity, webmasters were faced with increasing content and user management challenges. A consolidated view of company information was judged insufficient; users wanted personalization and customization. Webmasters, if skilled enough, were able to offer some capabilities, but for the most part ended up driving users away from using the intranet.

Many companies began to offer tools to help webmasters manage their data, applications and information more easily, and through personalized views. Portal solutions can also include workflow management, collaboration between work groups, and policy-managed content publication.

Did u know? Corporate Web portals allow internal and external access to specific corporate information using secure authentication or single sign-on.

JSR168 Standards emerged around 2001. Java Specification Request (JSR) 168 standards allow the interoperability of portlets across different portal platforms. These standards allow portal developers, administrators and consumers to integrate standards-based portals and portlets across a variety of vendor solutions.

The concept of content aggregation seems to still gain momentum and portal solution will likely continue to evolve significantly over the next few years. The Gartner Group predicts generation 8 portals to expand on the Business Mashups concept of delivering a variety of information, tools, applications and access points through a single mechanism.

With the increase in user generated content, disparate data silos, and file formats, information architects and taxonomist will be required to allow users the ability to tag (classify) the data. This will ultimately cause a ripple effect where users will also be generating ad hoc navigation and information flows.

Corporate Portals also offer customers and employees self-service opportunities.

Stock Portals

Stock Market portals or stock exchange portals are Web-based applications that facilitates the process of informing the share-holders with substantial online data such as the latest price, ask/bids, the latest News, reports and announcements. Some stock portals use online gateways through a central depository system (CDS) for the visitors to buy or sell their shares or manage their portfolio.

Health and Medical Web Portal

Health and medical portal is the biggest place where display health & medical related information around the world.

- Emedical point Biggest Health and Medical web Portal in Bangladesh.

Notes

Search Portals

Search portals aggregate results from several search engines into one page.

Tender's Portals

Tender's portals stands for a gateway to search/modify/submit/archive data on tenders and professional processing of continuous online tenders. With a tender portal the complete tendering process-submitting of proposals, assessment, administration-are done on the web.

Electronic or online tendering is just carrying out the same traditional tendering process in an electronic form, using the Internet.

Using online tendering, bidders can do any of the following:

- Receive notification of the tenders.
- Receive tender documents online.
- Fill out the forms online.
- Submit proposals and documents.
- Submit bids online.

Hosted Web Portals

Hosted web portals gained popularity a number of companies began offering them as a hosted service. The hosted portal market fundamentally changed the composition of portals. In many ways they served simply as a tool for publishing information instead of the loftier goals of integrating legacy applications or presenting correlated data from distributed databases. The early hosted portal companies such as Hyperoffice.com or the now defunct InternetPortal.com focused on collaboration and scheduling in addition to the distribution of corporate data. As hosted web portals have risen in popularity their feature set has grown to include hosted databases, document management, email, discussion forums and more. Hosted portals automatically personalize the content generated from their modules to provide a personalized experience to their users. In this regard they have remained true to the original goals of the earlier corporate web portals. Emerging new classes of internet portals called Cloud Portals are showcasing the power of API (Application Programming Interface) rich software systems leveraging SOA (service oriented architecture, web services, and custom data exchange) to accommodate machine to machine interaction creating a more fluid user experience for connecting users spanning multiple domains during a given "session".

Domain-specific Portals

A number of portals have come that are specific to the particular domain, offering access to related companies and services, a prime example of this trend would be the growth in property portals that give access to services such as estate agents, removal firm, and solicitors who offer guidance. Along the same lines, industry-specific news and information portals have appeared, such as the clinical trials specific portal: IFPMA Clinical Trials Portal.

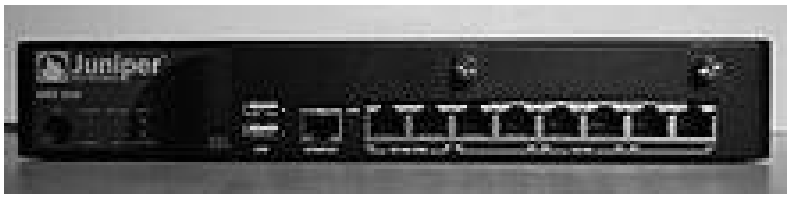
Self Assessment

Fill in the blanks:

1. A ..... is a web site that functions as a point of access to information on the world wide web.
2. ..... types of portal are present.
3. A ..... portal is a site on the world wide web that typically provides personalized capabilities to its visitors, providing a pathway to other content.

Notes

14.2 Gateway (Telecommunications)



Juniper SRX210 service gateway

In telecommunications, the term **gateway** has the following meaning:

1. In a communications network, a network node equipped for interfacing with another network that uses different protocols.
   - A gateway may contain devices such as protocol translators, impedance matching devices, rate converters, fault isolators, or signal translators as necessary to provide system interoperability. It also requires the establishment of mutually acceptable administrative procedures between both networks.
   - A protocol translation/mapping gateway interconnects networks with different network protocol technologies by performing the required protocol conversions.
2. Loosely, a computer or computer program configured to perform the tasks of a gateway.

