



DIGITAL LIBRARIES DEVELOPED AS A KNOWLEDGE HUBS IN INDIA

Dr. Bezwada Ravi Kumar *Ph.D (Lib), M.A, P.G.D.C.A*

*Associate Professor (Library), St. Ann's college of Engineering & Technolog, CHIRALA - 523155
Bapatla Dist, Andhra Pradesh, India*

Email: libraryprofessional2@gmail.com, bezwadasreekanth@gmail.com

Abstract

In recent years, there has been tremendous development in the concept of digital libraries—a knowledge base that can be stored and retrieved through online networks. Digital libraries are the most complex forms of information systems that support digital document preservation, distributed database management, hypertext, filtering, information retrieval, and selective dissemination of information. This has really overcome geographical barriers by offering a wide range of academic, research, and cultural resources with multimedia effects that can be accessed around the world over distributed networks. The paper examines the concept of a digital library, the technology that has enabled its emergence, and the architecture of a digital library system. It also highlights the digital library projects undertaken in the USA, UK, and India. Here, the authors explored the unique feature of a digital library and the possible challenges ahead for library and information professionals in the digital environment.

Keywords:

Digital, E-resources, Literature review, Research findings, Advantages of digital libraries.

1. INTRODUCTION:

A digital library (also referred to as an electronic library or digital repository) is a focused collection of digital objects that can include text, visual material, audio material, and video material, stored as electronic media formats (as opposed to print, microform, or other media), along with means for organizing, storing, and retrieving the files and media contained in the library collection. Digital libraries can vary immensely in size and scope, and can be maintained by individuals, organizations, or institutions affiliated with established physical library buildings or institutions, or academic institutions. The electronic content may be stored locally, or accessed remotely via computer networks. An electronic library is a type of information retrieval system.

The term digital libraries were first popularized by the NSF/DARPA/NASA Digital Libraries Initiative in 1994 (Wikipedia, 2014).

In the digital library, information is stored as "digital objects". A primitive idea of a digital object is that it is just a set of bits, but this idea is too simple. The content of even the most basic digital object has some structure, and information, such as intellectual property rights, must be associated with the digital object.

To manage valuable intellectual property, certain metadata is required. This is shown in the figure. It always includes a unique identifier (the handle). It may also include properties such as rights and access methods. One property states whether a digital object is mutable, in that it may be altered after being placed in a repository. Another is a digital signature or other method of validating that an object has not been changed. Frequently, it is useful to keep a log of all transactions associated with each digital object.

USER INTERFACES:

Both the pilot and the prototype have two user interfaces: one for the users of the library, the other for the librarians and system administrators who manage the collections. Each user interface is in two parts. A standard Internet

browser is used for the actual interactions with the user. This can be Netscape Navigator, Microsoft's Internet Explorer, or the Grail browser developed by our colleagues at CNRI. The browser connects to client services, which provide intermediary functions between the browser and the other parts of the system. The client services allow the user to decide where to search and what to retrieve; they interpret information structured as digital objects; they negotiate terms and conditions, manage relationships between digital objects, remember the state of the interaction, and convert among the protocols used by the various parts of the system.

REPOSITORY:

Repositories store and manage digital objects and other information. A large digital library may have many repositories of various types, including modern repositories, legacy databases, and Web servers. We have a pilot repository that we have implemented and enhancements planned for the prototype. The interface to this repository is called the repository access protocol (RAP). Features of RAP include explicit recognition of rights and permissions that need to be satisfied before a client can access a digital object, support for a very general range of disseminations of digital objects, and an open architecture with well-defined interfaces. Repositories must look after the information they hold. A repository stores digital objects, both the content and the metadata.

The internal organization of a repository and the way that digital objects are stored are hidden from the user. A simple protocol is provided for interactions with the repository. This protocol is called the "repository access protocol." The basic commands in this protocol are those to access a digital object and its metadata, and the service request to disseminate a digital object. In addition, there are commands to add and delete digital objects.

