Chapter-4

Computer Applications in Libraries: Basic

Location	Learning Outcome	Topic/Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
Unit-1 : Computer Hardware for a Library: Concepts				
Classroom/ Computer Laboratory	Understanding the importance of ICT components used in libraries.	Meaning of ICT, its hardware components, and their utility.	Chart out different types of hardware and their utility	**Innovative lecture:** Meaning of ICT, hardware components and their utility using audio visual aids/ presentations or actual display of components in laboratory **Activity:** Present PPT on computer hardware used in library: functions and utility
Unit-2 : Library Automation: Concepts and Applications				
Classroom/ Computer Laboratory/ Library	Understanding Library Automation: Concepts and Application	Meaning and purpose of Library Automation	Chart out: • Meaning and purpose of library automation • Criteria for selecting library automation software • Barriers in library automation	**Innovative lecture:** Meaning and purpose of library automation, criteria for selecting library automation software and barriers in library automation using audio visual aids/ Presentations. **Activity:** Visit an automated library, observe its functioning, and prepare a report.

Location	Learning Outcome	Topic/Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
Unit-3 : Use of Web Based Communication Systems				
Classroom/ Computer Laboratory/ Library	Understanding Internet, In-tranet, Searchengines, e-mail and Database.	Concept and utility of Internet, Intranet, Search engines, e-mail, and Database.	Chart out the functions and utility of Internet, Intranet, Search engines, e-mail, and Database.	**Innovative lecture:** concept and real time demonstration of functions and utility of Internet, Intranet, Search engines, e-mail and Database. **Activity:** Practice on functions and utility of Internet, Intranet, Search engines, e-mail and Database.

Unit 1 Computer Hardware for a Library : Concepts

4.1.0 Introduction

With the advent of Information and Communication Technology, the scenario of library operations has been changed in Indian librarianship. Now electronic and digital documents have replaced a good count of traditional print documents. At the same time the library housekeeping activities have also been changed from traditional manually operated system to computerized/automated systems. Due to such major change, the internal seen of library collection and operations has received a new look in the form of ICT enabled practices. In this chapter, we will discuss about various computer hardware components and peripherals for acquainting students with the ICT based environment of libraries.

4.1.1 Desktop computers, Server and their specifications

4.1.1.1 Desktop computers

A desktop computer is type of a personal computer which is commonly made for use over a single location like desk or table. Desktop system includes a computer monitor, keyboard, mouse and other internal components like power supply, motherboard, hard drive and optical drive etc. It is also known as home computer and workstation.

Characteristics

Main characteristics of a desktop system are:

1. Desktop computer occupies considerable space due to its big size.
2. Desktop system is a combination of monitor, keyboard, mouse, power supply and some other internal devices etc. Therefore, it is not an easily portable device.
3. Desktop is heavy in weight.
4. It is easy in use.
5. It is good for office use.

Computer Hardware:

Computer hardware is the tangible part of a computer. In the computer world, it refers to the physical components that make up a computer system. It includes keyboard, monitor, mouse etc. The modern computers are much better in processing speed and have an enough memory status. Computer is made of different physical parts inside it and this is known as the hardware. Some important computer hardware components are:

Central Processing Unit (CPU)

Central Processing Unit is the main part of the computer. It represents the working power of computer system and is also known as computer brain. All processing works of a computer system are performed by its CPU. CPU is also accountable for performing and controlling the works of the other parts of a computer system. It's able to transfer the data on to the motherboard.

Motherboard

A motherboard is the mother of all hardware components of a computer system. All other parts of a computer system are attached to motherboard. Motherboard is a part of the computer hardware that is hidden inside its CPU.

Hard Disc

Hard Drive is the store house of a computer system. It is the place where all programs of computer including its basic data are stored. When you save any file, it goes to the hard disc; also, you are able to retrieve a specific file through its unique path, which is allotted and stored for each document.

Random Access Memory (RAM)

The Random-Access Memory is the computer's volatile memory. It is used to store the information in the computer that needs to be accessed often and quickly. RAM consists of some integrated circuit (Chip) and is attached to the motherboard of the computer system. Due to sufficient RAM, computer system works faster and processes the information and data quickly.

Visual Display Unit (VDU)

Visual Display Unit is popularly known as monitor. It is the most popular hardware device for display and presents data in soft form as output. A Monitor is associated generally to a keyboard and together they from a video display terminal which is also a hardware. Now a days, basically two types of monitors are in use – Cathode Ray Tube (CRT) and Liquid Crystal Display (LCD).

Figure 4.1: Monitor

(Source: http://en.wikipedia.org/wiki/Computer_monitor
Accessed on 30.07.2021 at 01:40hrs IST)

Keyboard

Keyboard is a most commonly used input device. Keyboard is a part of computer system which is used to key in the letters and instructions to the computer system for initiating a task. Today the most popular keyboard uses 101 keys and is known as QWERTY keyboard.

Figure 4.2: Keyboard

(Source: http://grardnr.wordpress.com/category/week-12/
Accessed on 30.07.2021 at 11:40hrs IST)

Mouse

A computer mouse plays a vital role in the computer system. It is a most popular point and draw device. A mouse is made up of two or more buttons on it and a wheel too. When the mouse is moved, it moves the cursor on monitor's screen. The functions of a computer mouse are multi-faceted, as it performs various functions like click, copy, paste, drag. drop etc.

Figure 4.3: Mouse

(Source: http://it.wikipedia.org/wiki/Mouse Accessed on 30.07.2021 at 01:40hrs IST)

Advantages of a Desktop computer

1. Desktops are more powerful in terms of hardware.
2. Generally, they have a larger screen and that makes it easier to read.
3. Desktop has a large storage capacity.
4. Desktops are cheaper than laptops.
5. Desktop computers are easy to upgrade.

Disadvantage

1. Desktop is not an easily portable device.
2. Desktops occupy a lot of space.
3. Desktop requires a separate monitor.

4.1.1.2 Server

A server is a system that refers to the combination of both hardware and software applications and program, which manages access to centralized resources or services in a network. Depending upon its functionalities, servers are of different types, some important of them are such as web server, proxy server, application or database server, dedicated server and cloud server. All these above servers are working on following two models of architectures namely Client-Server based model and Peer-to-peer based system. The client server model is based on a computer network architecture in which each computer on the network is either a client or a server. The server computer system is managing all applications such as disk drives, printer, traffic, etc., to run the various applications within any workstation (or client) computer over a network. Whereas peer to peer model is decentralized in nature, which enables each computer works as client and server both, mean all computers have equivalent capabilities and responsibilities. Today, both models are in wide use depending upon their business requirements.

4.1.2 Printers and their types

Printer is the most used output device in computer technology. It is used for producing text and graphics on paper. Printers are attached by a printer cable or a USB cable to a computer system which serves as a document source and instructor. On the other hand, in modern printer can directly attached to electronic media like a memory card, scanner, digital camera etc.

Types of Printer

Printer can be categorized in various types on basis of their work and architecture. There are mainly two types of printer as follows:

1. Impact Printer
2. Non- Impact Printer

Impact Printer:

Impact printer works by massive head or needle against an ink ribbon to make a mark on the paper. In other words, this printer works when the ink ribbon is contacted with the paper.

Example- Dot-matrix printer, Chain printer, Drum printer etc.

Dot-Matrix Printer

Dot–matrix printer prints one character at a time. It follows two directional way of printing, thus the print head run from left to right and again right to left. Dot-matrix printer is an impact printer as it works by moving a pin head over the inked ribbon to give ink impressions on the paper through the impact of the head. It can produce various sets (copies) of printouts by using carbon paper. Dot–matrix printer is a noisy printer as when the head and ink-ribbon stroke together on the paper, voice is produced.

Normally the printing speed of dot–matrix printers is less. Mostly these types of printers are used by individuals and institutions for printing, where printing speed and quality are not important.

Drum Printer

Drum printer is a type of line printer; it prints the entire line at a time. The drum printers have a set of hammers in front of the drum in a manner that an inked ribbon and paper can be accommodate between hammers and drum. The total number of hammers is equal to the bands on the drum. In the drum of the drum printer is made up of metal. This drum is expansive in nature and cannot be changed easily. Drum printer has small flexibility in the size of character set and their description. Although printing speed of drum printer is faster than a dot-matrix printer, but it is not suitable for commercial or fast printing assignments.

Non-Impact Printer

Non–Impact printer does not work by striking a head against the ribbon. In other words, it produces the print (text and picture) without contact with the paper.

Example- Inkjet printer, Laser printer, etc.

Inkjet Printer

Inkjet printers are also a character printer. Inkjet printers print head include up to 64 nozzles. It can be warmed in a moment by an integrated circuit resistor. When the resistor warms up, the ink flows and is ejected via the nozzles making an impression on the paper in front of the print head.

Figure 4.4: Printer

(Source: http://computer.howstuffworks.com/inkjet-printer.htm
Accessed on 30.07.2021 at 11:40hrs IST)

An Inkjet printer produces better quality result in comparison of impact printers. Its print resolution is also better. Its result is based on the tiny dots of pattern.