Gateways, also called protocol converters, can operate at any network layer. The activities of a gateway are more complex than that of the router or switch as it communicates using more than one protocol.

Internet-to-Orbit Gateway

An Internet to orbit gateway (I2O) is a machine that acts as a connector between computers or devices connected to the Internet and computer systems orbiting the earth, like satellites or even manned spacecrafts. Such connection is made when the I2O establishes a stable link between the spacecraft and a computer or a network of computers on the Internet, such link can be control signals, audio frequency, or even visible spectrum signals.

Cloud Gateway

A Cloud storage gateway is a network appliance or server which resides at the customer premises and translates cloud storage APIs such as SOAP or REST to block-based storage protocols such as iSCSI or Fibre Channel or file-based interfaces such as NFS or CIFS.

Notes Cloud storage gateways enable companies to integrate cloud storage into applications without moving the applications into the cloud. In addition they simplify data protection.

14.3 Electronic Journal

Electronic journals, also known as e-journals, e-journals, and electronic serials, are scholarly journals or intellectual magazines that can be accessed via electronic transmission. In practice, this means that they are usually published on the Web. They are a specialized form of electronic document: they have the purpose of providing material for academic research and study, and they are formatted approximately like journal articles in traditional printed journals. Being in electronic form, articles sometimes contain metadata that can be entered into specialized databases, such as DOAJ or OACI, as well as the databases and search-engines for the academic discipline concerned.

Notes

Some electronic journals are online-only journals; some are online versions of printed journals, and some consist of the online equivalent of a printed journal, but with additional online-only (sometimes video and interactive media) material.

Most commercial journals are subscription-based, or allow pay-per-view access many universities subscribe in bulk to packages of electronic journals, so as to provide access to them to their students and faculty. It is generally also possible for individuals to purchase an annual subscription to a journal, via the original publisher.

An increasing number of journals are now available as online open access journals, requiring no subscription and offering free full-text articles and reviews to all. Individual articles from electronic journals will also be found online for free in an *ad hoc* manner: in working paper archives; on personal homepages; and in the collections held in institutional repositories and subject repositories. Some commercial journals do find ways to offer free materials. They may offer their initial issue or issues free, and then charge thereafter. Some give away their book reviews section for free. Others offer the first few pages of each article for free.

14.4 Mailing List

A **mailing list** is a collection of names and addresses used by an individual or an organization to send material to multiple recipients. The term is often extended to include the people subscribed to such a list, so the group of subscribers is referred to as "the mailing list", or simply "the list".

14.4.1 Types of Mailing Lists

At least two types of mailing lists can be defined: an announcement list is closer to the original sense, where a "mailing list" of people was used as a recipient for newsletters, periodicals or advertising. Traditionally this was done through the postal system , but with the rise of email, the electronic mailing list became popular. The second type allows members to post their own items which are broadcast to all of the other mailing list members. This second category is usually known as a discussion list.

Announcement List

Announcement lists are an easy and cost-effective means of communicating with a large number of people. Also known as one-way lists, announcement lists facilitate communication from authorized senders (usually one or a few editors) to the entire list. List members receive messages but do not interact directly with one another. Announcement lists provide a valuable solution for distributing newsletters, product announcements, new alerts, press releases and promotional offers to a large number of recipients.

When administering announcement lists, it is important to use full-featured email list management software. The software should provide double opt-in functionality and an easy-to-use interface for people to automatically subscribe, unsubscribe and change their email addresses or subscription settings. Naturally, the software should also automatically handle bounces or delivery errors, maintain message archives and keep the lists secure. Support for HTML and multi-part messages is also important for creating professional newsletter.