HANDLE SYSTEM:

Handles are general-purpose identifiers that can be used to identify Internet resources, such as digital objects, over long periods of time and to manage materials stored in any repository or database. CNRI's handle system is a computer system that provides a distributed directory service for identifiers (handles) for Internet resources. When used with the repository, the handle system receives as input a handle for a digital object and returns the identifier of the repository where the object is stored.

The design of the digital library system assumes that there will be many indexes and catalogues that can be searched to discover information before retrieving it from a repository. These indexes may be independently managed and support a wide range of protocols.

OBJECTIVE OF STUDY:

The major objectives of these papers are as follows:

It will provide cutting-edge facilities and services to support research, teaching, learning, and scholarly communication across disciplines.

To collect, organize, and collate prints and digital information and disseminate it at the point of care and for future use.

1. To provide seamless access to information.
2. To act as a gateway to digital and electronic information.
3. To develop into a single-access-point library.
4. To develop and conduct tutorials for the users to enable them to effectively utilize the facilities and resources made available by the library.

SIGNIFICANCE OF STUDY:

The relevance of this research is to attempt to understand the importance and benefits of digital libraries as individuals, in our environment, and also in society. Thus, the significance is as follows:

To bring readers up-to-date on the progress, nature, and impact of digital libraries, bridging the gap since the publication of the best-known digital library texts.

It provides a global perspective and integrates material from many sources in one place.

SCOPE of study:

The scope of this topic covers the historical background of digital libraries, advantages and disadvantages of digital libraries, components of a digital library, how to use a digital library, the importance of digital libraries to society, the internal diagram of a digital library, characteristics of a digital library, types of digital libraries, the function of a digital library, the purpose of a digital library, how to create a digital library, how to add and remove an article on digital libraries, Types of digital libraries and examples, software used for developing a digital library, and hardware involved(if any)

LIMITATION OF STUDY:

This research work is limited by the facts that:

1. There is a lack of screening or validation.
2. There is a lack of preservation of a fixed copy (for the record and for duplicating scientific research).
3. There is difficulty in knowing and locating everything that is available, and differentiating valuable from useless information.
4. There are job losses for traditional publishers and librarians.
5. Costs are spread, and many become hidden.

DEFINITION OF SOME TERMS:

Library: A library is a collection of sources of information and similar resources, made accessible to a defined community for reference or borrowing.

A digital library is a focused collection of digital objects that can include text, visual material, audio material, and video material, stored as electronic media formats (as opposed to print, microform, or other media), along with means for organizing, storing, and retrieving the files and media contained in the library collection.

Digital objects: A digital object is a character string used to uniquely identify an object, such as an electronic document.

Repository: Repositories store and manage digital objects and other information.

Metadata: Metadata is data about data; it is defined as the data providing information about one or more aspects of the data, such as: means of creation of the data, the purpose of the data, Time and date of creation, creator or author of the data, Location on a computer network where the data were created.

Memex machine: Memex is a device in which an individual stores all his books, records, and communications, which is mechanized so that it may be consulted with exceeding speed and flexibility.

LITERATURE REVIEW:

HISTORICAL BACKGROUND:

The digital library concept can be traced back to the famous papers of pioneering scientists like Vannevar Bush and J.C.R. Licklider, who identified and pursued the goal of innovative technologies and approaches towards knowledge sharing as fundamental instruments for progress. Bush (Bush, 1945) devised a device in which an individual stores all his books, records, and communications and which

are mechanized so that it may be consulted with exceeding speed and flexibility...

RELATED LITERATURES:

In the 1980s, library card catalogues were being replaced by online public access catalogues (OPACs). These were usually closed systems that could contain little more than bibliographic data. Most OPACs are done in Machine Readable Cataloguing (MARC) format. It generally represents an individually published item or "information product," and describes the physical characteristics of the item itself (Brenner et al., 2006).

The archival community, however, no longer employs the MARC format. They use the Encoded Archival Description (EAD) format. The EAD format is better suited for encoding the hierarchical relationships between the different parts of the collection and displaying them to the user (Brenner et al., 2006). Recent trends have capitalized on the strengths of both formats to improve access to digital collections (Alderman, 1998).

