2.0 Introduction

Over the last decade there have been significant changes in the way people work. The changes are due to advances in technology such as the introduction of computers, the expansion of telecommunications and the rise in popularity of the Internet. These advances are on going, and are especially important in that they offer access to huge amounts of information to people at home or at work.

Information once stored in electronic form can break all the physical and geographical barriers and reach the remotest corners of the world. New technologies are emerging to store and process large amounts of information electronically. New methodologies for accessing information are evolving on an almost daily basis. Access to right information at the right time is the need of the hour. Different types of information, a user can get at different levels beginning from resources available in a library or information centre to the network based information services from different networks.

Types of Electronic Information Resources:

The following are the sources of Electronic Information:

1. CD-ROMs.
2. Electronic Databases.
4. DVDs
6. Electronic Journals
7. Electronic mail Data
8. ETD’s (Electronic Theses and Dissertations)
9. Internet Resources
10. OPAC

**Characteristics:**

The following are the characteristics of Electronic Information:

1. Potentially E-Resources are huge
2. Encompassing every thing
3. Organized arbitrarily
4. Occupying no physical space
5. Full content searchable
6. Elimination of time, space, cost constraints
7. Public domain of information (Internet)
8. Hyperlinks to related information
9. Preservation & Dissemination of knowledge
   (a) Faster and wider
   (b) Backup preservation
10. Archiving the content

**Limitations:**

The following are the limitations of Electronic Information:

1. Requirement of Hardware/Software
2. Infrastructure required for access
3. Non-Availability of campus wide LAN
4. Bandwidth issues
5. User training issues
6. Content Selection & identification for access
7. Librarians role
8. Source enabler
9. Collection enhancement and development
10. Resource sharing
11. Many networks and one world
12. Evolving new access dissemination and retrieval models
13. Archiving and preserving the digital collection

2.1. Compact Disk Read-Only Memory (CD-ROM)

Definitions:

1. Compact Disk Read-only Memory. A type of storage device that looks just like an audio CD and stores as much as data of large hard disk (700 MB), making it a popular means of distributing fonts, photos, electronic encyclopedias, games and multimedia offerings. As the name indicates, however, one can’t change files on a CD-ROM, but only read them.

2. A memory disc for computers that holds 700 megabytes of data. CD-ROM can be used to store computer programs, databases, books, video, pictures and sound. These media are stored on the same disc to create “multimedia” information and playback.

The Information revolution comprises the immense technological advances made during the past centuries in human capabilities to encode, record, reproduce, and disseminate information. New technologies for preserving and transmitting visual information have greatly increased information processing capacity. The electronic computer together with its peripheral equipment provides an electromechanical capability for modifying and reprocessing stored
information to produce vast new stores of information. Spiraling cost of conventional printed documents in the modern technological era compelled the libraries and information centres to go for the procurement of electronic media like, CD-ROM (Compact Disc Read Only Memory), floppy diskettes, magnetic tapes, etc.

The CD-ROM, one of the storage and distribution technologies uses the laser power and optical techniques. The CD-ROM can store substantially more information in a given amount of space. CD-ROM, an optical disc made of polycarbonate having 12 cms in diameter with only 1.2mm thickness can accommodate upto 700 MB of information which is equivalent to 2,75,000 to 3,00,000 A4 type written pages of text or a single disc can store the entire Encyclopedia Britannica.

The capacities and other features of the Compact Discs are given in the following table:

<table>
<thead>
<tr>
<th>Type</th>
<th>Sectors</th>
<th>Data max size (MB)</th>
<th>Audio max size (MB)</th>
<th>Time (Min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>180 MB (8 cm)</td>
<td>94,500</td>
<td>193.536 ∼ 184.6</td>
<td>222.264 ∼ 212.0</td>
<td>21</td>
</tr>
<tr>
<td>650 MB</td>
<td>283,500</td>
<td>580.608 ∼ 553.7</td>
<td>666.792 ∼ 635.9</td>
<td>63</td>
</tr>
<tr>
<td>700 MB</td>
<td>333,000</td>
<td>681.984 ∼ 650.3</td>
<td>783.216 ∼ 746.9</td>
<td>74</td>
</tr>
<tr>
<td>800 MB</td>
<td>360,000</td>
<td>737.280 ∼ 703.1</td>
<td>846.720 ∼ 807.4</td>
<td>80</td>
</tr>
<tr>
<td>800 MB</td>
<td>405,000</td>
<td>829.440 ∼ 791.0</td>
<td>952.560 ∼ 908.4</td>
<td>90</td>
</tr>
<tr>
<td>900 MB</td>
<td>445,500</td>
<td>912.384 ∼ 870.1</td>
<td>1,047.816 ∼ 999.3</td>
<td>99</td>
</tr>
</tbody>
</table>

MB=Megabytes, MiB=Megabits, Min=Minutes
Source: www.wikipedia.com
The usage of CD-ROMs now in India has gained much popularity due to easy availability of CD-ROM titles and also due to reducing cost of CD players. This technology also extends an off-line alternative for search. Now, several leading companies in the entire world have started to launch their products through this form.