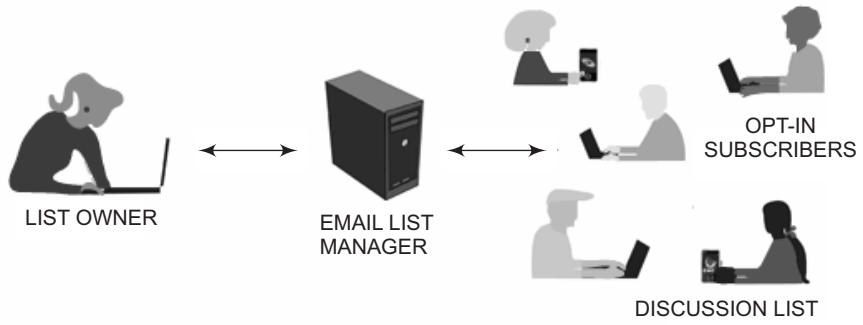
Notes

Advantages of Announcement Lists

1. **Announcement Lists Build Loyalty, Recognition and Trust**: A professional electronic newsletter is one of the strongest ways for companies and organizations to build customer loyalty boost brand recognition and keep customers and stakeholders engaged. By providing quality content and a consistent graphical profile in a regularly distributed newsletter, an organization can greatly enhance its image among subscribers, which, in turn, can contribute to higher customer satisfaction and increased sales.
2. **Announcement Lists Are Easy to Use:** Recipients can subscribe or unsubscribe quickly and easily to opt-in announcement lists. Email list management software automates most administrative tasks, such as subscriptions, sign-offs and bounce handling, making mass email communication easy and cost-effective.
3. **Announcement Lists Allow for Customization:** Email newsletters and other types of announcements can be easily customized according to each recipient's individual preferences, drawing on information from an organization's customer or member database.
4. **Announcement List Activity Can Be Measured:** Responses to newsletters and announcements can be measured through open-up and click-through tracking to determine the most compelling content. These analytics can be expanded to measure resulting sales or membership conversions. Based on real data, future announcements can be modified to more closely match the needs and preferences of individual subscribers.
5. **Announcement Lists Foster Interactivity:** Although announcement lists primarily involve one-way communication, interactive polls and surveys can be easily added to email newsletters and announcements, leading to valuable feedback, which can help build a two-way relationship between senders and subscribers.

Discussion Lists

Discussion lists are an effective and widely used platform for interaction among groups of people, providing opportunities for collaboration, information sharing and forming virtual communities. Discussion lists can operate with or without monitoring by a list owner or editor, known as moderation. Examples of discussion lists include technical support forums, interest groups, fan clubs and professional networks. Members of a discussion list communicate around a given focus topic. Each member can send messages to the list for distribution to all subscribers.



Many companies and organizations are using discussion lists to enhance customer communication and to build internal workgroups. Discussion lists are ideal for exchanging expertise, obtaining feedback and fostering collaboration among geographically dispersed work team members. When administering discussion lists, it is important to use full-featured email list management software. The software should provide double opt-in functionality and an easy-to-use interface for group members to automatically subscribe, unsubscribe and change their email addresses or subscription settings. Naturally, the software should also automatically handle bounces or delivery errors, maintain message archives and provide security features that keep the groups free from viruses and spam.

Notes

Advantages of Discussion Lists

Discussion lists are ideal for promoting interaction, exchanging expertise, obtaining feedback and fostering collaboration among geographically dispersed work team members.

1. **Discussion Lists Facilitate Information and Expertise Sharing:** From experts to everyday people, members of a discussion group can easily come together to discuss a topic of shared interest, exchanging information and expertise.
2. **Discussion Lists Build Communities:** A sense of community is developed when people discuss topics of shared importance. Online communities provide a vital link to many people who may lack in-person support and understanding regarding a specific issue or challenge.
3. **Discussion Lists Help Manage Information Flow:** Organizations can use discussion lists to quickly distribute and discuss announcements across various departments for day-to-day or crisis communication.
4. **Discussion Lists Create Business Support Forums:** Companies can create moderated or non-moderated discussion forums about their products and services, serving as a cost-effective means to provide customer support and to enhance customer relationships.
5. **Discussion Lists Form Collaborative Work Groups:** Discussion lists allow employees to collaborate on special projects, committees and task forces, making them more active participants. Discussion lists also allow telecommuters and other geographically dispersed colleagues to easily work together, creating virtual teams.

Task Define how electronic mailing differ from traditional one.

14.4.2 Listwashing

Listwashing is the process through which individual entries in mailing lists are removed. These mailing lists typically contain email addresses or phone numbers of those that have not voluntarily subscribed. An entry is removed from the list after a complaint is received.

Only complainers are removed via this process. It is widely believed that only a small fraction of those inconvenienced with unsolicited email end up sending a proper complaint. Because most of those that have not voluntarily subscribed stay on the list, and only the complainers stop complaining because they are removed, this helps spammers to maintain a "complaint-free" list of spammable email addresses.

Notes Internet service providers who forward complaints to the spamming party are often seen as assisting the spammer in list washing, or, in short, helping spammers.

List of Academic Databases and Search Engines

This page contains a representative list of major databases and search engines useful in an academic setting for finding and accessing articles in academic journals, or in repositories, archives, or other collections of scientific and other articles. As the distinction between a database and a search engine is unclear for these complex document retrieval systems, see:

- the general list of search engines for all-purpose search engines that can be used for academic purposes
- bibliographic databases for information about databases giving bibliographic information about finding books and journal articles.

Notes

Self Assessment

Multiple choice questions:

4. The machine that acts as a connector between computers or devices connected to the internet and computer system orbiting the earth like satellites or even manned space crafts is:
   (*a*) Internet-to-orbit gateway (*b*) Cloud gateway
   (*c*) Juniper service gateway (*d*) None of these
5. The collection of names and addresses used by an individual or an organization to send materials to multiple recipients is called:
   (*a*) Mailing list (*b*) List washing
   (*c*) Search engines (*d*) Bulletin board.
6. How many types of mailing list?
   (*a*) 2 (*b*) 3
   (*c*) 4 (*d*) 6
7. Which mailing list is easy and cost effective means of communicating with a large number of people?
   (*a*) Announcement list (*b*) Discussion list
   (*c*) Both (a) and (b) (*d*) None of these.

