Cloud based service in library: Boon or Curse?

D. P. Tripathi
Assistant Librarian
Biju Patnaik Central Library
National Institute of Technology Rourkela
Rourkela, Sundargarh, Odisha
dptnitrkl@gmail.com

Dr. Shri Ram Pandy
Assistant Professor
Department of Library & Information Science
Banaras Hindu University, Varanasi
Uttar Pradesh
ram.mlib@gmail.com

Abstract- **Cloud computing is a new form of computing technology and functions on web server, managed remotely and focuses on service. This technology is mainly responsible for providing infrastructure as a service (IaaS), platform as a service (PaaS) and software as a service (SaaS) to others and ensures all infrastructure and software applications are flexible, dynamic and usable for others. The cloud may deal with different services and applications such as web hosting, institutional repository, email, mail server, data storage, online meetings & web conferences, and many more. Libraries throughout the world has also started using cloud computing for managing e-resources access, web application hosting, online public access catalogue, managing digital libraries, hosting different statistical software and data sets etc. This technology may help to reduce the involvement of huge cost, save manpower efforts, provide platform to library users to browse resources with ease and utilize different library services online. This study has been carried out to analyze the impact of cloud based services in library and to understand whether cloud computing is being considered as a curse or boon. This study will help to know about cloud computing and it is relevant to libraries in order to implement the cloud technology and benefit the institutions.**

Keywords- Library, Cloud Computing, Cloud Services in Library, Library Automation, Digitization

I INTRODUCTION

A library has always been a heart of any institute where different types of collection are preserved. These curated collections are major sources of information selected by a group of experts in different domains and further made accessible to the academic community for borrowing or reference. The library also provides physical access or even digital access these days to the users. The collection comprises of books, e-books, periodicals, maps, atlas, manuscripts, documents, audio visuals, audio books, databases, newspapers etc. and other formats. The basic motto of any library is to provide organized collection to its users. In addition to provide documents, library also provide different services such as online public access catalogue, current awareness services, different alert services based on charging/discharging of documents, access to online electronic resources over the Internet. Libraries these days are being re-defined as a place to get unrestricted access to maximum information in different formats through various sources and ensure that services are extended to end users beyond the physical boundaries and assist the users to find and process information from different digital resources. Moreover, libraries these days involve in helping the community and have become centre where programs are scheduled, lecture is delivered and users involve them in learning. Technology in this regard has been playing a major role and cloud computing is one of them.

Cloud technology helps to share resources, services and applications with others without having such resources on their own infrastructures / servers and is known as one of computing technology. In ICT domain, the cloud comprises of network, connections, servers, applications and resources. This technology is based on pay as you use or utility model where resources are provided based on demand same as mobile technology [1].

1.1.1. Deployment Models:

There are four (4) different types of access defined by deployment model.

1. **Public Cloud Model** which permits the access of system and service by the open public. In this type of access, the control of infrastructure is managed by third parties such as, Amazon, Microsoft cloud services over the internet, Google.
2. **Private Cloud Model** is maintained within an organization and allows system and services within the premises. In general, it does not allow the access of services and system for outsiders. However, this type of cloud can be managed by third parties internally with more security with internal firewall.
3. **Hybrid Cloud Model** comprises of private and public model. Many organizations use this type of cloud in which public cloud services is implemented along with its own cloud to perform different applications internally.
4. **Community Cloud Model** is used by maximum group of organization where system and services are accessed by many at the same time and third parties can be given responsibility to manage the cloud to share the services and infrastructure with other organization.

1.2.1. Service Model:

There are three (3) service models identified and are as follows:

1. **Infrastructure as a Service (IaaS)** is responsible for providing access to fundamental resources such as online storage, virtual systems, physical computers etc. Different software, applications or even operation systems are developed by the customer itself and the resources are made accessible to end users via server virtualization.

2. **Platform as a Service (PaaS)** allows development and deployment tools to develop applications quickly and efficiently.

3. **Software as a Service (SaaS)** allows software applications as a service to the users. The software is hosted on cloud and is made available to the end users over internet. There are many SaaS applications such as building invoice system, CRM applications, Helpdesk applications, Human Resource applications and many more. This is mostly used model and rapidly growing in the market.