Due to the advancement of technology, the CD-ROMs are getting used profusely in the document copying/writing business. The price has been falling for CD-R (CD Recordable) drives that can write data to a special type of Compact Disc. No portions/parts of data can be written/recorded on the already written discs. However, data can be added without any change in the pre-recorded data. Drives for rewriteable CD-ROMs (CD-RW), which overcome the immutability of CD-R. The data transfer speeds of CD-R are given in the following table:

<table>
<thead>
<tr>
<th>Transfer Speed</th>
<th>Megabytes/s</th>
<th>Megabits/s</th>
<th>Mebibits/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>1x</td>
<td>0.15</td>
<td>1.2</td>
<td>1.2288</td>
</tr>
<tr>
<td>2x</td>
<td>0.3</td>
<td>2.4</td>
<td>2.4576</td>
</tr>
<tr>
<td>4x</td>
<td>0.6</td>
<td>4.8</td>
<td>4.9152</td>
</tr>
<tr>
<td>8x</td>
<td>1.2</td>
<td>9.6</td>
<td>9.8304</td>
</tr>
<tr>
<td>10x</td>
<td>1.5</td>
<td>12.0</td>
<td>12.2880</td>
</tr>
<tr>
<td>12x</td>
<td>1.8</td>
<td>14.4</td>
<td>14.7456</td>
</tr>
<tr>
<td>20x</td>
<td>3.0</td>
<td>24.0</td>
<td>24.5760</td>
</tr>
<tr>
<td>32x</td>
<td>4.8</td>
<td>38.4</td>
<td>39.3216</td>
</tr>
<tr>
<td>36x</td>
<td>5.4</td>
<td>43.2</td>
<td>44.2368</td>
</tr>
<tr>
<td>40x</td>
<td>6.0</td>
<td>48.0</td>
<td>49.1520</td>
</tr>
<tr>
<td>48x</td>
<td>7.2</td>
<td>57.6</td>
<td>58.9824</td>
</tr>
<tr>
<td>50x</td>
<td>7.5</td>
<td>60.0</td>
<td>61.4400</td>
</tr>
<tr>
<td>52x</td>
<td>7.8</td>
<td>62.4</td>
<td>63.8976</td>
</tr>
</tbody>
</table>

Source: www.wikipedia.com
In the digital age, a paperless library has already come into existence with the availability of CD-ROM databases; CD-ROM has an indispensable role to play in the dissemination of electronic information and it has already found a special place in the rapidly growing digital libraries. In CD-ROM, text and graphics are available in digital form in the modern publishing process.

2.2. Offline Electronic Databases

Definitions:

1. A collection of information organized and presented to serve a specific purpose (A telephone book is a common database). A computerized database is an updated, organised file of machine-readable information that is rapidly searched and retrieved by computer.

2. A shared collection of logically related data, designed to meet the information needs of multiple users in an organization. The term database is often erroneously referred to as a synonym for a "database management system (DBMS)"/ they are not equivalent. A database is a store of data that describe entities and the relationships between the entities. A database management system is the software mechanism for managing that data.

3. A database can be defined as a computerized collection of logically related data or data records about something (say about an enterprise objects, or certain problem areas) that are stored, organized or structured in the computer in such a flexible manner that it enables people to get information out of it very quickly.
The features of a database are:

- Each data element is stored once and only once in a record
- Any number of users can have access to a data element any number of times.
- Data elements in the database are independent of data representation, devices descriptions, programs or special structures of the data.
- A database is a physically available object.

Introduction

Data that is stored more or less permanently in a computer readable file is termed as a database. The software that allows one or many persons to use and/or modify this data is a database management system (DBMS). Major role of DBMS is to allow the user to deal with the data in abstract terms, rather than as how the computer stores it.

Typical operations that are performed on databases are:

- Inserting a record
- Deleting a record
- Correcting or modifying a record
- Searching a record
- Downloadable
- Copying
- Transfer etc.

Users and application programs which access data do not need to be aware of the detailed storage structure of the data on a computer storage device,
in other words, the data are stored in a way so that they are independent of one or more application programs that use the data.

A database can also be seen as a collection of interrelated largely similar data or data records in a set of linked files designed to facilitate the retrieval of information, which may be processed by one or more application programs. Further, the files of the database are organised and administered in such a flexible way that these can be adapted to new, unforeseen tasks.

**Types of databases:**

a. **Integrated Database:** It supports two or more library functions. Example: Acquisition, OPAC, Serial Control, Circulation etc.

b. **Shared Database:** Individual pieces of data or data records in the database, which may be shared among several different users.

c. **Distributed Database:** is one that resides on two or more computers simultaneously. The database can be partitioned and physically distributed among several locations/computers, usually quite far removed from one another.

d. **Bibliographic Database:** A component of bibliographic information system, which maintain data about collections of documents or publications. It typically has records composed of attributes or data/elements such as Authorship, Title, Keywords, Abstracts etc. to the bibliographic entries.

e. **Full text Database:** These databases provide the citation, or reference, to journal articles, and often contain the full text of the article. The term full-
text refers to the availability of a whole article accessed on an online database. The complete article or paper is available usually in pdf format. An example of such a database is ProQuest and Expanded Academic ASAP.

f. **Factual Database:** An indexed computer or print source that provides information in the form of guidelines for diagnosis and treatment, patient indications, or other authoritative information. Examples are PDQ a computer database on cancer management, and DRUGLINE a computer database on drug indications, contraindications, and interactions.