Laser Printer

Laser printers are non–impact printers, they do not create noise. A laser printer works through the patterns generated by laser beam. The printing quality of these printers is very high at the same time the printing speed is very fast. But this printer is more expansive comparison than other types of printers.

Laser printer is a page printer, it prints one page at a time. A laser printer works through following parts:

1. A laser beam source
2. A multi-sided mirror
3. A photoconductive Drum
4. Toner

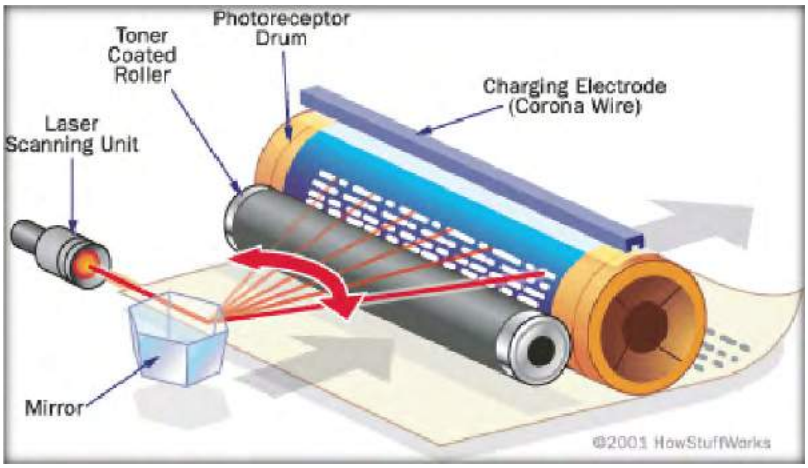

Figure 4.5: Laser printer

Source:http://www.dginter.net/cst/2011CST/Chapter07/old/UnitBPrinters/old/dev/HowStuffWorks/How%2 0Laser%20Printers%20Work_files/laser-printer-laser.gif

Accessed on 12.8.2021 at 13:25 Hrs IST)

4.1.3 Scanners

Scanners are computer support devices/peripherals, used to capture information from print sources and to convert that captured information in the computer readable digital form. With the help of scanners, one can save his/her time in feed in / input data in the computer system.

Types of scanners

Presently there are various types of scanners. One can use any specific type of scanner according to his/her specific requirement, based on the type of print source. Some of the common types of printers are as follows:

Flatbed scanners

These are suitable for all types of photographs, transparencies, negatives and pages up to A3 size and that may be laid absolutely flat. They are not suitable for bound volumes, glass plates, mounted slides, documents larger than A3. As these scanners uses very bright light, anything that is in danger of fading is not suited for these scanners.

Figure 4.6: Flatbed scanner

(Source: https://www.scantastik.com/hardware/widetek-scanners/images/WT25-650_angled-open.gif Accessed on 12.08.2021 at 13:30 Hrs IST)

Drum Scanner

These are used by reprographic houses. Whilst they produce very high quality results they are expensive and the originals have to be fastened around a drum, which means that the print document need to be very flexible and unmounted.

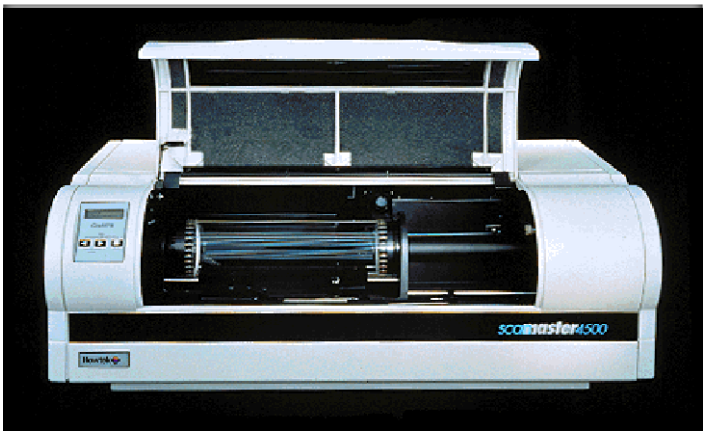

Figure 4.7: Drum scanner

(Source: https://www.circuitstoday.com/wp-content/uploads/2010/03/Drum-Scanner.GIF Accessed on 12:08.2021 at 11:40hrs IST)

Hand Scanners

A Hand scanner is a manual device that is dragged on the face of the image to be scanned. It requires a steady hand, to avoid uneven scanning rate that would produce distorted images.

Figure 4.8: Hand-held scanner

(Source: http://scanner6-1.blogspot.com/2010/
Accessed on 12.08.2021 at 11:50 hrs IST) mm scanners

These would seem to be ideal for collections made up of slides only. However, many of them are aimed at the domestic market and will not be robust enough for any reasonable sized collection. They often struggle to produce up to 18 Megabyte files of a good dpi.

Figure 4.9: mm scanners

(Source: http://www.aug-inc.com/file/33/f50_500.jpg Accessed on 12.08.2021 at 13:45 Hrs IST)

Digital cameras

Digital cameras come in a variety of standards. To be suitable for digitization work these must be of a professional standard and capable of 18 Megabytes plus, with interchangeable lenses and accessories.

Figure 4.10: Digital cameras

Source:https://static3.nasim.news/thumbnail/MjE2MDg0oLdP/oVph2BhIYF0omkBZaVwWxrcCcvbE-VFnNlCnJl7Q13eZgB5Jy5Zfn0AdgpTzUVUL2p6kBTxVX3c,/MjE2MDg0oLdP.jpg

Accessed on 12.08.2021 13:50 hrs IST

4.1.4 Bar Code Technology

Barcode technology plays an important role in automating various activities of a library. The application of bar code technology increases the speed and accuracy in library operations. Barcode Technology provides a simple and inexpensive method of encoding text information that is easily read by inexpensive electronic devices. A bar code consists of a series of parallel, adjacent bars and spaces. Predefined bar and space patterns are used to encode small strings of character data into a printed symbol. A bar code reader/scanner decodes a bar code by scanning a light source across the bar code and measuring the intensity of light reflected back by the white spaces. The pattern of reflected light is detected with a photodiode which produces an electronic signal that exactly matches the printed bar code pattern. This signal is then decoded back to the original data by inexpensive electronic circuits.

Bar Code Reader

Bar code reader is a device which is used for reading bar coded data. It may be a handheld scanner or embedded in stationary scanner. It scans a bar code image and converts it into an alphanumeric value that is then fed to the computer. Its uses laser beam scanning technology.

Figure 4.11: Bar Code Reader

(Source: http://barcode2u.com.my/wp-content/uploads/2017/07/argox-as8120-ccd-barcode-scanner- silveseraph-1110-12-silveseraph@28-1.jpg Accessed on 30.07.2021 at 12:20 hrs IST)

Bar Code Writer

Bar code writer is a type of computer printer which prints bar codes on the slips or sticker role. These bar codes are generated by bar coding software against specific record of the stored database.

Figure 4.12: Bar Code Writer

(Source: http://b2binformation.blogspot.in/2013/05/barcode-printers-features-and.html Accessed on 30.07.2021 at 12:20hrs IST)

Basic Requirements for Bar Code Application

For implementing bar coding in library applications, following hardware and software are required:

1. Personal computers
2. Barcode Scanner
3. Decoder
4. Printer
5. Printing Software

6. Database of Library Holdings
7. Library Automation Software and
8. Membership Database

4.1.5 RFID - Radio Frequency Identification Technology

Application of Radio Frequency Identification technology in libraries make library operations easier for visitors and librarians both. RFID is the latest technology which is used in library for implementing theft detection system. RFID based systems facilitate easier and faster charging and discharging system.

RFID system is developed with support of two technologies- radio frequency-based technology and microchip technology. Microchips in the form of tags are used for storing information and are affixed on library materials, while this information is read with the help of radio frequency technology. The devices used for circulation and inventorying are usually called "readers" while the device used at the library gate are usually called "sensors".

Components of an RFID System:

A comprehensive RFID system has four components:

1. RFID tags that are electronically programmed with unique information.
2. Readers or sensors to query the tag.
3. Antenna
4. Server on which the software that interfaces with the integrated library software along with the appropriate database.