14.5 Bulletin Board

Bulletin Board System

A **Bulletin Board System**, or **BBS**, is a computer system running software that allows users to connect and log in to the system using a terminal programme. Once logged in, a user can perform functions such as uploading and downloading software and data, reading news and bulletins, and exchanging messages with other users, either through electronic mail or in public message boards. Many BBSes also offer on-line games, in which users can compete with each other, and BBSes with multiple phone lines often provide chat rooms, allowing users to interact with each other.

Notes Originally BBSes were accessed only over a phone line using a modem, but by the early 1990s some BBSes allowed access via a Telnet, packet switched network, or packet radio connection.

Ward Christensen coined the term "Bulletin Board System" as a reference to the traditional cork-and-pin bulletin board.

Presentation

BBSes were generally text-based, rather than GUI-based, and early BBSes conversed using the simple ASCII character set. However, some home computer manufacturers extended the ASCII character set to take advantage of the advanced color and graphics capabilities of their systems. BBS software authors included these extended character sets in their software, and terminal programme authors included the ability to display them when a compatible system was called. Atari's native character set was known as ATASCII, while most Commodore BBSes supported PETSCII. PETSCII was also supported by the nationwide online service Quantum Link.

Did u know? Ward Christensen coined the term "Bulletin Board System".

Notes

The use of these custom character sets was generally incompatible between manufacturers. Unless a caller was using terminal emulation software written for, and running on, the same type of system as the BBS, the session would simply fall back to simple ASCII output. For example, a Commodore 64 user calling an Atari BBS would use ASCII rather than the machine's native character set. As time progressed, most terminal programs began using the ANSI standard, but could use their native character set if it was available.

COCONET, a BBS system made by Coconut Computing, Inc., was released in 1988 and only supported a GUI interface (no text interface was available), and worked in EGA/VGA graphics mode, which made it stand out from the text-based BBS systems. COCONET's bitmap and vector graphics and support for multiple type fonts were inspired by the PLATO system, and the graphics capabilities were based on what was available in the Borland BGI graphics library. A number of companies wanted to license the COCONET GUI but Coconut Computing chose not to, and as a result, a competing approach called Remote Imaging Protocol (RIP) emerged and was promoted by Telegrafix in the early to mid 1990s but it never became widespread. A similar technology called NAPLPS was also considered, and although it became the underlying graphics technology behind the Prodigy service, it never gained popularity in the BBS market. There were several GUI-based BBS's on the Apple Macintosh platform, including TeleFinder and FirstClass, but these remained widely used only in the Mac market.

In the UK, the BBC Micro based OBBS software, available from Pace for use with their modems, optionally allowed for colour and graphics using the Teletext based graphics mode available on that platform. Other systems used the Viewdata protocols made popular in the UK by British Telecom's Prestel service, and the on-line magazine Micronet 800 whom were busy giving away modems with their subscriptions.

Task State briefly how bulletin board system helps to user.

The most popular form of online graphics was ANSI art, which combined the IBM Extended ASCII character set's blocks and symbols with ANSI escape sequences to allow changing colors on demand, provide cursor control and screen formatting, and even basic musical tones. During the late 1980s and early 1990s, most BBSes used ANSI to make elaborate welcome screens, and colorized menus, and thus, ANSI support was a sought-after feature in terminal client programs. The development of ANSI art became so popular that it spawned an entire BBS "artscene" subculture devoted to it.

Amiga program Skyline BBS was the first in 1987 featuring a script markup language communication protocol called Skypix which was capable to give the user a complete graphical interface, featuring rich graphic content, changeable fonts, mouse-controlled actions, animations and sound.

Today, most BBS software that is still actively supported, such as WorldGroup, Wildcat! BBS and Citadel/UX, is Web-enabled, and the traditional text interface has been replaced (or operates concurrently) with a Web-based user interface. For those more nostalgic for the true BBS experience, one can use Net Serial (Windows) or DOSBox (Windows/*nix) to redirect DOS COM port software to telnet, allowing them to connect to Telnet BBSes using 1980s and 1990s era modem terminal emulation software, like Telix, Terminate, Qmodem and Procomm Plus. Modern 32-bit terminal emulators such as mTelnet and SyncTerm include native telnet support.

Content and Access

Since early BBS' were frequently run by computer hobbyists, they were typically technical in nature with user communities revolving around hardware and software discussions. Many SysOps were transplants of the amateur radio community and thus amateur and packet radio were often popular topics.

As the BBS phenomenon grew, so did the popularity of special interest boards. Bulletin Board Systems could be found for almost every hobby and interest. Popular interests included politics,

Notes

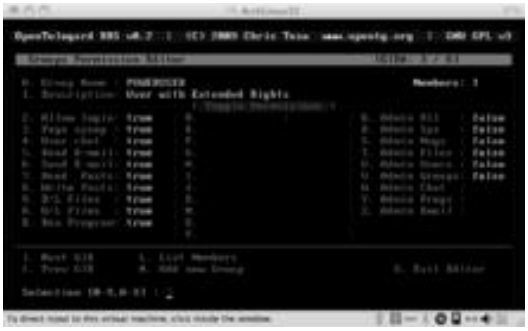
religion, music, dating, and alternative lifestyles. Many SysOps also adopted a theme in which they customized their entire BBS (welcome screens, prompts, menus, and so on.) to reflect that theme. Common themes were based on fantasy, or were intended to give the user the illusion of being somewhere else, such as in a sanatorium, wizard's castle, or on a pirate ship.