g. **Research Databases:** Online indexes and abstracts as well as informational databases available through Ohio LINK, ERIC, MEDLINE and Contemporary Authors are some examples. Usually they contain information on a specific subject or a type of information. Libraries subscribe to research databases to access their contents.

h. **Article Databases:** E-Resources Online tools that index, abstract, or provide electronic access to articles, books, dissertations and other types of content. Many of these databases offer limited full text. Listing of articles in journals, magazines, newspapers, etc. Many include abstracts (article summaries). Some include, or link to, the full text of articles.

i. **Subject Oriented Databases:** Rather than building one massive centralized data warehouse, most companies are building numerous subject-oriented warehouses to serve the needs of different divisions.

j. **Relational Databases:** A relational database is a database based on the relational mode. Strictly speaking the term refers to a specific collection of
data but it is often used synonymously with the software that is used to manage that collection of data. That software is more correctly called a relational database management system, or RDBMS.

k. **Image and Sound Databases**: Listing of material in audio or video formats, photographs, paintings, or other visual materials. Some of these sources include or link to the actual items.

### 2.3. Digital Libraries

**Definitions:**


2. Digital Libraries are the repositories of electronic texts, images, and other materials. Digital Libraries are generally found on the Internet, although large collections of remotely accessed CD-ROMs could also be considered a digital library. Materials in a digital library may have been “born digital” or they may have been digitized using a scanner.

3. Digital library is a system of distributed databases, most often in full text and multimedia form, accessible online on computer networks. The important components of a digital library are a ‘digital object’ or information object, which may be textual, audio, video, image, numeric, computer programmes or multimedia composites.
Introduction

The term digital library was evolved in early 1970s. The first application of digital library concept was associated with character coded storage and full text indexing of legal and scientific documents. Digital Libraries basically store materials in electronic format and manipulate large collection of those materials effectively. When the information is organized, processed and transmitted by means of digital devices, the concept of digital library emerges. It may be the library within a real library or it can be truly a virtual library if it is started on purely digital basis. Thus digital library means:

- Creation and maintenance of information in digital format.
- Digitization of the documents of the library, which are in print form and
- Online access to the external digitized information with the provision of user ID and password to the users.

The key technological issue is how to search and display the desired selections from and across large collections. The main focus of digital libraries should be on issues of access, cost, digitization technology and how to develop the necessary infrastructure for effective mass manipulation of the information in the network.

Digital library requires well-tested and proven information technologies for accessing the database or servers through networks. The following components are very essentials to create digital library.
Hardware:

- Internet connectivity,
- Computer
- Servers
- Scanners
- Storage Media
- Digital Camera etc.

Software:

- Operating Systems
- Digital Library Software etc.

Humanware:

- Management Skills
- Technical Skills
- Subject Skills.

Advantages of Digital Libraries:

Electronic resources offer ever-increasing abilities to store, both print and non-print material such as sound, images and video. They provide faster access, and libraries do not have to deal with the problems of misplaced, missing, or mutilated books. Electronic resources are able to meet the users increasing demands and expectations for quicker and easier access to information, where physical space is of little concern. Digital Libraries make use of latest information technologies to store vast amounts of information in electronic form. Digital Library equipment requires a fraction of the amount of space given to the storage of print collections. Furthermore, the physical location of digital libraries is not an issue because digital library collections will be accessible through information
technologies making it possible for library staff and end users to access digital libraries from their offices, homes, or anywhere else at their convenience. Another driving force behind digital libraries is the cost of scholarly information. The volume of scholarly information is increasing faster than the ability of researchers to manage it, publishers to print it, libraries to collect it, and scholars to read it. This flood of scholarly materials, particularly in journal form, has placed great burdens on library budgets. Increases in library budgets have not been sufficient to maintain serials collections, leading to massive serial title cancellations in most academic libraries. Preservation is also very easy for digital materials when compared with documents.

**Disadvantages**

Some people criticize that copyright law hampers digital libraries, because works cannot be shared over different periods of time in the manner of a traditional library. The content is, in many cases, public domain or self-generated content only. Some digital libraries, such as Project Gutenberg, work to digitize out-of-copyright works and make them freely available to the public.

Digital libraries cannot reproduce the environment of a traditional library. Many people also find reading printed material to be easier than reading material on a computer screen although this depends heavily on presentation as well as personal preferences. Also, due to technological developments, a digital library can see some of its content become out-of-date and its data may become unaccessible.
Digital libraries are wholly dependent on cheap, abundant sources of electricity. Without electricity, the content cannot be accessed. Hence, any threat to the energy security of a society will threaten the very existence of the digital library.

2.4. Digital Versatile Disc (DVD)

Definition:

1. Digital Versatile Disc: An advanced type of CD-ROM that holds a minimum of 4-7 gigabytes to a maximum of 17 gigabytes of information. They contain the compressed data/information using the MPEG codec, which stores only the changes from one frame to another instead of the entire frame.

2. Digital Versatile Disk is a high-density mass storage medium similar to CD-ROM, but capable of storing much larger amounts of information due to improvements in recording density and use of multiple layers per side.