What exactly is a digital library? According to Donald Waters, digital libraries are "organizations that provide the resources, including the specialized staff, to select, structure, offer intellectual access to, interpret, distribute, preserve the integrity of, and ensure the persistence over time of collections of digital works so that they are readily and economically available for use by a defined community or set of communities" (Waters, 1998). This definition allows for a great degree of interpretation. The concept of a digital library has multiple senses that one might invoke in various contexts. For example, the concept may refer simply to the notion of collection without reference to organization, intellectual accessibility, or service attributes. This extended sense seems to be in play, for example, when we hear the World Wide Web described as a digital library. The concept might also refer to the organization underlying the collection, or, even more specifically, to the computer-based system in which the collection resides (DLF, 1995). Digital libraries represent the meeting point of a large number of disciplines and fields, i.e., data management, information retrieval, library sciences, document management, information systems, the Web, image processing, artificial intelligence, human-computer interaction, and others. (Ioannidis, 2005). The Alex Catalogue of Electronic Texts is one example of a digital library.

The development of a coordinated funding strategy from both public and private sources The formation of selection guidelines that will ensure conformance to a theme and ensure the digital library has a large corpus of significant materials The involvement of leaders in government, education, and the private sector to address network issues and policy Establishment of a comprehensive evaluation of how clients make use of the digital library for research, how that usage compares to traditional library research, and how digital libraries affect the mission, economy, and staffing of organizations and library institutions (DLF, 1995).

The Centre for the Study of Digital Libraries (CSDL) was established in 1995 at Texas A&M. The centre provides experience and expertise to help transfer all types of collections, from books to biological specimens, into digital libraries. The centre also plays a leadership role in the online development and application of world-wide access to digital library services (CSDL, 1995). According to the Centre for the Study of Digital Libraries mission statement, digital libraries will be ubiquitous in the future and will provide the basis for a very broad set of distributed living activities, including computer-supported cooperative work, distance learning, electronic commerce, and entertainment.

The transition to an electronic workplace has already begun in full force. We believe that digital libraries will significantly impact the quality of education and, indeed, the quality of life over the next decade (CSDL, 1995). The CSDL has created a few notable digital library projects, including the George Bush Digital Library, the Cervantes Project 2001, and the TAMU Herbaria Project. One of their most interesting projects is called Walden's Paths. Walden's Paths is a K–12 education project intended to help educators organize the web for their students (Alderman, 1998).

These digital libraries do completely different things, have completely different interfaces, and use different technologies to display information for their users. The Alex Catalogue of Electronic Texts has a very simple, clean layout. It also has a simple search function. There is no advanced search available with this digital library. American Memory by the Library of Congress is a little more advanced than the Alex Catalogue of Electronic Texts. American Memory has a little more complicated setup because it offers a wider variety in its collections. The Alexandria Digital Library has a much more sophisticated search function. While using their National Geospatial Digital Archive, one can search anywhere throughout the United States and recover satellite images, multiple varieties of air photos, and maps.

The University of California, Berkeley, started up the Cheshire II system to change their OPAC to full-text online resources. It was developed to retrieve ranked based probabilistic retrieval methods while still supporting Boolean retrieval methods.

Digital libraries have distinct advantages and disadvantages over traditional libraries. Digital libraries have the potential to contain an unlimited amount of information. Traditional libraries, on the other hand, have to be contained in a physical space, which limits the amount of information that can be held within the library. In the same way, a traditional library's physical space makes it difficult for people far away to access the library's collection. A digital library can be accessed from all around the world. Traditional libraries have hours of operation. When the library is closed, you cannot access the information. A digital library can be accessed at any time. When someone takes out a piece of a traditional library's collection, no one else can use it. Any piece of a digital library can be accessed by numerous people at the exact same time.

Digital libraries have had their share of critics. Digital libraries can have issues with copyright and copyright law. These concerns can be avoided by working around the problem by using only public domain content and copyright law. These concerns can be avoided by working around the problem by using only public domain content. Another way around copyright law is by licensing content and distributing it on a commercial basis. A big criticism of digital libraries is that many can only be accessed by certain audiences. For example, many digital libraries force you to pay to access their collections. The only people who usually get to access these collections are in an academic setting. Many people who could gain a lot from access to such information will never get the chance. Many argue that digital libraries could mean the end of the printed book.