In the early days, the file download library consisted of files that the SysOps obtained themselves from other BBS and friends. Many BBSes inspected every file uploaded to their public file download library to ensure that the material did not violate copyright law. As time went on, Shareware CD ROMs were sold with up to thousands of files on each CD ROM. Small BBS copied each file individually to their hard drive. Some systems used a CD ROM drive to make the files available. Advanced BBS used Multiple CD ROM disk changer units that switched 6 CD ROM disks on demand for the caller(s). Large systems used all 26 DOS Drive letters with multi-disk changers housing tens of thousands of copyright free shareware or freeware files available to all callers. These BBSes were generally more family friendly, avoiding the seedier side of BBSes. Access to these systems varied from single to multiple modem lines with some requiring little or no confirmed registration.

Some BBSes, called elite, warez or pirate boards, were exclusively used for distributing pirated software, phreaking, and other questionable or unlawful content. These BBSes often had multiple modems and phone lines, allowing several users to upload and download files at once. Most elite BBSes used some form of new user verification, where new users would have to apply for membership and attempt to prove that they were not a law enforcement officer or a lamer. The largest elite boards accepted users by invitation only. Elite boards also spawned their own subculture and gave rise to the slang known today as leetspeak.

Another common type of board was the "support BBS" run by a manufacturer of computer products or software. These boards were dedicated to supporting users of the company's products with question and answer forums, news and updates, and downloads. Most of them were not a free call. Today, these services have moved to the web.

Figure 14.1: Access group editor in a developer build of Open TG BBS



Some general purpose Bulletin Board Systems had special levels of access that were given to those who paid extra money, uploaded useful files or knew the sysop personally. These specialty and pay BBSes usually had something special to offer their users such as large file libraries, warez, pornography, chat rooms or Internet access.

Pay BBSes such as The WELL and Echo NYC (now Internet forums rather than dial-up), ExecPC, and MindVox (which folded in 1996) were admired for their tightly-knit communities and quality discussion forums. However, many "free" BBSes also maintained close knit communities, and some even had annual or bi-annual events where users would travel great distances to meet face-to-face with their on-line friends. These events were especially popular with BBSes that offered chat rooms.

Some of the BBSes that provided access to illegal content did wind up in trouble. On July 12, 1985, in conjunction with a credit card fraud investigation, the Middlesex County, NJ Sheriff's department raided and seized The Private Sector BBS, which was the official BBS for grey hat hacker quarterly

Notes

2600 Magazine at the time. The notorious Rusty *n* Edie's BBS, in Boardman, Ohio, was raided by the FBI in January 1993 for software piracy, and in November 1997 sued by Playboy for copyright infringement. In Flint, Michigan, a 21 year old man was charged with distributing child pornography through his BBS in March 1996.

Networks

Most early BBSes operated as stand-alone islands. Information contained on that BBS never left the system, and users would only interact with the information and user community on that BBS alone. However, as BBSes became more widespread, there evolved a desire to connect systems together to share messages and files with distant systems and users. The largest such network was FidoNet.

As is it was prohibitively expensive for the hobbyist SysOp to have a dedicated connection to another system, FidoNet was developed as a store and forward network. Private electronic mail (Netmail), public message boards (Echomail) and eventually even file attachments on a FidoNet-capable BBS would be bundled into one or more archive files over a set time interval. These archive files were then compressed with ARC or ZIP and forwarded to (or polled by) another nearby node or hub via a dialup Xmodem session. Messages would be relayed around various FidoNet hubs until they were eventually delivered to their destination. The hierarchy of FidoNet BBS nodes, hubs, and zones was maintained in a routing table called a Nodelist. Some larger BBSes or regional FidoNet hubs would make several transfers per day, some even to multiple nodes or hubs, and as such, transfers usually occurred at night or early morning when toll rates were lowest. In Fido's heyday, sending a Netmail message to a user on a distant FidoNet node, or participating in an Echomail discussion could take days, especially if any FidoNet nodes or hubs in the message's route only made one transfer call per day.

FidoNet was platform-independent and would work with any BBS that was written to use it. BBSes that did not have integrated FidoNet capability could usually add it using an external FidoNet front-end mailer such as FrontDoor, BinkleyTerm, InterMail or D'Bridge, and a mail processor such as FastEcho or Squish. The front-end mailer would conduct the periodic FidoNet transfers, while the mail processor would usually run just before and just after the mailer ran. This program would scan for and pack up new outgoing messages, and then unpack, sort and "toss" the incoming messages into a BBS user's local electronic mailbox or into the BBS's local message bases reserved for Echomail. As such, these mail processors were commonly called "scanner/tosser/packers."

Many other BBS networks followed the example of FidoNet, using the same standards and the same software. These were called **FidoNet Technology Networks** (FTNs). They were usually smaller and targeted at selected audiences. Some networks used QWK doors, and others such as RelayNet (RIME) and WWIVnet used non-Fido software and standards.