3. In 1995 Philips and Sony introduced a new type of disc, known as a digital videodisc (DVD), which was able to store up to 4.7 gigabytes of data, such as high-definition digital video files. A DVD has the same dimensions as a standard CD but cannot be read by a standard CD player, although a DVD player can read standard CDs. DVD players use a higher-power red laser (0.65 micrometre) that enables smaller pits (0.4 micrometre) and separation tracks (0.74 micrometre) to be used.
Advances in computer technology have brought most people as close as a mouse click to the wealth of information. It is no longer necessary to flip through volume upon volume of a printed encyclopedia to access information. Today we can simply go to our library, ask for our favorite encyclopedia on CD-ROM, sit down at a terminal, and retrieve information. No technology will last forever, but it appears that books and optical discs will last some time yet, even while we see the future. Optical discs, specifically in the form of CD-ROMs have become increasingly important as a medium for storage and dissemination of information during the 1990s. Most librarians thought that books would persist usefully forever, along with electronic sources. Optical media are much nearer to books than online, although their content can be networked and delivered online.

CD-ROM was introduced in 1985, the audio CD in 1982. In each case, the successor will be DVD. DVD has been around for a few years, making a slow start. The move from megabyte to gigabyte should stimulate any information professional’s interest and imagination. DVD will transform libraries and information services, not fundamentally but measurably and definitely for the better. CD-ROM’s day are counted. But it is clear that change will be even more dramatic than we have seen over previous centuries, and that optical media is starting to fulfill its role in the history of reference source publishing. The economical availability of powerful PCs along with declining DVD prices and steady increase in DVD content will have many libraries seriously consider this option.
What is DVD?

DVD – Digital Video Disc or Digital Versatile Disc for the computer industry, is the next generation to Compact Disc in optical disc storage technology. A DVD looks just like a CD (both 120 mm. diameter), but has higher data storage capacity. Like a CD, data is recorded on DVD in a spiral trail of tiny pits, and the discs are read using a laser beam. The DVD’s larger capacity is achieved by making the pits smaller and the spiral tighter, and by recording the data in as many as four layers, two on each side of the disc. To read these tightly packed discs, lasers that produce a shorter wavelength beam of light are required, as are more accurate aiming and focusing mechanisms. In fact, the focusing mechanism is the technology that allows data to be recorded on two layers. To read the second layer, the reader simply focuses the laser a little deeper into the disc, where the second layer of data is recorded. However, since a 135-minute movie fits on a single DVD layer, single layer DVDs will be the most common. DVD players can also read CDs. The DVD technology provides a storage capacity that is at least 6 to 7 times greater than that of a CD, in the same aerial space. With very high quality video (two to three times greater than with a VCR tape). Added to this, is an equivalent increase in audio quality. 5-channel sound is available for home theater applications. The main feature of DVD is the compression technology and storing data on multi-layer sides. A single sided-single layer DVD holds 4.7 GB and two layer DVD can hold 8.5 GB of data. There are other DVD formats with double sided specifications. A double-sided single layer DVD can hold about 9.4 GB and double-sided double layer DVD can hold about 17 GB of data. There are various kinds of DVD’s like DVD-
ROM, DVD-Audio, DVD-Video, DVD-Recordable, DVD-Erasable etc. The transfer rate of data from a DVD can be sustained at more than 1 MB per second.

The comparison and characteristics of DVD & CD are given in the following table:

**Table - 2.3: Comparison of DVD and CD characteristics**

<table>
<thead>
<tr>
<th>Particulars</th>
<th>DVD</th>
<th>CD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter</td>
<td>120 mm</td>
<td>120 mm</td>
</tr>
<tr>
<td>Thickness</td>
<td>0.663 mm</td>
<td>1.2 mm</td>
</tr>
<tr>
<td>Track Pitch</td>
<td>0.74 nanometers</td>
<td>1.6 nanometers</td>
</tr>
<tr>
<td>Minimum Pitch length</td>
<td>0.46 nanometers</td>
<td>0.834 nanometers</td>
</tr>
<tr>
<td>Laser Wave length</td>
<td>640 nm</td>
<td>780 nm</td>
</tr>
<tr>
<td>Data Capacity (Per layer)</td>
<td>4.7 GB to 17 GB</td>
<td>0.7 GB (700 MB)</td>
</tr>
<tr>
<td>Layers</td>
<td>1, 2 and 4</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: www.wikipedia.com

**Advantages of DVD**

- The high data storage capacity of DVDs makes it possible to represent more multimedia elements, like sound and video and to integrate many reference sources on a single disc.
- The quality of sound and video in DVD is better than CD-ROM. In fact, DVD makes it possible to display longer full screen, full motion and high quality videos.
- DVD can deliver the data at a higher rate than CD-ROM.
- DVD drives can read both CD-ROMs and DVD-ROM’s.
- By using DVD databases it might be possible to avoid CD-ROM jukeboxes.
- DVD eliminates the need for disc swapping of deluxe multimedia databases and makes information seeking more convenient.
Blu-ray Disc

Blu-ray, also known as Blu-ray Disc (BD), is the name of the next-generation optical disc format jointly developed by the Blu-ray Disc Association (BDA), a group of the world’s leading consumer electronics, personal computer and media manufactures. The format was developed to enable recording, rewriting and playback of high definition video (HD), as well as storing large amounts of data. The format offers more than five times the storage capacity of traditional DVDs and can hold up to 25GB on a single-layer disc and 50GB on a dual-layer disc. While current optical disc technologies such as DVD, DVD-RW and DVD-ROM rely on a red laser rays to read and write data, the new format uses a blue-violet laser instead, hence the name Blu-ray Disc.

