

Cloud infrastructure and Services for Library Phase Shift of Library for the Next Decade: The Cloud Based Services

Kimidi Siva Shankar

Raja V

Abstract

Most of the traditional libraries are still trying to induce themselves to get acquainted with the technological movement to envelope into the existing library setup for a changeover. Fortunately, the advent of automation of libraries could bring a change from traditional to digital library setup. The existing library system are quest to provide new services in much better way to the user community involving a greater access to the library resources and services. This article will brief about the infrastructure-based services which we saw during transformation from traditional to digital library age. The paper also intends to elaborate how the Cloud infrastructure and services can bring a change in the library system and its services for next few years from now.

Keywords: Traditional Library, Digital Library, Cloud Services, Libraries on Cloud

1. Introduction

We are in the 21st Century, and since past couple of decades we saw drastic changes which took place in almost all the major subject disciplines like, Agriculture, Science & Technology, Engineering etc. After the advent of personal computer and internet we can say that cloud technologies and services will bring new phase of change in prevailing Information and Communication Technology. For number of business across the world, Cloud is being used for experimental and developmental use. Cloud become popular because of their four major service qualities like Efficiency, Scalability, Robustness and Security. Cloud computing is a development based on distributed, parallel and grid computing concepts. Through cloud computing the dissemination of the information can reach the end user efficiently and effectively saving the time of the user. This simplified

the service reach very easy through an abstraction method.

From the world's oldest 'Al-Qarawiyyin Library' to the latest top-class libraries in the world, the infrastructure plays a vital role. The resources, users and services may differ from library to library, but the physical infrastructure remains same like physical book racks, card catalogues, Cardex, etc., from these access points the information reach the users who visit the libraries. The libraries don't mean to have only books, journals etc., but also, they do carry forward the heritage of information from generation to generation. The information which might be available on clay tablets, pamphlets, manuscripts, artefacts, music compositions, rare documents, books, reports, journals etc., required an infrastructure. The generations changed and the information explosion galloped its pace. This brought the library systems changes from traditional libraries way to now called as digital age libraries. The advent of advanced computing technologies



brought a drastic change in the information reach and libraries systems.

2. Services: Traditional to Digital library

In a traditional library system, the services right from user entry to exit requires manual intervention. Users who visit library in search of the required information somehow the other will come across any one of the services which the library system aligns to provide a better service to the user. Below lists out few major services which were available in a Traditional library:

- ❖ Information search service;
- ❖ Circulation service;
- ❖ Technical service;
- ❖ Reference service;
- ❖ Reprographic service; and
- ❖ Special material for reference.

The user who is looking for a particular resource need to take help of a physical card catalogue system which is a primary access point in the traditional library scenario. Classified catalogue, author catalogue, title catalogue these are the three basic card catalogue formats which helps a library user to search for a physical information resource whether it is in the form of a book, journal or a research report.

Next important service is the circulation desk where the issues, returns and renewal will take place. Library collection consists of variety of material carrying different information spread over in different domains, these sources of the information which were kept in a traditional library can be managed only if they have gone through another vital service called Technical processing, it is one of the important

sections of the library, which consists set of procedures to be followed in making a particular resource available to the users without any ambiguity for the information resource they are looking for.

Almost all the services in a traditional library set manual intervention is required. Now, a transition took place from traditional towards the digital library as discussed by (Austin, 2015) in his blog. Information availability in electronic and print formats is now been accessible to full text of documents. Even retrospective and archival information are also being digitized. As discussed by (Corbin & Coletti, 1995), anywhere access can be provided to these type of information to the users without any physical damage to the fragile documents. The list below depicts the key digital library services which are correlated with the traditional libraries:

- ❖ OPAC;
- ❖ Self-check-in-check-out kiosks;
- ❖ Automated ILMS;
- ❖ Referral desk / Ask a Librarian;
- ❖ Advanced reprographic system;
- ❖ Specialized media laboratories; and
- ❖ Virtual discussion rooms.

Almost all the core services which are available in the traditional library set-up are now available in the automated environment in a digital format. Few among those are OPAC, self-check-in/check-out and renewal kiosks, media laboratories, advanced access points for an easy reach and read to the rare manuscripts, artefacts etc., On the arrival of cloud computing technology the traditional library

services got elevated to a major reach and usage. Due to the four major cloud computing services almost all the services which were offered in a traditional library system could get accommodated to cater the information needs to the users much effectively and efficiently doing justice as per the Dr. S.R. Ranganathan's fourth law of Library Science, all these services can be made accessible. Below table.1 presents a simple comparison of traditional library and digital library.

Traditional Libraries	Digital Library
Physical holding of a library (eg. Books, journals etc..)	Resources in the Electronic form
Development phase is very slow, and unchanging	Quick and active change
Not related to other physical objects due to individual identity	Logically linked with the other electronic collection
Flat structure with minimal contextual metadata	Scaffolding of data structures and richer contextual metadata.
Scholarly content with validation process	More than scholarly content with various validation processes
Anywhere access	Open access as well as paid access

Table: 1

Now, most of the libraries moved from a placard system to the library webpages available on intranet or internet. It made the users for an easy access to wide variety of services offered without any physical presence in the library. Below table. 2 will give a brief about attributes in a Traditional library and a Digital Library.