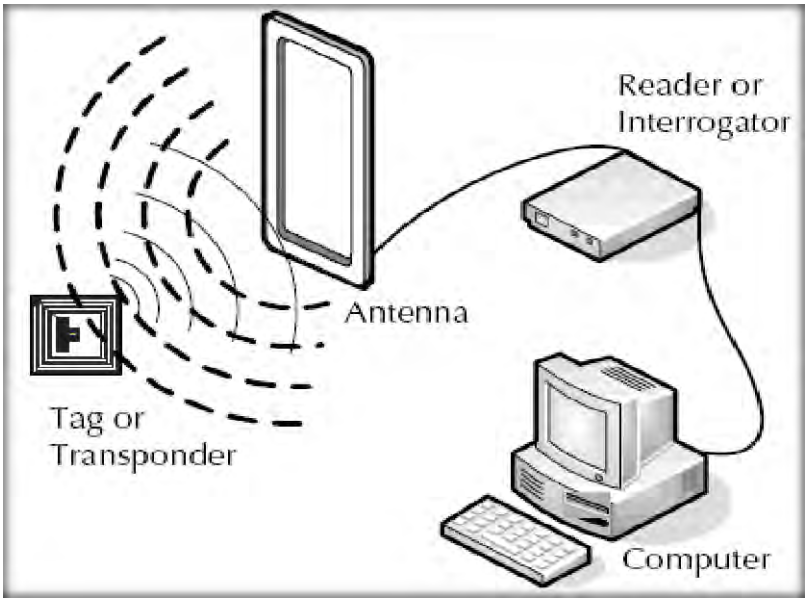

Figure 4.13: RFID system components

(Source: http://www.epc-rfid.info/rfid Accessed on 30.07.2021 at 12:30hrs IST)

Advantages of RFID in Libraries

Main advantages of implementing RFID system in libraries are as follows:

1. RFID provides the self-charging and discharging support.
2. It facilitates high level of reliability.
3. The life of RFID Tag is quite long.
4. RFID has changed the Circulation system; it provides very fast circulation activity.
5. It simplifies the process of stock verification.
6. It is quite supportive in theft detection.
7. It facilitates high level of security.
8. Misplaced documents inside the stack may be easily identified.
9. RFID tags are very simple to install/inject inside the books.

4.1.6 Modem (Modulator and Demodulator)

Modem is an important device of a data communication system. Modem is used for communication among various computers through telephone line. A modem converts digital signals received from a computer into analog signals for transmitting them over a telephone line and on other end receives analog signals and converts into digital signals for a computer system. Thus, modem is the common parts of the communication process. A modem is used to carry out the modulation and demodulation process. The word modem made of two words – Modulator and Demodulator. Modulator words derive from word 'Modulate' which means 'convert'. So, a modulator is a device which used to converts the digital information into analog information for a telephone line. While the other word demodulator changes the analog signals to digital signals for a computer system. Thus, a modem allows two computers to communicate over a telephone line.

Types of Modem

On basis of their structure and design, there are mainly two types of modem:

1. Internal Modem
2. External Modem

Internal Modem:

Internal modem is in the forms of a detachable card and placed inside the system unit. It is an optional add-on circuit board that may be attached in one of the computer expansions slots. It is inbuilt with the computer system. It takes power from computer's expansion bus.

Figure 4.14: Internal Modem

(Source: http://alioting.blogspot.in/2013/04/definition-of-internal-and-external.html Accessed on 30.07.2021 at 12:59hrs IST)

External Modem

External modem is attached outside the system unit. It is connected to the mother board through a port. It has its own power supply, and its front panel displays the connection status. An external modem relates to a computer through a port. These are more expansive.

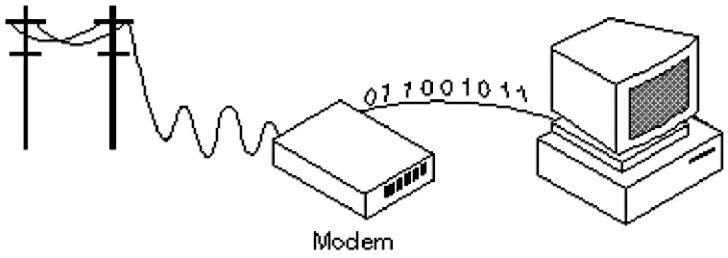

Figure 4.15: External Modem

(Source: http://www.webopedia.com/TERM/E/external_modem.html Accessed on 30.07.2021 at 12:59hrs IST)

Usage of Modem

In the early days, modems were used to communicate between data terminals and a host computer. Later the use of modems was extended to communicate among end computers. Now-a-days modem is used for performing various activities including transferring data to remote systems where it is not possible to lay down network cable and telephone lines are easily available. And thus, provide a cheap networking solution.

Wi-Fi

Wi-Fi allows to connect the network through a wireless router or access points. Wi-Fi stands for Wireless Fidelity. Here, wireless network utilizes radio waves in the form of communication channel between computers. Wireless computing systems communicate by modulating radio waves or pulsing infrared light. Wireless communication is linked to the wired network infrastructure by

stationary transceiver. The area covered by an individual transceiver's signal is known as a cell. Cell sizes vary widely. For instance, an infrared transceiver can cover a small meeting room, a cellular phone transceiver has a range of a few miles and a satellite beam can cover an area more than 400 miles in diameter.

Wireless Technology

Some of the most popular wireless technology applications are as follows:

2G and 3G Technology

The second generation of wireless networking technology is known as 2G technology; that was digital, circuit based and narrowband but comfortable for voice and limited data communications. While the third-generation wireless networking technology is known as 3G technology that is suitable for voice and advanced data applications, including online multimedia and mobile e-commerce.

Wireless LANs

Wireless Local Area Networks (WLANs) are like traditional LANs having a wireless interface to enable wireless communication between the devices that are part of the LAN. The component of a wireless LAN is the wireless interface card that has an antenna. Wireless LAN has limited area and is made to be used only in Local Area such as a room or building.

WIMAX

WIMAX stands for Worldwide Interoperability for Microwave Access. WIMAX provides the wireless data communication over long distances in different ways, including point to point link and full mobile cellular type access. WIMAX operates in the frequency band between 3.3 to 3.4 GHz.

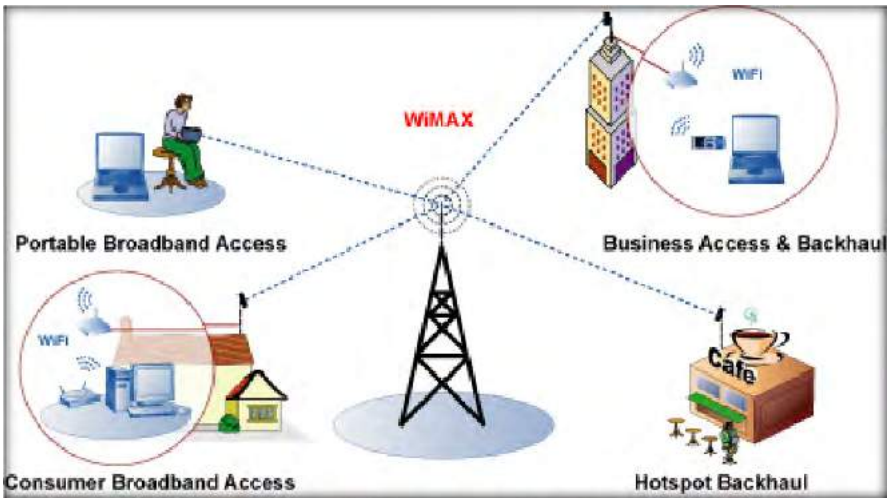

Figure 4.16: Wimax

(Source: https://image.slidesharecdn.com/wirelessbroadbandpresentation-130320224114-phpapp02/95/wireless-broadband-11-638.jpg?cb=1363819337 Accessed on 12.08.2021 at 14:00 hrs IST)

Radio Router Technology

Radio router technology uses a radio transmission framework for packet based, broadband, IP wireless communications. It is an emerging wireless technology designed to make links in an IP network.

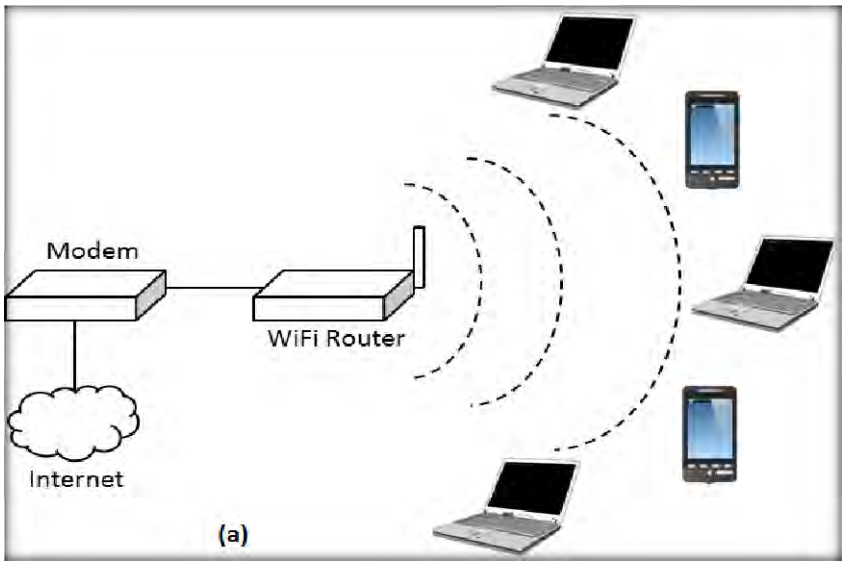

Figure 4.17: Radio Router Technology

(Source: http://www.thelifenetwork.org/about.html
Accessed on 30.07.2021 at 12:02 hrs IST)

4.1.7 Switches

A network switch is a computer networking device which is used to connect many computer devices each other over a network. Switches in network are also known as switching hub, but a network switch is more advanced than a network hub, as a switch sends only those messages to the device which are demanded. A network switch is a multi-ported network bridge that processes and forwards data at the data link layer of the OSI model. Some switches have additional features, including the ability to direct the packets. These switches are commonly known as multilayer switches. Switches exist for various types of networks including Fiber optic, Asynchronous Transfer Mode, Ethernet etc.