The present study conducted on different Organizations/Institutions, found that no Library is using this latest technology, however, some are planning to introduce this technology in future.

2.5. Electronic Books (e-Books)

Definitions:

1. e-Book as a portable hardware and software system that can display large quantity of readable textual information to the user and let the user navigate through this information. An e-Book is digital reading material that a user can view on a desktop or notebook personal computer, or on a dedicated, portable device with a large storage capacity and the ability to download new titles via a network connection.
2. Working definition of e-Books is presented by AAP (Association of American Publishers). “A literary work in the form of a Digital Object consisting of one or more standard unique Identifiers and Monographic body of content intended to be published and accessed electronically”.

Today there are an increasing number of web sites, news groups, discussion boards, and email newsletters dedicated solely to the promotion of books. More importantly, one will find web sites that provide information on very specific and narrow genres. These web sites will address audiences and topics that are considered to small or narrow to be addressed by traditional means today. Soon readers will be able to learn about good news books more easily than they do today. Established book reviewers are already reaping the benefits of e-Books. E-Books will allow reviewers to review more books than traditional paper books. As greater number of electronic resources become available, retrieving relevant and authoritative information has become more challenging and consuming. Integrating e-Books into the digital library has created challenges and opportunities for the e-Book sellers, publishers and librarians.

**Emergence of Electronic Books**

Over the last two decades a number of important factors have influenced the need for and development of electronic books. Some of the more important of these factors include:

1. The advent of desktop publishing,
2. The growing acceptance of ‘paperless’ publishing,
(3) The ease with which electronic information can be created, updated, copied, shared, distributed, and searched,

(4) The more widespread availability of both local-area and global computer based communication networks, and

(5) The incipient onset of the electronic ‘information explosion’.

The rationale for converting to paper what already exists in electronic form is again a consequence of our increment with paper as a publication medium. However, in the past, this situation has been forced upon us by the relative lack of appropriate and cost-effective technology to enable us to access, view, and read electronic documents directly. Obviously, as equipment to facilitate this requirement becomes more widely available, the need to use paper will undoubtedly become less. Indeed, as the infrastructures needed to handle electronic documents become better established, we could see a major movement toward paperless publishing, with all the advantages.

Undoubtedly, two of the major reasons for the development of electronic book systems have been: (1) the ease with which electronic information can be moved from one location to another, and (2) the ease with which this information can be automatically searched in order to locate items of interest. Obviously, these two very attractive features of electronic books will help us to overcome many of the problems that we are likely to encounter as the volume of globally available electronic information increases with time.
What is e-Book?

An e-Book is essentially the contents of a book distributed in the form of an electronic file. Any file that holds text can be in theory used as an e-Book. However, there are a number of specialized formats and reading programs designed with e-Book reading in mind. E-Books are exactly like print or paper books except that they are bound electronically. E-Books come in a variety of formats as well. They can be downloaded in .pdf, .html, plain text and rich text formats for example, and they can also be purchased in CD-ROM and floppy disc formats. e-Books are simply books that are available in digital formats. This definition is too generic especially when there are different types of e-Documents viz:
1. Offline: Electronic Publications, by which we mean those issued on discrete physical digital media such as tapes, diskettes or, more commonly, optical disks of some kind, such as CD-ROM.

2. Hybrid: Electronic Publications, by which we mean offline publications, which contain links to online material.

3. Online: Electronic Publications, by which we mean published resources accessible on the Internet or on proprietary networks.

Features of e-Books

Simply put an e-Book in a special computer file, which contains the text of a printed book. The file may be read on a personal computer (PC), a personal digital assistant (PDA), or an electronic device designed specially for reading e-Books (e-book reader). E-Book readers have many features that are simply not available with standard printed text. The following are some special features of e-Books:

- e-Books cost less than traditional books.
- Books never go out of print
- Economically feasible to publish low demand titles.
- No shipping and handling charges when purchased online.
- Ability to self publish and distribute own books inexpensively
- Look up words with dictionary software (included most e-Book readers)
- Annotate or highlight text
- Enjoy content which includes audio and full motion video
- Choose different fonts (text) sizes in which to read
• Teachers may prepare customized e-Textbooks for their students
• Read in the dark or low light conditions
• Carry several books in one small package
• E-Books may be customized to suit an individual’s specific interests and tastes
• Save e-Books on the Internet or Personal Computer.
• Copyright protected through software (prevent unauthorized duplication of e-Book content)
• Create links between multiple e-Books
• The visually impaired may switch to audio mode and have an e-Book read to them.
• Reduce environmental waste (save trees, and reduce pollution from delivery trucks)
• Reference material in e-Book form may be easily updated
• Libraries may loan e-Books by setting a time period in which an e-Book may be read.
• Access from any where
• Prevention from being lost, stolen or damaged.