Table 2: Attributes of traditional library and digital library

Attributes	Traditional library	Digital library
Access location	Centralised access location	Distributed access location
Interaction	One way communication	Two way communication
	Loosely coupled	Tight coupled
		Fast interaction
Search	One way search	Systematic search
Query of access	Structured text queries	Complex interaction of query/Navigation/ browsing Social filtering

Table. 2

3. Infrastructure: Traditional to Digital Library

Libraries are considered as the gateways of knowledge and culture, libraries bring out the opportunities for learning. They support education and literacy which in turn shape the budding ideas which were igniting for a better society. As per the WordWeb in a crisp definition infrastructure means “The stock of basic facilities and capital equipment needed for the functioning of a country or area”. A physical library requires a huge infrastructure, starting from library building to its interior requirements. Each and every section in the library need a basic infrastructure to cater the information to the user to his requirement. The traditional library consists of various type of infrastructure like physical stack area for books, periodicals etc, circulation desk, physical card catalogue stands, physical server rooms etc., which are used in variety of services which are rendered to its users.

Advent of digitization in the library system, a quick shift took place from the traditional library system to digital. The infrastructure shift couldn't be

affected completely, but could creep into few of the sections which could really bring the change.

With the advent of automation and digitisation all most the traditional library infrastructure got shrink, physical collection which occupies space of multi cubic meters can be shrinked to few hard disk drives. A new look and feel took place in the traditional library environment starting from the circulation desk, reading rooms, media laboratories etc., The day to day activities of a library and its users made easy by bringing a change in the library infrastructure with versatile data storage and access methods. Library without walls, a blueprint which was suggested by Michael, James can be drawn from the concept of five I's discussed (“From Traditional to Digital Libraries,” 1998). The core elements which are, in a digital library network they should be able to have interconnectivity in nature which should be able to connect to a network, the complete system should be able to interact with other networking computer, this should be interoperable.

The major functions in the library consists of information storage, organization, processing,

information analysis and collection development, in the traditional library systems these services are used to be managed with a great expertise and loss of man-hours. The information technology supported the library systems for an extent, after the advanced technological application intervention it is really a challenging time for the library professional to catch hold the latest IT applications (Dhanushraja, K & Jayalakshmi, M, 2014). One among the latest technology which added value in the libraries is cloud computing which can be utilized for various purposed which shows an avenue for achieving economy in the major library functions.

It was clearly defined by (Goldner, 2011) in his paper that, the Gartner Group defines cloud computing as “a style of computing in which massively scalable and elastic IT-enabled capabilities are delivered as service to external customers using Internet technologies”. In the cloudtutorial.com (Mell & Tim, 2009), NIST defines cloud computing as ‘cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources. (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction’.

From the above definitions the usual features of cloud computing can be explained as:

- ❖ Pay for the space how much you use
- ❖ Can deploy countless resources as per the requirement.
- ❖ User friendly interface
- ❖ Resources can be simulated or emulated.

4. INFLIBNET & Cloud Services

INFLIBNET has its wide offering of its services across the country to all most all the academic institutions and into other verticals. Being it’s one of the primary objectives of (“INFLIBNET Centre Gandhinagar,” 2018.), it undertakes system design and studies in the field of communications, computer networking, information handling and data management. The change over from physical server to the cloud based servers have been successfully implemented. INFLIBNET has its in house information products which were used to be on the physical servers which have been migrated to its own state of the art data-centre, Centre’s R&D team has successfully deployed the below services onto the cloud servers which are now running successfully.

- ❖ IR @ INFLIBNET, in house institutional repository, <http://ir.inflibnet.ac.in/> is hosted on the cloud server using the DSPACE software. ;
- ❖ Instances of all IR hosting services are running on cloud; and
- ❖ Indian Research Information Network System (IRINS) <http://irins.org/irins/> was also hosted on the cloud-based server, which currently holds more than 12 instance of institute at National importance institutes, central universities, and few technological universities.

Most of the INFLIBNET major projects via. NIRF, Vidwan: Expert Database; Vidya-Mitra; Study in India, E-NBA, are on the cloud services. Already INFLIBNET started its step ahead of creating its indigenous cloud space shift all its services and products shifted from a physical presence to the cloud based.

5. Conclusion

Reinventing libraries and the way we do business are getting easier with more tools available all the time. Librarians simply need to keep in touch with technology developments, figure out how to improve an existing service, or establish a new service, and go for it! Cloud computing can change the way library systems are built and the current services are delivered, allowing libraries with an opportunity to extend their impact to cater the information needs. We were put on guard through the narration by (White, 2012), that if we are not able to build the libraries which couldn't catch the technological generation pace, then it would be difficult to advance the existing research and come out with new inventions to human knowledge or conserve the world's retrospective knowledge and heritage for future young generations.

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About Authors

Mr. Kimidi Siva Shankar, Scientist-B (LS), INFLIBNET Centre, Gandhinagar, Gujarat
Email: siva@inflibnet.ac.in

Mr. Raja V, Scientist-B (CS), INFLIBNET Centre, Gandhinagar, Gujarat
Email: raja@inflibnet.ac.in

Note:

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