Figure 4.18: Switches

(Source: http://www.indiamart.com/maa-trading-co/networking- products.html#router-cable
Accessed on 30.07.2021 at 12:40hrs IST)

Types of Switches:

There are four main types of network switches which are available for connecting devices. These are as follows:

1. Managed Switches
2. Unmanaged Switches
3. Smart Switches
4. Enterprise managed Switches

Managed Switches

A managed switch is a device whose software gives permission to the user for modifying and updating the settings of the switch. This type of the device needs a sophisticated user to change the setting of the switch according to the user need.

Unmanaged Switches

An unmanaged switch is another type of network switch; it is the cheapest option to connect devices. Unmanaged switch performs the main functions of managing the data flow between a connected device and multiple computers. This type of switch is basically used in the small office and business organization.

Smart Switches

Smart switches carry both type of the network switch (Managed and Unmanaged) character. It provides the user interface of web based and popular default settings.

Enterprise Managed Switches

An enterprise managed network switch provides a wide range of adjustable settings; to allow customized use within the campus. These are usually managed by network specialists and are constantly monitored, due to the size and complexity of the network.

4.1.8 Router

Router is a device that sends the data along networks. Routers are located at gateways, the places where two or more networks connect, and are the critical device that keeps data flowing between networks and keeps the networks connected to the Internet. This networking device filters the data and manages the data flow between computer networks. A router is connected to two or more data lines from different networks.

Data breaks in part; into header and trailer and it flow in packet among network. When packets

come in one of the lines, the router reads the address information in the packet to determine its ultimate destination. Then, using information in its routing table or routing policy, it directs the packet to the next network on its journey. Routers work a like "traffic police" on the Internet.

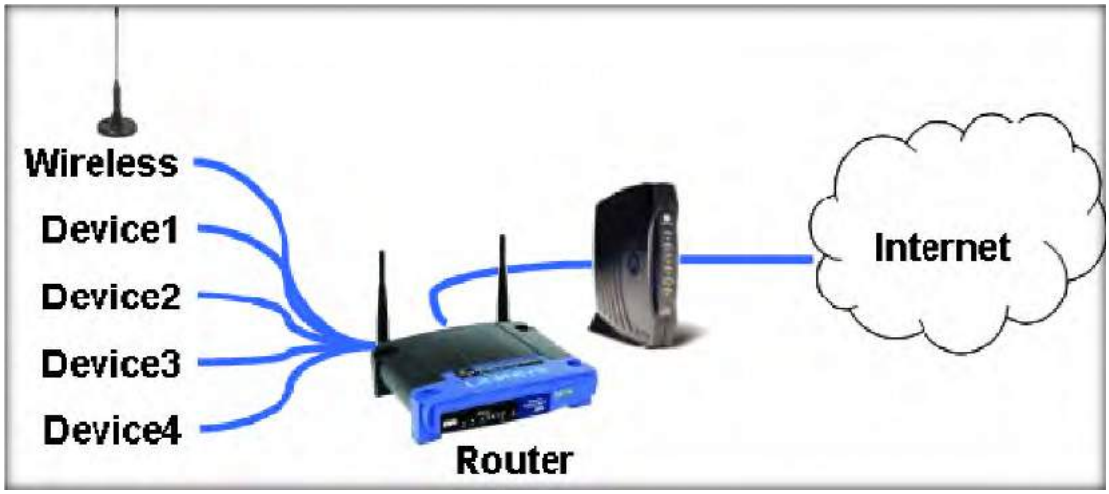

Figure 4.19: Router

(Source: http://voipstuff.net.au/routers/ Accessed on 30.07.2021 at 12:45hrs IST)

The most popular type of routers are home and small office routers that simply pass data, such as web pages, email, IM, and videos between the home computers and the Internet. An example of a router would be the owner's cable or DSL modem, which connects to the Internet through an ISP. More sophisticated routers, such as enterprise routers, connect large business or ISP networks up to the powerful core routers that forward data at high speed along the optical fibre lines of the Internet backbone.

Types

There are following types of router:

Brouter

Brouter is the short form of Bridge Router. It is a networking device that serves as a bridge and a router in parallel manner.

Core router

A core router is a router in a computer network that routes data within a network, but not between networks.

Edge router

An edge Router is a router in a computer network that routes data between one or more networks.

Virtual router

A Virtual Router is a backup router used in a Virtual Router Redundancy Protocol (VRRP) setup. VRRP is defined as a protocol used with routers that helps prevent network downtime. In the event of a router failing, the backup or virtual router would become the master router.

4.1.9 Summary

In this chapter we have discussed all possible ICT components which are essential for computerized and automated library and information centre. We have discussed about their utility and functions for improving the functionality of modern libraries.

4.1.10 Exercise

Short questions

1. What is the role of CPU in a computer system?
2. Discuss various advantages and disadvantages of a desktop system.
3. What is the difference between an Impact printer a Non-impact printer?
4. Which type of printer produces fast and quality output and why? Explain.
5. What is the use of a printer in a library?
6. What do you mean by a scanner?
7. Discuss various types of scanners.
8. What is the difference between a flatbed scanner and a digital camera in terms of utility?
9. What do you mean by a Modem?
10. How does a Modem work?
11. Discuss the role of a Modem in information transfer over a network.
12. What do you understand by Wi-Fi?
13. Discuss various wireless technologies.
14. What is the difference between cabled and Wi-Fi connection of a network?
15. What do you mean by a Bar code?
16. How Bar code technology supports in library automation process?
17. Discuss various requirements of bar code applications in libraries.
18. What do you understand by RFID?
19. Discuss various components of RFID system.

20. Point out various advantages of RFID application in libraries.
21. What is the role of a switch in a computer network?
22. Discuss various types of switch.
23. Differentiate between managed switch and unmanaged switch.
24. What are the basic functions of a Router?
25. Explain various types of Routers.

Long questions

1. Discuss various components of a desktop system.
2. Explain the utility and requirement of scanners in a modern library.
3. Point out various benefits of Wi-Fi network over cabled network.
4. What is the use of printers in a library? Discuss it with the context of its various types.
5. What is the role of bar coding and RFID in automating library operations? Explain.

4.1.11 Reference

1. Singh, Ajay P. (2014). Digital Preservation. Delhi: Ess Ess Publications.

4.1.12 Glossary

Bar code: Bar code consists of a series of parallel, adjacent bars and spaces. Predefined bar and space patterns are used to encode small strings of character data into a printed symbol.

IP: Internet Protocol

RFID: Radio Frequency Identification technology. It is the latest technology which is used in library for implementing theft detection system.

Router: Router is a device that sends the data along networks. Routers are located at gateways, the places where two or more networks connect, and are the critical device that keeps data flowing between networks and keeps the networks connected to the Internet.

Switch: A network switch is a computer networking device which is used to connect many computer devices each other over a network.

WIMAX: WIMAX stands for Worldwide Interoperability for Microwave Access. WIMAX provides the wireless data communication over long distances in different ways, including point to point link and full mobile cellular type access.

Unit 2 Library Automation: Concepts and Applications

4.2.0 Introduction

According to the fifth law of library science of Dr. S.R. Ranganathan, Library is a growing organism. In the form of growth, a library holds a natural characteristic of change. This change may be reflected in the form of improvements, modifications or advancements. As Information and communication technology has revolutionised all fields of public or individual life, the library systems could not keep themselves away from this technological advancement. In this regard automation was first and foremost process which was invited by the library professionals in the form of remedy against traditional problems of library practices. After implementing automaton, libraries have not only improved the quality of existing library operations but also introduced new and better library services for the ultimate satisfaction of its users.

The library automation means applications of computer and communication technology in library operations and activities to eliminate/reduce the manual work to serve the library needs of the users. It enhances the access to the library resources and also fosters the routine work. Automation of library operations avoids repetitive jobs, duplication of work; enhance the speed of library functions and increase the optimal use of library resources. It may apply to all library functions such as acquisition, technical processing, serial control, circulation, and reference service. Automation of the functions saves the precious time of both library staff as well as the users.

Figure 4:20

Source: https://www.tmmnursingcollege.in/wp-content/uploads/elementor/thumbs/Computer-Lab-p5zgjjtotl5tr8rd0x9mwvaxnksml0semylhehu080.jpg Accessed on 12.08.2021 at 14:15 hrs IST

4.2.1. Definition

The term automation has derived from the Greek word 'automose' which means, a system having potentiality of spontaneous motion or self-movement. The term 'automation' was first coined by

D. S. Harder in 1936, who was then associated with the General Motor Company in the USA. He used the term for handling parts between progressive production processes. Since its inception, the concept has been defined by different sources or scholars differently depending upon the field of application. The definition of the term automation as defined in different reference sources are as given below.