Taxonomy of e-Books

From the point of view of communication modality, electronic books can contain a variety of different types of information, such as text, pictures, and sound. Depending upon the types of information that they embed, the basic
properties that they exhibit and the functions that they have to perform, electronic books can be classified into ten basic types. The different types of books that we have identified as being of major importance are listed below:

### Table – 2.4: Simple taxonomy of Electronic Books

<table>
<thead>
<tr>
<th>Book type</th>
<th>Characteristic feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Textbooks</td>
<td>Contain linear text/search engine</td>
</tr>
<tr>
<td>Picture books</td>
<td>Embedded various sorts of static pictures</td>
</tr>
<tr>
<td>Talking books</td>
<td>Use audio narrations and sound effects</td>
</tr>
<tr>
<td>Moving picture books</td>
<td>Embed animation and/or video</td>
</tr>
<tr>
<td>Multimedia</td>
<td>Combine text, Pictures, sound etc</td>
</tr>
<tr>
<td>Polymedia books</td>
<td>Use electronic and non-electronic media</td>
</tr>
<tr>
<td>Hypermedia books</td>
<td>Involve nonlinear information structures</td>
</tr>
<tr>
<td>Intelligent electronic books</td>
<td>Can adapt to a given user’s behavior</td>
</tr>
<tr>
<td>Telemedia books</td>
<td>Embedded telecommunications facilities</td>
</tr>
<tr>
<td>Cyber books</td>
<td>Involve the use of virtual reality techniques</td>
</tr>
</tbody>
</table>

Source: Encyclopedia of Library and Information Science

**Advantages of e-Books**

e-Books may have their advantages over regular paperback/hardcover books. First of all, e-Books take much less space. These can be made available on a CD-ROM and occupy a fraction of the space of a paper volume of the same title. e-Books are also nice because anyone can read them with the click of mouse. Instead of driving over the library, going to a nearby bookstore, or ordering a book online and waiting days to receive it, e-Book can be sent in the computer instantly to read. The e-Book both in its online or CD-ROM form may contain animations and live action illustrations, which are not possible in paper books.
2.6. Electronic Journals (e-Journals)

**Definition:**

1. An article or complete journal available fully electronically via a website on the Internet. It could be available free or as part of a paid for service. This trend is older and more established than the trend of providing e-book content via the Internet.

2. Full-text journal publications those are available in electronic format, covering a variety of subjects, which are available over the Internet.

3. A periodical available via computer usually by subscription. Most of which are available with restricted access over the Internet.

**Introduction**

The advent of Information and Communication Technology (ICT) has played a pivotal role in transforming the conventional library into a digital library. This has resulted in the proliferation of electronic publishing (e-publishing), which provides information in a digital form. The electronic journals (e-journals) occupy a major share in e-publishing and they are fast becoming the preferred format for information dissemination, especially in science and technology. The full-text e-journals can be viewed as individual issues that correspond to their print counterparts. Full text article databases are collections of articles and not complete issues of journals. Often these collections bring together articles on a particular subject such as engineering or medicine and they are usually searched by subject.

E-journals those are accessible via the World Wide Web (WWW). The e-journals are made available in various modes namely:
• Free with a print subscription.
• At a nominal cost with a print subscription
• As web editions only with a paid subscription

Electronic Journals (e-Journals) are full text journals that are accessible via Internet/Intranet. The buzzword at the moment is linkage. Hypertext has made it much easier for libraries and other institutions to place their collections on the Intranet for the patrons to access them.

There are two types of electronic journals. The first is the offline CD-ROM version that can be distributed in a similar manner to printed journals and second one is the online or Internet-based journals. But there are several points of considerable difference that one could take note of them. Readers of online journals can be alerted about new papers in issues via electronic mail, discussion lists or news groups. Clearly this is not exclusive to online publications, but such an information service presupposes that the recipient is online and therefore seems to carry more weight if the publications are also online. Much earlier access to latest articles, due to the immediate nature of distribution of online journals as compared to CD-ROM versions, which depend on snail mail to reach the customer. Cost of updating online journals is much less, since the files are simple added or replaced on the specific server hence issues can be made more frequent than CD-ROM versions, which come out with more or less the same frequency as the print versions.
Advantages of e-Journals

The ability to deliver 3-D images, video, animation, communication forums, and links to the abstracts or full text of other journals articles provides added value compared to the printed journal. There are several advantages in using an electronic format:

Electronic Journals are/can:

- Easy to search for articles by a particular author or on a particular topic or any specific information anywhere in the text
- Interactive
- Support multimedia
- Link to other pages on the internet and scholarly publication
- Speedy scientific communication process
- Possibility of more open peer review process
- Demand no library space nor shelving costs nor can they be stolen from the library
- Available 24 hours a day, 7 days a week
- Easily be merged with alerting services

Disadvantages of e-Journals

- Uncertainty of permanent access
- Desire to browse the print version/difficulty in reading computer screens.
- Instability of the web
- Changing scenario of storage media
Access to e-Journals

In order to make the maximum use of e-journals and access options, one has to be very careful in subscribing the e-journals about various IT issues and formats available such as HTML, PDF, SGML. Because they require specific application programme for reading, retrieving, and downloading the contents. Access to e-journals is provided either by publishers themselves or through e-journals portals. The libraries and information centres cater to the information and reference needs of a variety of users in different disciplines, which indeed is tedious and problematic task to subscribe to all e-journals through various publishers. e-journal portals are the best options for subscribing unlimited number of e-journals published through various publishers at a single gateway. There are many e-journal portals, providing access to various different e-journals ranging from bibliographic data to full text retrieval.