Before commercial Internet access became common, these networks of BBSes provided regional and international e-mail and message bases. Some even provided gateways, such as UFGATE, by which members could send/receive e-mail to/from the Internet via UUCP, and many FidoNet discussion groups were shared via Usenet. Elaborate schemes allowed users to download binary files, search gopherspace, and interact with distant programs, all using plain text e-mail.

As the volume of FidoNet Mail increased and newsgroups from the early days of the Internet became available, satellite data downstream services became viable for larger systems. The satellite service provided access to FidoNet and Usenet newsgroups in large volumes at a reasonable fee. By connecting a small dish and receiver, a constant downstream of thousands of FidoNet and Usenet newsgroups could be received. The local BBS only needed to upload new outgoing messages via the modem network back to the satellite service. This method drastically reduced phone data transfers while dramatically increasing the number of message forums.

Notes

FidoNet is still in use today, though in a much smaller form, and many Echomail groups are still shared with Usenet via FidoNet to Usenet gateways. Widespread abuse of Usenet with spam and pornography has led to many of these FidoNet gateways to cease operation completely.

Shareware and Freeware

Much of the "Shareware " movement was started via user distribution of software through BBSes. A notable example was Phil Katz's PKARC (and later PKZIP, using the same ".zip" algorithm that WinZip and other popular archivers now use); also other concepts of software distribution like freeware, postcardware like JPEGview and donationware like Red Ryder for the Macintosh first appeared on BBS sites. Doom from id Software and many Apogee games were distributed as shareware. The Internet has largely erased the distinction of shareware - most users now download the software directly from the developer's website rather than receiving it from another BBS user 'sharing' it. Today shareware is commonly used to mean electronically-distributed software from a small developer.

Many commercial BBS software companies that continue to support their old BBS software products switched to the shareware model or made it entirely free. Some companies were able to make the move to the Internet and provide commercial products with BBS capabilities.

Features

A classic BBS had:

- a computer
- one or more modems
- one or more phone lines
- a BBS software package
- a sysop-system operator
- a user community

The BBS software usually provides:

- menu Systems
- one or more message bases
- file areas
- sysOp side, live viewing of all caller activity
- voting-opinion booths
- statistics on message posters, top uploaders / downloaders
- online games (usually single player or only a single active player at a given time)
- a doorway to third-party online games
- usage auditing capabilities
- multi-user chat (only possible on multi-line BBSes)
- internet email (more common in later Internet-connected BBSes)
- networked message boards
- most modern BBSes allow telnet access over the Internet using a telnet server and a virtual FOSSIL driver.
- a "yell for SysOp" (The original chat, before multi-line systems) caller side menu item that sounded an audible alarm to the SysOp. If chosen, the SysOp could then initiate a text-to-text chat with the caller; similar to what commercial websites have used to sell and support products.

14.6 Computer Conference and Virtual Seminar

Computer conferencing technology encompasses a broad class of software and hardware tools that facilitate real-time (or nearly so) interactions over **computer networks,** and in particular text-based chat programs

Notes

- whiteboard utilities
- groupware
- instant messaging systems
- audio and video conferencing software

These nascent technologies appeal to businesses because they have potential to save time in getting tasks done, to reduce travel expenses, and to enhance communications and collaboration across the organization. However, computer conferencing has its drawbacks. Though some programs are inexpensive—even free—their performance may be substandard. For example, video and audio conferencing over the Internet require fast connections. Otherwise, the process quickly becomes an exercise in frustration as words and images lag or are lost completely. Simpler, text-based chat conferencing is less prone to traffic hang-ups, but is relatively inflexible for multi-person and multimedia collaboration and can be tedious to use for extended periods. In addition, some collaboration packages only work well for a moderate-sized group, say 30 simultaneous users, and thus are impractical for larger companies that need to assemble many people at once, such as for computer-based training sessions. A final limitation is the lack of standardization, especially between high-end programs, which means that all participants must have the exact same software. As a result, conferencing with individuals outside the company may prove troublesome; as there are no guarantees they are using a compatible program.

Nonetheless, whatever form it takes, computer conferencing is an important and still-emergent business technology. Particularly in the so-called groupware programs—integrated **electronic mail,** document storage, and collaboration applications—software developers have concentrated on bringing to market a polished, easy-to-use, and effective collaboration environment that has wide appeal for business functions.

Notes Tens of millions of corporate users already have access to at least some form of groupware through popular installations like Lotus Development Corp.'s Domino/Notes programs, Microsoft Corp.'s Exchange and NetMeeting, and Novell Inc.'s GroupWise.

In addition to these applications' off-the-shelf functions, businesses are usually able to customize the interfaces and tools to meet their needs; however, most use of these programs to date has been for e-mail and for static document sharing in bulletin-board fashion. The key for software vendors and for their business clients will be to migrate this large user base toward real-time interactions via computer conferencing tools.