Swihart Stanley S and Hefley Beryl F have defined the term library automation as "the processing of certain routine clerical function in the library with the assistance of computer or other mechanized or semi-automatic equipment".

The Webster's Third New International Dictionary of English Language defines 'automation' as "the technique of making an apparatus, a process, or a system operate automatically; the state of being operated automatically; automatically controlled operation of an apparatus, processor system by mechanical or electronic devices that takes the place of human labor".

The Kent's Encyclopedia of Library and Information Science defines the term as "automation is the technology concerned with the design and development of process and system that minimize the necessity of human intervention in operation".

Likewise, you can find several other definitions of the term in different sources. On the basis of above definitions, we can say that "the automation is a process of making a system based on mechanism and machinery to reduce human intervention in getting the work done".

Now let's understand concept of library automation. The phrase library automation defined in the Kent's Encyclopedia of Library and Information Science as "the library automation is the use of automatic and semiautomatic data processing machines to perform acquisition, cataloguing, circulation and other library operations.

Hence, the library automation is a process of developing a library system with the help of a mechanism and machines to get its work done automatically or with less human efforts. The place of mechanism and machines has been taken by information and communication technology.

Therefore, we can conclude that "library automation is the process where we try to perform all library housekeeping operations with the help of library automation software in an integrated environment and with least human interference.

4.2.2 Need and Purpose and Importance

The information is playing a vital role in all walks of human life today. All of us need faster and accurate information to achieve academic, professional or recreational goals. The automated library systems satisfy the expectations of the society better than the manual system hence, automation of the library is the need of the hour.

4.2.2.1 Need for library automation

Some of the basic needs of library automation are:

- **Accuracy and Reliability:** It is evident that during the manual processing human can do any sort of error, while the computer performs all set of data processing in error free and reliable manner? Library automation removes the possibility of data error and yields the user a reliable service. Hence improve the efficiency of library staff.
- **Time saving:** It saves the staff time in doing the manual work and speed up the process of all in-house activities and saves the times of user in finding needed materials within as well as outside the library.

- **Statistics generation:** Automated in-house activities generate numerous data, which assist to generate multiple statistics. Statistics help us to formulate policies to manage the library and information services.
- **Library service:** It helps to give better access to resources within library and elsewhere and improve the quality of library services. The automated library can provide bibliographic search facility through OPAC to its users. If the catalogues are made accessible through internet then, the user can search the resources anytime irrespective of location.
- **Resource sharing:** It makes resource sharing possible as data of the library becomes sharable among libraries.
- **Dissemination of information:** The wider dissemination of library information with the help of communication technology like internet, telecommunication, etc., becomes possible. The automation provides capability to disseminate information about the resources and services of the library through web. Such dissemination mode saves the time and efforts of the users as they are able to accesses required information remotely with the help of computer, laptop, smart phone, etc.
- **OPAC:** The Online Public Access Catalogue provides the facility to search bibliographic information of the Library resources which helps in locating her/his desired publication/ material.
- **Enhancement of library management:** It enhances the library management as reports and statistics become available with the click of mouse. The automated system gives the management input and feedback on various services and also monitors the human resources of the library effectively and efficiently.

Although modernization of organizational practice is a natural process for all systems but being a service institution, it becomes essential for libraries to provide quality support for the maximum satisfaction of their users. In present scenario, there are following reasons which compel us for automating the library system:

- In**formation explosion**
- **Increase in library collection**
- **Inability to explore unlimited literature**
- **Advancements in Telecommunication technology**
- **Wastage of user's precious time in locating information**

- **Inability to facilitate wider access of resources in libraries and elsewhere**
- **For improving the quality in library service**
- **For** promoting Cooperative efforts for better library services

4.2.2.2 Areas of Automation in Libraries

In the process of automating any organization, ideally it becomes obvious to automate each and every activity of the same. But for designating a library and information centre automated one, it becomes essential to automate at least housekeeping activities of the library. Such library housekeeping activities along with their major or minor works are:

1. Library administration
   - Activities related to:
     - Office work
     - Letter writing
     - Report writing
   - Accounts
     - Preparation of budget
     - Receipt of services
   - Other works
2. Library acquisition
   - Selection of documents
   - Placing orders
   - Checking receipt
   - Forwarding bills
3. Library cataloguing
   - Generation of catalogue cards using any catalogue code
     - CCC
     - AACR II

- Any list of subject heading
  - Sear's list
  - Library of congress list of subject heading

4. Library circulation
   - Issue
   - Return
   - Reserve
   - Record keeping
5. Library serials control
   - Selection and acquisition
   - Receipt and control
   - Indexing of article
   - Circulation and routing
   - Renewal of subscription
   - Binding
   - Searching
6. Other library services
   - Current awareness services
   - Selective dissemination of information
   - Document delivery service
   - Bulletin board services
   - CD-ROM search services
   - On-line information retrieval services

4.2.2.3 Problems in implementing automation

According to Dr Ranganathan 'library is a living organism' which is surrounded by 'Books',

'Staff' and 'Users'. Moreover, it is also abounding with all of other activities which are common in other government institutions. Keening in view of all such characteristics, we can identify following issues which creates hurdle

- Institutional finance: Being a social institution, a library cannot generate its own finance in the form of profit making. Thus it is fully dependent on its parent organization or funding body for satisfying its financial requirements. For the purpose of automating its practices, library require a good amount of financial support for procuring hardware, automation software and developing infrastructure.
- Technical know-how: For implementing a successful automated system, the automating process not only requires an expert leadership but also it requires well acquainted subordinate staff of the library system. In absence of such support, it is not possible to implement a useful automation solution in a timely manner.
- Fear of new technology: Due to lack of training and awareness of new technology i.e. ICT, it may be possible that the staff members of the library do not express their willingness to adopt it. For avoiding it we should make them aware about the benefits of library automation and thus motivate them about the forthcoming solution.

4.2.2.4. Criteria for choosing library automation software

After taking a decision for moving towards an automated library system, we must be very much careful while finalizing the automation software for our library. Once we implement any specific software, library staff and the users are bound to take support of it while providing and receiving service from the library. A wrong decision on software selection may waste our efforts or finance. Therefore, we should take care of following issues before taking the long-lasting final decision:

- General issues
  - Acceptability of the software
  - Cost
  - Applicability in the library system
  - Reputation of software designer
  - Reputation and goodwill of software supplier

- Technical issues
  - Language of the interfaces
  - Operating system
  - Requirement of hardware configuration
  - Additionally, required software for implementing all supports
  - Data storage capacity
  - Easy to use
- Support provided by the software developers
  - Availability of Documentation of the product/software
  - Support for software installation by the supplier
  - User training facility from the supplier/developer
  - Obtainability of further future-based modifications
  - Obtainability of new versions in future
  - Club/group of existing software users for discussing issues
- Legal
  - Registration/copyright of the product
  - Acceptable provisions of Warranty statement

4.2.3 Summary

Being a service institution library bound us to update our library services for providing best, fastest and most convenient information support while exploiting latest technological advancements. After going through the above mentioned concepts, it is now obvious that we can facilitate better library support in an automated library system. We can conveniently manage various problematic issues like increasing workload, information explosion, limited staff and even limited recurring financial support. We have also discussed about some of the quality library automation software for developing better understanding.

4.2.4 Exercise

Short questions:

1. Define the concept of Library Automation.
2. Why automation is required in any organization?
3. Discuss the need of Library Automation.
4. What are the barriers in automating a library?
5. Point out various areas of automation in a library.
6. Point out some essential technical issues to be considered while selecting automation software for library.

Long questions:

1. While defining library automation, discuss the need of automating a library for providing quality information support.
2. Discuss various issues to be considered while selecting suitable automation software for library in detail.
3. How a library can provide better information services in an automated environment? Discuss it in detail.

4.2.5. References

1. HARAVU (L J). Library automation design, principles and practice. 2004. Allied Publishers, New Delhi.
2. INFLIBNET. Software for university libraries user manual. 2003. INFLIBNET, Ahmedabad.
3. RAJARAMAN (V). Introduction to information technology. 2007. Prentice-Hall of India, New Delhi.

4.2.6. Glossary

KARDEX: It is one of the library furniture which support as a tool for maintaining serials control in the library. It was developed by Remington Rand.

RFID: Radio Frequency Identification technology. It is the latest technology which is used in library for implementing theft detection system.

CCC: Classified Catalogue Code: With additional rules to Dictionary Catalogue Code

AACR II: Anglo-American Cataloguing Rules, Second edition

CAS: Full form is Current Awareness Service. This is a generalized service for keeping all users aware about the advancements, updating and events in their respective library.

SDI: Full form is Selective Dissemination of Information. This is a specialized service for keeping a specific user aware about the addition of information of his/her interest in his/her respective library.