2.7. Information through Electronic Mail (e-Mail)

Electronic mail, abbreviated as e-mail or email, is a method of composing, sending, storing, and receiving messages over electronic communication systems. The term e-mail applies both to the Internet e-mail system based on the Simple Mail Transfer Protocol (SMTP) and to intranet systems allowing users within one company or organization to send messages to each other. Often these work group collaboration systems natively use non-standard protocols but have some form of gateway to allow them to send and receive Internet e-mail. Some organizations may use the Internet protocols for internal e-mail service.
Origins of e-mail

E-mail predates the Internet; existing e-mail systems were a crucial tool in creating the Internet. E-mail started in 1965 as a way for multiple users of a time-sharing mainframe computer to communicate. Among the first systems to have such a facility were SDC's Q32 and MIT's CTSS. E-mail was quickly extended to become network e-mail, allowing users to pass messages between different computers. The early history of network e-mail is also murky; the AUTODIN system may have been the first allowing electronic text messages to be transferred between users on different computers in 1966, but it is possible that the SAGE system had something similar some time before the AUTODIN.

The ARPANET computer network made a large contribution to the evolution of e-mail. There is one report, which indicates experimental inter-system e-mail transfers on it shortly after its creation, in 1969. Ray Tomlinson initiated the use of the @ sign to separate the names of the user and their machine in 1971. The common report that he "invented" e-mail is an exaggeration, although his early e-mail programs SNDMSG and READMAIL were very important. The first message sent by Ray Tomlinson is not preserved. It was "a message announcing the availability of network email". The ARPANET significantly increased the popularity of e-mail, and it became the killer of the ARPANET.

Growing popularity

As the utility and advantages of e-mail on the ARPANET became more widely known, the popularity of e-mail increased, leading to demand from people
who were not allowed access to the ARPANET. A number of protocols were developed to deliver e-mail among groups of time-sharing computers over alternative transmission systems, such as UUCP and IBM's VNET e-mail system. Since not all computers or networks were directly inter-networked, e-mail addresses had to include the "route" of the message, that is, a path between the computer of the sender and the computer of the receivers. E-mail could be passed this way between a number of networks, including the ARPANET, BITNET and NSFNET, as well as to hosts connected directly to other sites via UUCP.

**Messages and mailboxes**

Messages are exchanged between hosts using the Simple Mail Transfer Protocol with software like Sendmail. Users download their messages from servers usually with either the POP or IMAP protocols, though in a large corporate environment users are likely to use some proprietary protocol such as Lotus Notes or Microsoft Exchange Server's.

Mail can be stored either on the client or server side. Standard formats for mail boxes include Maildir and mbox. Several prominent e-mail clients use their own, proprietary format, and require conversion software to transfer e-mail between them. When a message cannot be delivered, the recipient MTA must send a bounce message back to the sender, indicating the problem.
2.8. Electronic Thesis and Dissertations (ETDs)

An ETD is a document that explains the research or scholarship of a research scholar in an electronic format. It is simultaneously suitable for machine archives and worldwide retrieval. The ETD is similar to its paper predecessor. For example, it has figures, tables, footnotes, and references, a title page with the author's name, the official name of the university, the degree sought, and the names of the committee members. Furthermore, it may describe why the work was done, how the research relates to previous work as recorded in the literature, the research methods used, the results, and the interpretation and discussion of the results, and a summary with conclusions.

The ETD is different from its paper predecessor, however, in a few important aspects. First, it provides a technologically advanced medium for expressing the scholars ideas. One can prepare an ETD by using nearly any word processor or document preparation system, and by incorporating relevant multimedia objects. Second, it is less expensive to prepare. By creating an ETD, the requirement of submitting multiple copies on special paper can be avoided. Third, ETDs promote greater access to the research work. ETDs are made available to anyone that browses the World Wide Web. They consume virtually no library shelf space, and never collect dust.

Overall, ETDs contribute to worldwide education and unlock the underutilized results of graduate research for the scholarly community.
2.9. Internet Resources

Networks

A number of PCs can be linked together so they can share resources like printers, files and disk space. A network uses a connecting cable to pass information between the different PCs in the network, each of which has a unique "address" so that it can be identified unambiguously. There are a number of ways that networks can be formed depending on the type of hardware and software in use, but essentially there are two types of network: a centralized network has one machine that holds all the crucial software, and the other linked machines are dependent on this central machine to run correctly. In this network, the linked machines will not run as standalone machines. Whereas, a decentralized network consists of a number of PCs, which are equivalent. They may be run as standalone machines, or as part of the network.

The Internet

At first military, then academic institutions began to see the benefits of connecting computers, mainly for the purpose of communicating and sharing information. For the first twenty years of networking, between the late 1960s and the late 1980s, such networks grew slowly. Over the last five years there has been a mushrooming of the number of computers that have become connected, as the technology became affordable to smaller organizations and to individuals. The resulting loose decentralized conglomeration of local/regional networks has become known as the Internet. It is important to realise the distinction between
"the Internet", which is the system of interconnected computers, and "Internet services" which are what people use the Internet for, and include applications such as e-mail and World Wide Web browsers which are discussed below.