Digital libraries will continue to grow but will not completely replace printed books. According to Walt Crawford, books are comfortable, portable, reliable, and economical means of providing large amounts of information in compact form (Crawford, 1998). Crawford gives a very strong argument for why traditional libraries will continue to be viable even with the proliferation of digital libraries.

I. RESEARCH FUNDINGS:

1. Mode of operation of a digital library.
2. Initial conversion of content from physical to digital form.
3. The extraction or creation of metadata or indexing information describing the content to facilitate searching and discovery, as well as administrative and structural metadata to assist in object viewing, management, and preservation.
4. Storage of digital content and metadata in an appropriate multimedia repository.

5. The repository will include rights management capabilities to enforce intellectual property rights, if required. E-commerce functionality may also be present if needed to handle accounting and billing.
6. Client services for the browser, including repository querying and workflow.
7. Content delivery via file transfer or streaming media.
8. Patron access through a browser or dedicated client.
9. A private or public network.

TYPES OF DIGITAL LIBRARY AND EXAMPLES:

1. Stand-alone Digital Library (SDL):

This is the regular classical library implemented in a fully computerized fashion. SDL is simply a library in which the holdings are digital (i.e., electronically scanned or digitized). The SDL is self-contained, and the material is localized and centralized. In fact, it is a computerized instance of the classical library with the benefits of computerization. Examples of SDLs are the Library of Congress (LC) and its National Digital Library (NDL) (<http://www.loc.gov>), and the Israeli K12 Portal Snunit (<http://www.snunit.k12.il>).

1. Federated Digital Library (FDL):

This is a federation of several independent SDLs in the network, organized around a common theme, and coupled together on the network. A FDL consists of several autonomous SDLs that form a networked library with a transparent user interface. The different SDLs are heterogeneous and are connected via communication networks. The major challenge in the construction and maintenance of a FDL is interoperability (since the different repositories use different metadata formats and standards). Examples of FDLs are the Networked Computer Science Technical Reference Library (NCSTRL) (<http://www.ncstrl.org>) and the Networked Digital Library of Theses and Dissertations (NDLTD) (<http://www.ndltd.org>).

2. Harvested Digital Library (HDL):

This is a virtual library providing summarized access to related material scattered over the network. A HDL holds only metadata with pointers to the holdings that are one click away in cyberspace. The material held in the libraries is harvested (converted into summaries) according to the definition of an information specialist (IS). However, a HDL has regular DL characteristics; it is finely grained and subject focused. It has rich library services and high quality control preserved by the IS, who is also responsible for annotating the objects in the library. The HDL harvesting model is further detailed in Section 3. Examples of HDLs are the Internet Public Library (IPL) (<http://www.ipl.org/>) and the Virtual Library (<http://www.vlib.org/>).

Examples of some digital libraries and how to access them:

i) LOC: Library of Congress American Memory (<http://memory.loc.gov/ammem/>).

1. NSDL: National Science DL (<http://nsdl.org>).
2. IPL: Internet Public Library (<http://www.ipl.org>).
3. CDL: California DL (<http://www.cdlib.org>).
4. ADL Alexandria DL (<http://www.alexandria.ucsb.edu>).
5. BL: British Library (<http://www.bl.uk/>).
6. NZDL, New Zealand DL (<http://www.nzdl.org/>),
7. Einstein Archives Online (<http://www.alberteinstein.info/>).
8. IEEE Digital Library (www.ieeedl.com).
9. ACM Digital Library (www.acmdl.org).
10. Networked Digital Library of Theses and Dissertations (NDLTD) (<http://www.ndltd.org>).

11. ArticleCentral.com! (<http://www.articlecentral.com/>)
12. Networked Computer Science Technical Reference Library (NCSTRL) – (<http://www.ncstrl.org>).
13. Israeli K12 Portal Snunit (<http://www.snunit.k12.il>).

SOFTWARES INVOLVED:

There are different types of software used in digital libraries, such as:

Alfresco (software):- Alfresco is a free or libre enterprise content management system for Microsoft Windows and Unix-like operating systems. It is used for enterprise content management for documents, web, records, images, and collaborative content development.