Unit 3

Use of Web-based Communication System

4.3.0 Introduction

In this digital era specially now, during the COVID 19 Pandemic we have experienced that we are dependent on web-based communication, be it for learning, information retrieval, communication, or entertainment. Web based Communication is defined as the sharing of information or ideas over the Internet. E-mail, webinars, social media tools are the examples of web-based communication system. These can be used for individual communication within a group and for a range of group activities. It is extremely prevalent in the present environment. Now, it becomes essential tool. Almost everyone participates in some form of web communication. It allows us to communicate with a person halfway around the world or a person in the room next to us, send a message that can be answered later or one that needs an immediate response. These forms of communication have benefits as well as have limitations. We have to choose the tools wisely. The advantages of the web-based communication are:

(i) Makes communication easier

(ii) Enhance collaboration

(iii) Cost effective

(iv) Improve work relationship

(v) Increases productivity

(vi) Increases accountability

4.3.1 Internet

Internet is a global network defined as the network of networks. It is spread globally over countries and continents and is the largest communication network throughout the world. It allows all types of networks from all over the world to get connected and share or exchange data with any other system or network faster than any other communication system. Internet follows TCP/

IP (Transmission Control Protocol/Internet Protocol which provides end-to-end connectivity. The salient feature of Internet is that due to its global coverage, it is not in control of a single body or organization. Hence, anyone can get connected or disconnected on their own or as and when required.

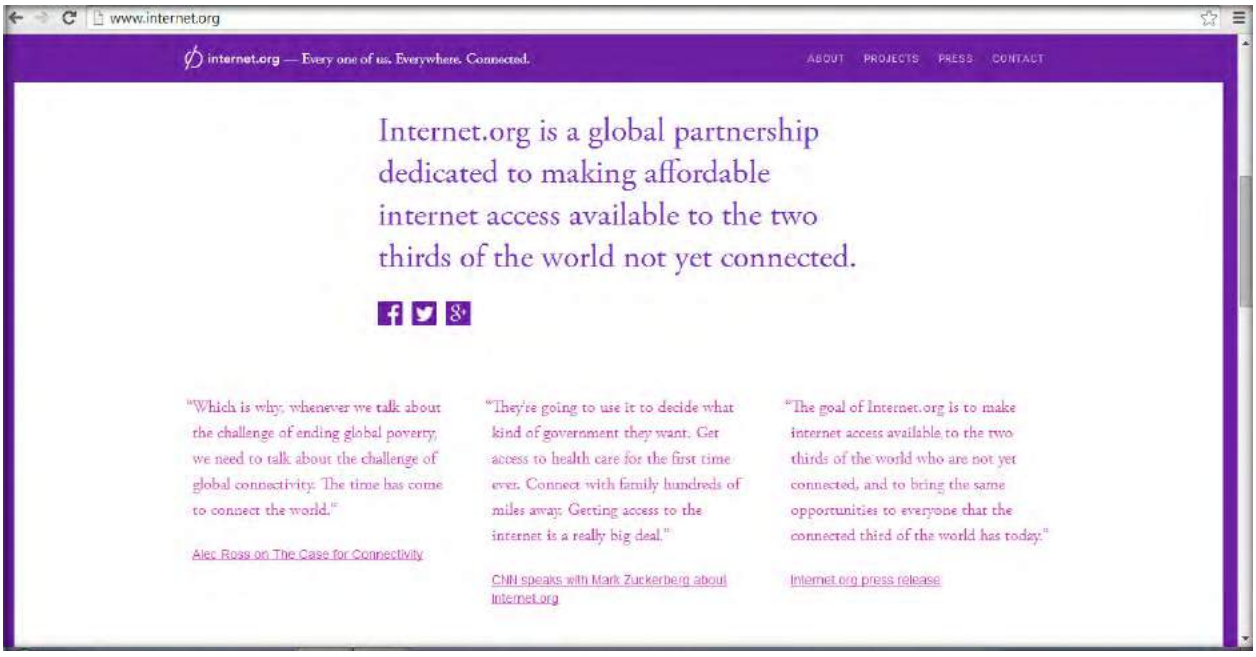

Figure 4.21: www.internet.org

Source:https://lh3.googleusercontent.com/IKZl4gPuu_q1nW94lBKGE8oB49vGXmrzQ6ngUZCYSclu2fq- 7U3fhFjVYaBlusNaOPxX=s165
Accessed on 12.08.2021 at 14: 24 Hrs IST

4.3.1.1 History of Internet

In 1960s a project was undertaken by the U.S. Defense Advanced Research Projects Agency (DARPA). It was in fact looking for some technology that could enable it to maintain its strategic military-based communication worldwide in case of a nuclear attack. This can be said as the main conception of the Internet.

Later, these developments led to the establishment of the Advanced Research Projects Agency Net (ARPA Net). The main interest of this was looking for a technology that could link computers in various locations by using a new technology called Packet Switching Technology. This new technology enabled several users to simultaneously share a single communication line. This technology was then used by U. S. National Science Foundation (NFS) to create its own network and called it NSFNET. The project met with a large success in achieving its objectives. Since, the users were mostly scientists and researchers, the demand went on increasing endlessly. The NSF found it unable to cope with the demand. In 1990, a non-profit organization Advance Networks and

Service (ANS) created by MERIT, MCI and IBM took over the NSFNET, upgraded it to the speed of 45 MBPS and formed ANSNET. Now the network become commercial and opened to the public. The ANSNET worked for five years and later sold to America Online. By the time, several companies started to offer IP services. Today in fact, anybody with several devices as computer, tablet, smart phone, etc, can access Internet with the help of some service provider

4.3.1.2 Salient features of internet

- It is a network of networks, can be called as Internetworks.
- It is the largest communication network in the world.
- It uses TCP/IP protocols to communicate with other systems.
- It is a collection of LANs connected by a WAN.
- It can transmit data from one part of world to another part in real time.
- Anyone with individual device or any network can get connected or disconnected at any time.

4.3.2 Intranet

Internet should not be confused with Intranet. Intranet is a private network within a company or an organization using internet technology within the network. It can be understood as private network using all the protocols used on internet for the operation of organization. It uses the same kinds of software that you may find on the Internet. Internet essentially used to exchange confidential information between the officials at certain levels, information that is not meant to share with others in the rest of that organization's overall network. Such network is created for security reasons. For example, within the organization Microsoft Outlook can be used for E-mail and Messaging among the staff.

4.3.3 Search Engine

Search Engine is a computing-based application software or program, which enable users to search information on the web. It is basically having program, called crawler or spider. It helps in locating information, index that information and produce result for the users for the submitted search query. There are several search engines available on internet. Some of the search engines, popular among user communities are Google, Bing, Yahoo, etc.

Figure 4.22 Search Engine

Source: https://lh3.googleusercontent.com/8dSUyJ6gzsj-Wj8jJ5HWnPahnp_B- dVwxjn_RGDZNy9b3YkJcsbNf8JaNzQGOKuYkcKmQJQ=s151 Accessed on 12.08.2021 at 14:30 Hrs IST

4.3.4 Email

The electronic mail is an internet protocol which allows computer users to exchange messages and data with another e-user via internet. All the email system having common application of e- messaging system such as inbox, sent folder, compose mail editor, attach documents, which allow users to send, receive, forward and store messages. It is faster, reliable; provide privacy setting and more convenient than other mode of information communication. Despite of these above features, still it is having issues like spam mail, hacking of security and privacy, if user unknowingly replay back to spam mails which are sent by undisclosed sender. For this, the user must know the basic functions of email tools and their use to protect their mail from such spam. Creating an email account is a very easy twostep process. First step is to sign up and fill necessary personal information like username, password, personal details, etc. After completion of this process, a specified email account is being created. Then, a confirmation email is being sent to the secondary email account of the user. With the help of the confirmation email, one can control the privacy setting like, changing of user password further, etc. In case of opening first email account, the confirmation code may be sent to the mobile phone of the user. Secondly, the owner of the email account has to sign in (log in) to the account with user ID and password during the first step. The email account looks at<username>@<server name>. For example, xyz@gmail.com. Here "xyz" is the username and gmail.com is the server name, the "@"

character is used as a separator, it separates the user name from server name. Now a day, so many email providers are available on the internet with more advances feature and tools. For Example, Gmail, Yahoo mail, Rediffmail, Hotmail etc. All most all above example are having feature like chat box, video chat, e-messaging groups, share photo, video and so on.