14.6.1 Early Conferencing Systems

One of the first widely publicized conferencing systems, EMISARI, served as the foundation for the Emergency Management Information System. At the same time in the early 1970s, researchers at the University of Michigan developed the text-based Confer system, which allowed users to enter controlled-access discussion areas, and read and post information related to the topic. Other early systems frequently relied on the manipulations of the Unix operating system to allow copying of files from one computer to another, or UUCP (Unix to Unix Copying Program). In 1979, a computer-based bulletin board software released into the public domain by Ward Christensen set the stage for further developments in computer conferencing. By 1980, a program called Usenet arrived to maintain a set of publicly accessible message postings on geographically dispersed computers. Usenet provided the foundation for so-called Internet newsgroups, which didn't necessarily contain news, but became popular sites for exchanging opinions, questions and answers, and other informal communications. Advances in speed and cost of networked microcomputers and the advent of the Internet combined to foster the growth and popularity of computer conferencing.

Notes

14.6.2 Current Technologies

As divergent computer-based interaction technologies have evolved, the notion of a "computer conference" has to some degree taken a backseat to other concepts that describe a particular kind of program or interaction, e.g., chat programs, collaboration suites, or video conferencing over the Internet. Hence, it is now common for people to engage in some form of computer conferencing without perceiving it or identifying it as such. To be sure, in business settings there are still innumerable conferences in the more traditional sense—whether by computer, telephone, satellite, or in person—but there are many important business communications achieved through derivatives of conferencing software that are no longer labeled "conferencing." For purposes of this discussion, computer conferencing includes all of these activities.

14.6.3 Group Lists and Listservers

A rather primitive form of computer conferencing—although technically it's not conferencing at all—can be achieved by using group e-mail lists and list servers. This method simply automates the process of sending the same email message to each recipient on a list, which can be centrally maintained. Thus, managers can create lists, for example, of all the staff under their supervision. Listservers are mostly used for Internet-wide discussion groups rather than internal communications, but this may be useful to some companies. If a company lacks a technology infrastructure for a more sophisticated computer conferencing system, a series of meaningful group lists, such as by work group, can provide some of the benefits at little or no cost.

14.6.4 Chat Tools

Some of the simplest computer conferencing tools are chat programs, which at their most basic involve typing text messages that are displayed on a running screen, akin to reading a printed dialogue. Typically inexpensive or free, chat programs may be used for private one-on-one discussions as well as with large groups. Most chat software is not well suited for visual and audio communications or for document sharing. It is most useful for quick and relatively informal discussions among coworkers. Chat functions are often offered in web browser suites and other multi-use software packages. Publicly accessible chat rooms are hosted on numerous sites for various purposes, though often for socializing rather than for business.

14.6.5 Whiteboards

Like their real-life namesakes, whiteboard programs allow multiple participants to share diagrams and text via computer. This function is usually a component of a larger application suite rather than a stand-alone program. Information drawn on the whiteboard screen can be saved to an image file or printed. Whiteboards are best for information exchanges that involve spontaneous illustration or brainstorming.

14.6.6 Audio and Video Conferencing

Programs that enable audio and video conferencing over computer networks are under active development by many firms, but few have managed the transition from novelty to essential work tool. Some large corporations have implemented computer-based video conferencing, for instance, in employee training programs. Similarly, audio programs can be used in place of conference calls, possibly saving long-distance phone charges. When a corporation conducts conferencing within its own network and has a fast enough system to support it, these technologies are increasingly valuable and cost-efficient versus their conventional counterparts, conference calls and satellite hook-ups. However, if a company relies on communicating over the Internet, the results may be disappointing, particularly with video. Still, ongoing advances in data compression and expanding bandwidth hold much promise for the future of these conferencing options.

Notes

14.6.7 Collaboration Suites and Groupware

Collaboration packages and groupware offer a set of integrated tools for various kinds of interactions; many of them include functions for basic activities like chatting and whiteboarding. Traditional groupware programs like Lotus Notes and Microsoft Exchange, which tend to be more tightly integrated with in-house networking software, have served as primarily e-mail managers and launch pads for more specialized interactions, such as browsing and posting static documents on a corporate messaging database or viewing and updating a group calendar. Collaboration suites include Netscape/America Online, Inc.'s Communicator and a plethora of smaller and more specialized applications. More recent refinements to these programs have added more real-time interactive features, including application sharing (e.g., several users can view and edit a single word processing document or browse a Web site simultaneously), whiteboards, chat, instant messaging (sending a short message that appears on the recipient's screen rather than waiting for him or her to check e-mail), direct file transfers, and formal conferencing software. Increasingly, groupware includes utilities for determining which corporate users are logged into the system and available for conferencing. The various software packages differ in how closely they integrate these functions and in whether a particular function is more central or more peripheral to the suite.

14.6.8 Privacy, Access, and Security

The digital transmission of information is fast and reliable but often vulnerable to hijack or destruction. Intellectual properties, eavesdropping, and fraudulent use are all examples of security issues raised within a computer conference. Other examples include trading of illegally copied software and pornography on conferencing systems.