Cambridge imaging system: It was founded in 1996, is a software company based near Cambridge, UK, that specializes in enterprise video platforms. It has one subsidiary company, Screen Ocean, based in London, UK, an online digital library containing programme material and related metadata from the Channel 4 archive.

Digital Commons: Digital Commons is a hosted open access institutional repository and publishing solution, combining traditional institutional repository functionality with tools for peer-reviewed journal publishing, conference management, and multimedia.

D Space: D Space is an open source repository software package typically used for creating open-access repositories for scholarly and/or published digital content. While DSpace shares some features with content management systems and document management systems, the D Space repository software serves a specific need as a digital archive system, focused on the long-term storage, access, and preservation of digital content.

EXo - Platform: – EXo Platform is an open-source, standard-based enterprise social platform written in Java and distributed under the GNU Lesser General Public License. The platform is sold and distributed by EXo Inc., a global company with U.S. headquarters in San Francisco, California, global headquarters in France, and offices in Tunisia and Vietnam.

Fedora Commons: Fedora (or Flexible Extensible Digital Object Repository Architecture) is a digital asset management (DAM) architecture upon which institutional repositories, digital archives, and digital library systems might be built. Fedora is the underlying architecture for a digital repository, and is not a complete management, indexing, discovery, and delivery application.

Greenstone (Software): Greenstone is a suite of software tools for building and distributing digital library collections on the Internet or CD-ROM.

The importance of digital libraries

1. Scholarly communication, education, research such as e-journals, e-books, and data sets, and e-learning.
2. Access to cultural collections such as cultural heritage, historical and special collections, museums, and biodiversity.
3. E-governance, such as improved access to government policies, plans, procedures, rules, and regulations.
4. Archiving and preservation.

ADVANTAGES OF DIGITAL LIBRARY:

No physical boundary. The user of a digital library need not to go to the library physically; people from all over the world can gain access to the same information, as long as an Internet connection is available. Round the clock availability a major advantage of digital libraries is that people can gain access 24/7 to the information. Multiple

accesses. The same resources can be used simultaneously by a number of institutions and patrons. This may not be the case for copyrighted material: a library may have a license for "lending out" only one copy at a time; this is achieved with a system of digital rights management where a resource can become inaccessible after expiration of the lending period or after the lender chooses to make it inaccessible (equivalent to returning the resource).

Information retrieval. The user is able to use any search term (word, phrase, title, name, or subject) to search the entire collection. Digital libraries can provide very user-friendly interfaces, giving clickable access to their resources. Preservation and conservation Digitization is not a long-term preservation solution for physical collections, but it does succeed in providing access copies for materials that would otherwise fall into degradation from repeated use.

Space. Whereas traditional libraries are limited by storage space, digital libraries have the potential to store much more information simply because digital information requires very little physical space to contain it and media storage technologies are more affordable than ever before.

Added value. Certain characteristics of objects, primarily the quality of images, may be improved. Digitization can enhance legibility and remove visible flaws such as stains and discoloration.

Easily accessible.

DISADVANTAGES OF DIGITAL LIBRARIES:

- i) Digital libraries, or at least their digital collections, have unfortunately also brought their own problems and challenges in areas such as:
- ii) Equity of access across the digital divide.
- iii) Interoperability between systems and software.
- iv) User authentication is required for access to collections.
- v) Information organization.
- vi) Interface design.

APPLICATION AREAS:

It can be applied in different areas, places, organizations and institutions.
These include:-

. 1. Schools, Colleges (Educational Institutions)

- 1. Banks.
- 2. Business organizations.
- 3. Economics.
- 4. Hospitals.

CONCLUSION:

There will be continued expansion of digital library activities. Digital libraries will build upon the work being done in the information and data management area. Digital libraries provide an effective means to distribute learning resources to students and other users. Planning a digital library requires thoughtful analysis of the organization and its users, and an acknowledgement of the cost and the need for infrastructure and ongoing maintenance (Adams, Jansen, and Smith 1999).

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