Estimates of how many people are connected to or use the Internet vary, but everyone agrees that the number is growing rapidly. Connecting to the Internet allows access to a number of different services, some of which are explained below. The most popular services are e-mail, newsgroups and the World Wide Web (WWW).

**Electronic mail** (e-mail) is one way of sending information from one computer to another. It works in the same way as posting a letter "snail-mail". Each network on the Internet has a unique identifier, and each person on a network also has a unique username; the combination of these two make up their e-mail address and are unique worldwide. Once connected, one can communicate with anyone else on the Net of course when the e-mail address is known.

**Mailing lists** (or list serves) are public e-mail addresses set up for a particular topic, for example the British Computer Association of the Blind (BCAB). Anyone who wishes to publicize information which they think will be of general interest to members of BCAB can post it to the list. Anyone who subscribes to the list will be sent a copy of the message, and may address questions or comments to it. This enables to contact people who share an interest.

**Usenet newsgroups** are another way of giving and getting information. A newsgroup is a public address, which many people can access. You may add
messages to the newsgroup, and anyone else who is registered can read the
message; they may then reply to you through the newsgroup or privately (i.e. to
your unique address). Like mailing lists, newsgroups tend to be focused on
particular topics, to limit the number of messages that will be posted to them. A
moderated newsgroup is one that has an administrator who monitors all
messages sent to the list and can block those they feel are inappropriate; an
unmoderated newsgroup has no administrator and therefore "anything goes".

The difference between mailing lists and newsgroups is that a mailing list
automatically mails out messages to subscribers, whereas newsgroup users still
have to contact the newsgroup and scan for anything new.

Finding Information

There are a number of ways of finding files, or of using on-line catalogues.
None of these is able to access everything on the Internet because there is
simply too much; a compromise has to be reached between the thoroughness of
a search and the time taken. One application may succeed where another fails,
so it is a good idea not to rely solely on one application.

Files are often located at more than one site, in order to make them easier
to find and available to people with restricted access, and in more than one
format - since there are many different types of computers using the Internet.
Text information is often stored as ASCII files, i.e. with no word processing
formats, so that it can be loaded into any word processor.
Below are some examples of tools that can be helpful in searching for information:

**Internet Search Engines** gather information from WWW documents and other types of online services and allow searching for particular words or phrases. Search engines have largely replaced Telnet and Gopher access.

**Internet gateways** can be used as a starting point for browsing through information. Information is divided into subject categories to help navigate.

**Downloading Information**

Once a file has been located the means and ways of downloading the files are many. There are a number of copy programmes; the one we use depends on the type of computer and operating system being using. The best-known PC copy program is called FTP while the corresponding program for the Mac. The more recent web browsers (see below) incorporate download facilities.

**FTP** is an acronym for File Transfer Protocol, and that is exactly what this does. Once address of the site is known one can access it through the FTP programme, locate the directory and file that is desired, and copy it to ones own hard disk.

**World Wide Web (WWW)**

This is a facility that allows users to add text, graphics, sound and video to documents (called pages) for others to view or take copies of. A large number of
individuals and organizations have taken advantage of this. On each and every subject there is either a page on it, or there will be one soon!

What makes the WWW different from what came before it is that the pages contain a facility called hypertext, which usually appears as underlined or highlighted text. Any such text or graphic on a screen will be a link to another web page (or a different part of the same page), and clicking the cursor on the text or graphic will move to the relevant page. The combination of the Internet and hypertext means that the traditional ways of arranging information - usually a linear form that is read from beginning to end - can be supplemented or replaced by a series of linked documents connected together like a web (hence the name World Wide Web), which readers can look at in a manner chosen by them.

A number of programs give the user the ability to browse through the information held on web pages - these programmes are called Web browsers, and examples are Netscape Navigator and Microsoft Internet Explorer. Net-Tamer is a text-only browser that gives DOS access with a screen reader. A user can browse from link to link without being aware that the information appearing on their screen is being sent from computers around the world.

2.10. Online Public Access Catalogue (OPAC)

Online Public Access Catalogue is a term used to describe any type of computerized library catalogue.

Online Public Access Catalogues allows in providing the flexibility to:
- Find out what the library has to offer
- Check the status of an item (checked out, on shelf, on hold, and so on)
- Check the library record for fines, reserves, or over dues
- Reserve an item
- Look up community information
- Use CD-ROM databases (such as indexes or encyclopedias)
- Link up with library catalogues or databases in other communities

Some OPACs are user-friendlier than others. In some libraries there are instruction sheets right at the terminal. In addition, guides to using the OPAC, called "help screens", appear on the screen whenever required while searching.

A library's card catalogue allows a search by title, author and subject, but that 3x5 card catalogue is almost gone. The same information is available online with some subject expansion. Some systems, allow to search by a combination of fields such as title and author, thus narrowing the search. As well, it may allow searching by keyword.

**Keyword Searching**

In most systems the first option on the menu is a keyword search, such as a title or any word from the title. Users can search for books on a special subject by keyword.