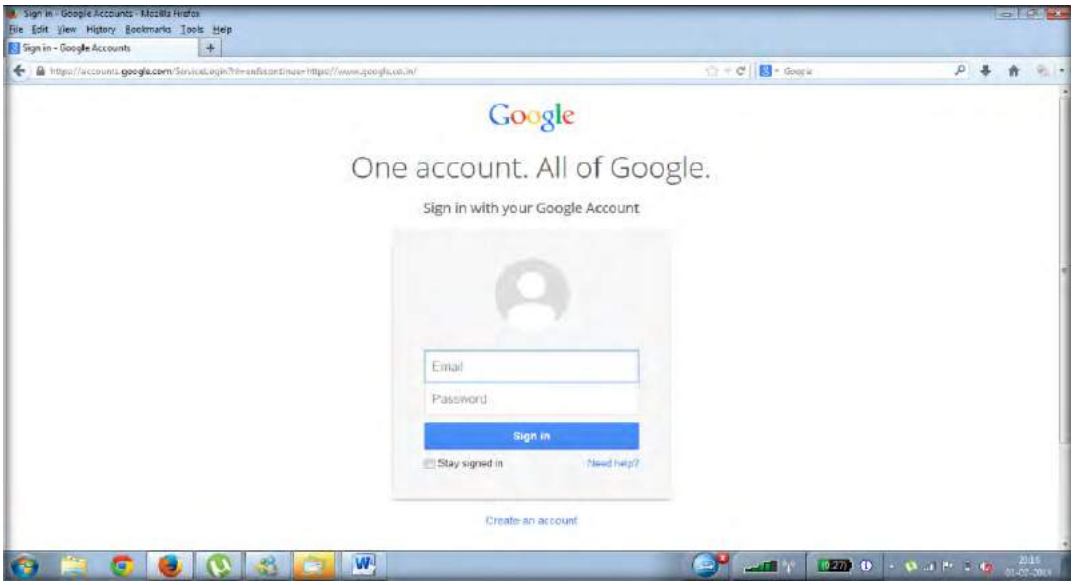

Figure 4.23 Source:https://lh3.googleusercontent.com/EYgSFlkYkC793gmDTKQONB_MEUEv6Z0r5l 3KsQds9FhQGCY-_Uq3GjDffrXDFhSwu489vQ=s151
Accessed on 12.08.2021 at 14: 35 Hrs IST

4.3.5. E-Database

An e-database is an organized collection of information, on a specific subject or multidisciplinary subject area. The information of an e-database can be searched and retrieved electronically with the help of personal computers, tablets, mobile phone, etc. The type of database on the basis of its content may be:

- Bibliographic Database
- Full-text Database
- Numerical and Statistical Databases
- Images Database
- Audio Database
- Video Database
- Multimedia Database

4.3.5.1 Bibliographic Database

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.

The Indexing and Abstracting Databases is one of the categories under the bibliographic databases. The database provides bibliographic information along with the abstract of the articles, published in different journals. Such databases are usually subject specific. There are a number of such databases in different subject area. For example, LISA i.e. Library and Information Science Abstract is an international database in the field of Library and Information Science, which index journals, conference proceedings, book reviews, and research reports of the subject from more than 68 countries and in 20 languages. In the field of biomedical science, the National Library of Medicine, United States of America maintains such database known as Medline. It is available on internet as PubMed (http://www.ncbi.nlm.nih.gov/pubmed). You can search the database and see the references. It is free of cost.

Examples:

- INDMED: Index to Indian Biomedical Journals (http://indmed.nic.in/) the ICMR-NIC Centre for Biomedical Information (Indian MEDLARS Centre) has designed and developed a bibliographic database from Indian biomedical literature. To start with 75 prominent Indian journals, have been selected to build up the database entitled IndMED. The coverage of database is from 1985.
- ISID Index to Indian Social Sciences Journals (http://isid.org.in/) indexes around 125+ Indian Social Science journals enabling users to search for references based on string (series of characters) either for author's name, or words in titles for selected journals. Most of the journals are indexed from the first volume. Also, indexes press clippings taken out from 14 India's English dailies. Access is free with simple registration. [Click on Databases to go to login page]
- AgEcon (http://ageconsearch.umn.edu/) search collects, indexes, and electronically distributes full text copies of scholarly research in the broadly defined field of agricultural economics including sub disciplines such as
- Agribusiness, food supply, natural resource economics, environmental economics, policy issues, agricultural trade, and economic development.
- Agricultural Online Access (Agricola) (http://agricola.nal.usda.gov/) is an index to all aspects of agricultural sciences.

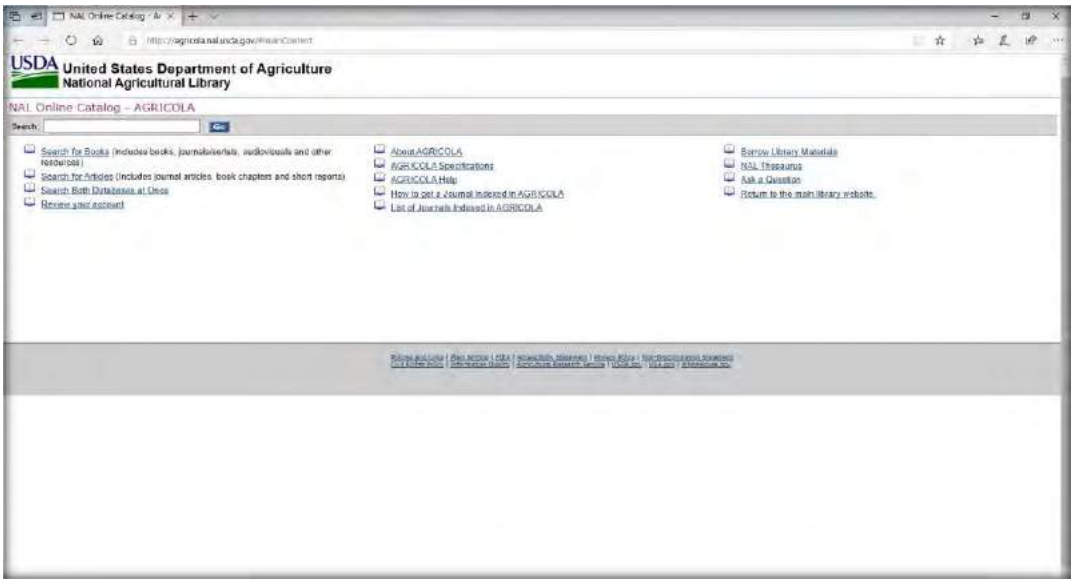

Figure 4.24 Bibliographic database

Source: https://agricola.nal.usda.gov/#mainContent Accessed on 12.08.2021 at 14:40 Hrs IST

4.3.5.2 Full-text databases

The Full-text databases are databases that provide full text of articles published in the journals that they index. The availability of full-text articles depends on whether they are open access (free) or on the Library's subscription agreements with each publisher or aggregator.

Examples:

- Economic History Encyclopedia Index (http://eh.net/encyclopedia/) here search can be made for high quality full articles related the area of Economic and Business History.
- Scientific Electronic Library Online [SCIELO] (http://www.scielo.org/) is a model for cooperative electronic publishing of scientific journals on the Internet. Especially conceived to meet the scientific communication needs of developing countries, particularly Latin America and the Caribbean countries, it provides an efficient way to assure universal visibility and accessibility to their scientific literature, contributing to overcome the phenomena known as "lost science".

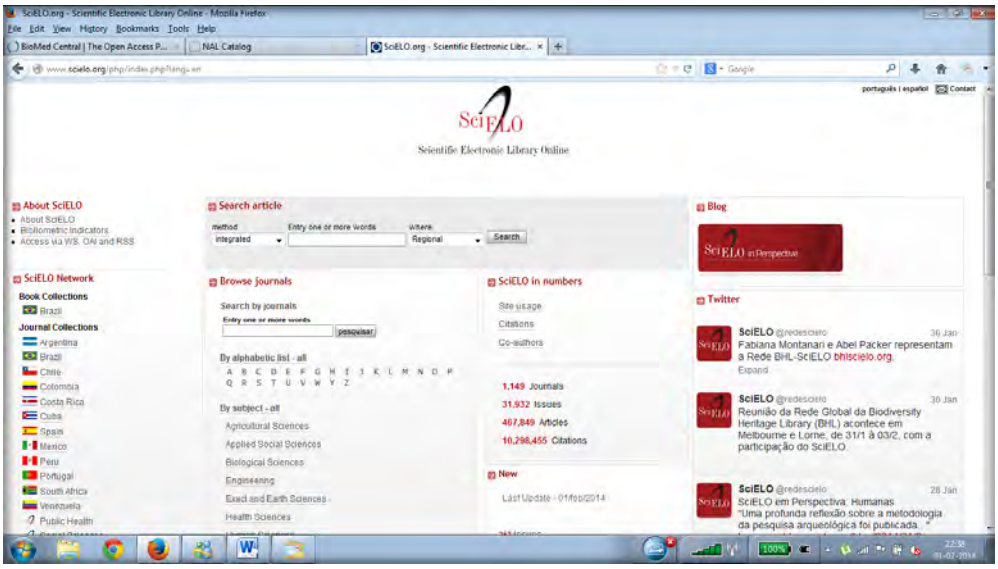

Figure: 4.25 Full Text Database Source:https://lh3.googleusercontent.com/EnYcmuNXwCwGfyOv3yKl4ft4ptntc P2InzlOEwa0wUsaFv8XERpC4iwuXMLTwY8xH8Aj=s151 Accessed on 12.08.2021 at 14:40 Hrs IST

4.3.5.3 Numerical and Statistical Databases

The numeric and statistic database contains the numeric data based on some characteristics. For example, database census of a nation, database of accounts of an organization, database of the results of an experiment, etc. such databases are needed for reference, planning and decision making, analyses, etc.