Issues with privacy include violation of messaging privacy, monitoring, matching or redesigning personal data for other than intended uses, caller identification, and other personal indignities like **computer fraud.** Accuracy of digital information arises as an issue when credit and financial decisions rely on automated credit ratings. Access to information and intellectual property laws and copyright conflict with rights of individual access. Recent encryption schemes, or coded information, seem to infringe on fair-use doctrine and remain unresolved. **Computersecurity** issues involve protecting both hardware and software.

14.6.9 Future Trends

Despite all the new developments in groupware and PC-based collaboration programs, some observers speculate that increasingly computer conferencing and related tasks, including e-mail, will be outsourced to mass providers and accessed via standard Web browsers and plug-in utilities. This view differs significantly from the current development trajectory, which has been to create separate applications for each major function, e.g., one program to manage e-mail and discussion boards, another to handle whiteboarding, and so on. Installing and supporting the multitude of conferencing software alternatives is an expensive endeavor for large businesses, in terms of both staffing and software/hardware costs, making third-party hosting and turn-key availability an enticing proposition.

Whether or not computer conferencing software is hosted locally or on the Internet, the trend has been decidedly toward removing barriers between the various kinds of conferencing and collaboration tasks. End users want a single interface from which they can initiate any number of collaborative tasks without needing to start several separate programs or search for utilities buried in software menus.

Did u know? Computer conferencing is emerging not only as a boon to productivity and cost containment over traditional alternatives, but for some companies it is a method of adding value to the enterprise's **intellectual capital.**

It can do so by keeping employees better informed and by documenting operational and managerial history and knowledge that can be accessed indefinitely into the future.

Notes

Virtual Seminar

A seminar delivered online with a live instructor. The instructor and attendees communicate with each other as if they were in the same room. Also called a "Webinar," virtual seminars tend to be replicas of classroom workshops, whereas the Webinar is often a short presentation with limited participation. A workshop or lecture delivered over the Web. Webinars may be a one-way Webcast, or there may be interaction between the audience and the presenters

Task State your views how audio video conferencing acts as a tool in communication.

Self Assessment

State whether the following statements are true or false:

8. A bulletin Board System or BBs, is a computer system running software that allows users to connect and log in to the system that allows users to connect and log in to the system using a total programmer.
9. Ward Christensen coined the term a Bulletin Board system as a reference to the traditional core-and-pin bulletin board.
10. Amiga program skyline BBs web the first in 1987 featuring a script mark up language communications protocol called sky pix.
11. In 1979 a computer based bulletin board software released into the public domain by word Christensen.
12. Whiteboard programs allow multiple participants to share diagrams and text via computers.

14.7 Summary

- A web portal or links page is a web site that functions as a point of access to information on the World Wide Web.
- A vertical information portal (VIP) is a specialized entry point to a specific marketplace and or industry niche.
- A personal portal is a site on the World Wide Web that typically provides personalized capabilities to its visitors, providing a pathway to other content.
- The traditional media rooms all around the world are fast adapting to the new age technologies.
- Stock Market portals or stock exchange portals are Web-based applications that facilitates the process of informing the share-holders with substantial online data such as the latest price, ask/bids, the latest News, reports and announcements.
- Electronic journals, also known as e-journals, e-journals, and electronic serials, are scholarly journals or intellectual magazines that can be accessed via electronic transmission.
- Listwashing is the process through which individual entries in mailing lists are removed.

14.8 Keywords

Collaboration : Collaboration is working together to achieve a goal. It is a recursive process where two or more people or organizations work together to realize shared goals.

Web Portal : A web portal or links page is a web site that functions as a point of access to information in the World Wide Web. A portal presents information from diverse sources in a unified way.

Notes

VIP : A vertical information portal (VIP) is a specialized entry point to a specific marketplace and or industry niche. VIP's provide news, editorial content, digital publications, and e-commerce capabilities.

Electronic Journals : Electronic journals, also known as ejournals, e-journals, and electronic serials, are scholarly journals or intellectual magazines that can be accessed via electronic transmission. In practice, this means that they are usually published on the Web.

Listwashing : It is the process through which individual entries in mailing lists are removed. These mailing lists typically contain email addresses or phone numbers of those that have not voluntarily subscribed. An entry is removed from the list after a complaint is received.

DHCP : The Dynamic Host Configuration Protocol (DHCP) is a network configuration protocol for hosts on Internet Protocol (IP) networks.

14.9 Review Questions

1. Write a short note on Mailing list.
2. Define List washing.
3. Write on FTNs.
4. Write briefly on features of BBSes.
5. Write on thin client.
6. Explain the gateway.
7. Explain about bulletin board with neat sketch.
8. Explain web portal with types of application
9. Analyze the electronic journal.

Answers : Self Assessment

1. web portal	2. Two	3. Personal
4. (*a*)	5. (*a*)	6. (*a*)
7. (*a*)	8. True	9. True
10. True	11. True	12. True.

14.10 Further Readings

Books

Alex Chaffee (2000-08-17). *What is a web application (or "webapp")*.

James Duncan Davidson, Danny Coward (1999-12-17). *Java Servlet Specification ("Specification") Version*: 2.2 Final Releases. Sun Microsystems.

Online links

http://www.ala.org/llama/committees/bes

http://www.nandoperettifound.org/en/page. php?project=329