Example:

Census of India (http://censusindia.gov.in/): The database is created and maintained by the Office of the Registrar General and Commissioner, India.

Figure 4.26 Numerical and Statistical Databases Source:https://lh3.googleusercontent.com/AZr4whjIn2q7O2kwSP9cMH4HhliF7g7jcEArp w8eRujkfnHJNjMv2OpPDO8WrkXiqO7bOA=s151 Accessed on 12.08.2021 at 14:50 Hrs IST

4.3.5.4 Images Database

The image database is a collection of images in digital form along with the description about the images. Such databases are being created on the basis of some characteristics and purposes. For example, the database of the images of slides, writers, leaders, sports persons, famous personalities, etc. Some of the libraries also maintain such databases for the members or official use.

Example:

- Kamat Research Database-Old Photographsof India (http://www.kamat.com/database/content/old_photo/)
- Families in British Indian Society, Image Gallery (http://www.gallery.fibis.org/)
- Oriental Bird Images-a database of the Oriental Bird Club(http://orientalbirdimages.org/)

Figure 4.27 Images Database

Source: https://lh3.googleusercontent.com/THusHgSDXDquG8aqGo-0VQCupohSG1DQ-f43Aw7V8I-cDTGI3aBAeUhPeK1ANWcgSt3ZAA=s151 Accessed on 12.08.2021 at 15:00 Hrs IST

4.3.5.5. Audio Database

The audio database is the collection of audio materials as songs, sound of instruments, speeches of leaders, thinkers, scientists, etc, audio books and so on. Each and every record is being created

with full details so it can be searched and retrieved from the database. You would often be downloading songs from the internet. The organizations providing downloading facilities, maintains the songs in the form of database with complete descriptions as in case of songs from movies then, lyricist, composers, singer, title of the movie, the song filmed on the characters, etc.

Examples:

- Indian Music Library-Twaang- a database of Indian Music maintained by the Google play and is freely available for listening. (https://play.google.com/store/apps/)

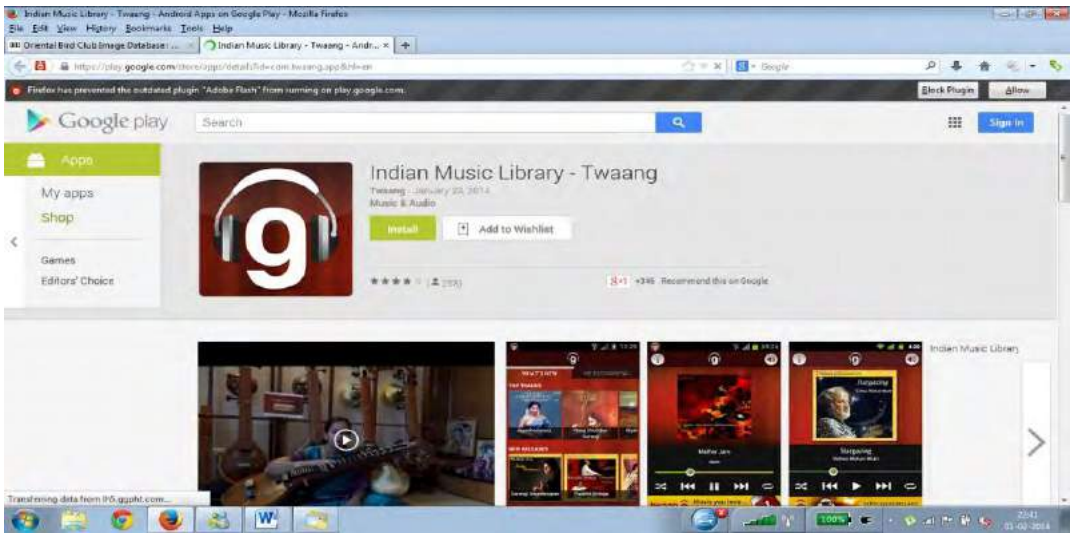

Figure 4.28 Audio Database

4.3.5.6 Video Database

The video database is the collection of videos with descriptions and search ability. You might have seen and uploaded as well downloaded video from internet. There are a number of organizations to create, maintain and provide access to video databases. For example, a database of Hindi films, documentaries on different subjects or themes, education ware, etc.

Example:

- YouTube (www.youtube.com)

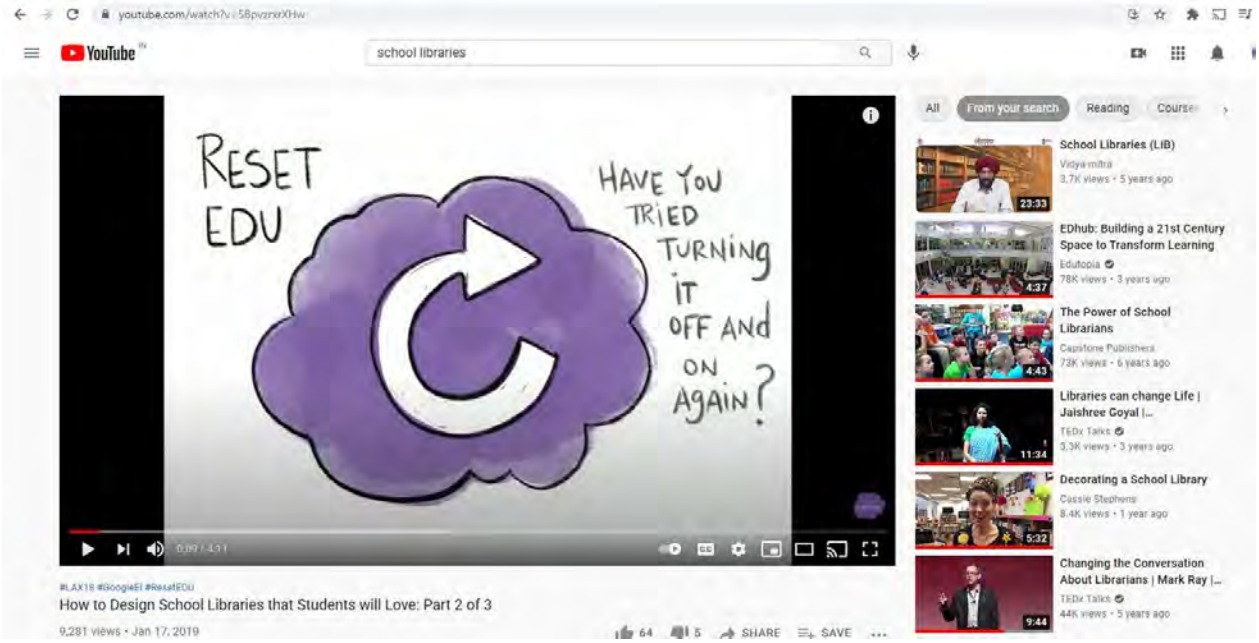

Figure 4.29 Video Database

Source: https://lh3.googleusercontent.com/34cL6wro3XS9CQfkGZYrjOZ1vb6iV2DQrto-3Kbnp9VYlz_eNcNp68gYYsCqcZcjXO3i=s167 Accessed on 12.08.2021 at 15:15 Hrs IST

4.3.5.7. Multimedia Database

The multimedia is such a content or document which uses media as audio, video, animation, text, images, graphics, drawings, etc. Some of these or all of them may be fussed for the purpose of creating content on a topic or subject. The database of such contents known as Multimedia database. Especially in education sector, such databases are created and provided for engaging students in better way. For example, the Indira Gandhi National Open University and National Council of Education Research and Training, create and maintains maintain such database in the field of education. You can also get such content on www.youtube.com.

4.3.6 Summary

Due to knowledge explosion, the World Wide Web is an important source of retrieving relevant information quickly. Although the web-based communication has definitely made our lives better. Its impact on a society is most felt by the choices we make while using it. Wisely using this, we can be able to reap the benefits and avoid its disadvantages. Database collects, stores, processes, and gives easy access to the data or information. It holds both the actual data and the metadata. It helps decrease data redundancy and increase consistency. It follows the 4th Law of Library Science i.e. “Save the time of the user”

4.3.7 Exercise

1. What do you mean by Web Communication System?
2. List five different Web Communication tools used in the library.
3. What is Intranet?
4. Differentiate between Internet and Intranet?
5. What is Database?
6. What do you mean by E-database?
7. What do you mean by bibliographical databases?
8. What do you mean by full text database?

ISBN No.: 978-93-92477-38-6

CENTRAL BOARD OF SECONDARY EDUCATION

Sikhsha Sadan, 17, Rouse Avenue, Institutional Area
Opposite Bal Bhawan, Near ITO, New Delhi-110002
Skill Education Unit