II   NEED OF CLOUD COMPUTING

Cloud computing is very popular these days and being used in libraries around the world. The libraries prefer to host automation system, website, digital libraries, e-resources and other resources on cloud based servers. The need for cloud services emerged due to the involvement of huge infrastructure in different activities and services by institutions. Maintaining the different services with infrastructure for different purposes are very costly in nature and very difficult for any organization / institution to procure for self. To overcome this, cloud computing seems good solution and helps a lot. Libraries or institutions face a difficulty when there is data loss or hardware failure. It becomes challenging task to recover the data or restore the system with ease. In this situation, cloud computing becomes helpful and data are restored easily in which server is kept separately and many computers are connected with it for data input and pulling the data out. In libraries, cloud computing is more helpful to execute the housekeeping operations such as acquisitions, cataloguing, circulation, serial management, digital object management etc. and also supports different international standards such as z39.50, MARC21 etc.

III   OBJECTIVE OF THE STUDY

This study has been carried out with following objectives.
- To find out the awareness among library professionals about cloud computing
- To understand different advantages of cloud computing in different libraries
- To identify the satisfaction level of different libraries in using cloud services
- To analyze the different problems and challenges in using cloud services

IV   APPLICATION OF CLOUD COMPUTING IN LIBRARIES

Based on the data collected through survey, Indian libraries have not fully accepted the cloud computing technologies. However, they are engaging themselves to implement cloud in the library and provide services also. The challenges in implementation are many such as lack of good service providers, sound technical skilled library professionals to enhance library managed with latest technologies, management support etc. But services such as library automation, web applications, digital libraries, use of web 2.0 features etc. are successfully functional. Different google based cloud services, OCLC services like WorldCat, DuraSpace are some of the good examples of successful cloud based services for libraries. Slowly, libraries are shifting services involving cloud and providing facilities to its users. The cloud services can be implemented on the following identified areas [1].
   a.   Library automation
   b.   Institutional repositories
   c.   Searching library resources such as e-journals, e-books, databases, etc.
   d.   Hosting the website
   e.   Search for scholarly content for better academic output
   f.   Storage of files
        Building community relations via different social media (facebook, twitter, etc.)

V   LITERATURE REVIEW

Many studies have been conducted on cloud computing and issues related to libraries with cloud. Khan [2] explained the meaning of cloud computing and suggested on use of cloud computing in to benefit its users. Pandey [3] based on SWOT analysis briefed about different implications of cloud computing in libraries and mentioned in his study that how SWOT (**strengths, weaknesses, opportunities, and threats)** are directly involved in cloud computing and also in libraries. Goldner [4] explained in his study about how the cloud computing is different from other computing technologies. He also expressed in his study about the advantages of cloud computing in libraries in technology, community and data. Srivastava [5] has mentioned in his study about the vision of cloud computing. He has also explained about the availability of different cloud based commercial services for the community and libraries and express that this technology is helpful in changing the way for the development of web based services. Murley [6] studied about law libraries and express his views about cloud computing including the resources and services may involve with it.

Sasikala [7] discussed about different perspectives of cloud computing, its standards, use in public and private sector and also its use in higher education with challenges, opportunities and different implications in library. Goya [8] explained the different merits and demerits of cloud computing and also compared the services based on price, limit, security of data, backup. Jordan [9] explained about cloud computing and its association with different library and web scale services. OCLC services functional on cloud is the best example, he mentioned in his study. Wang [10] expressed in his study about significance of cloud computing with different implications. In addition to this, he also mentioned about different trends.

VI METHODOLOGY

To meet the basic objective of the study, quantitative research methodology along with a comprehensive literature review was employed. The study population comprised on library professionals working in Indian libraries. To collect the data, structured questionnaire was circulated among professionals working in India via social media, forum, WhatsApp groups and personal email IDs. Based on statistics received total 167 professionals viewed the survey and responded. The questionnaire was prepared using the online google form.

VII DATA ANALYSIS

This study targeted the libraries to find out their opinion about cloud computing as curse or boon in order to provide library services. The structured questionnaire was distributed through email, forum, different WhatsApp groups, social media and posting on self-site i.e. www.dptripathi.in. Total 157 respondents attempted to answer the questions and submitted their opinions through online google form. Out of which 152 (96.8) respondents participated in the survey from India and remaining 5 (3.2%) from other countries such as Pakistan, Papua New Guinea, Bangladesh, Ethiopia and Nigeria.

A. Nature of Institutes responded:

Total 157 respondents from different institutes participated in the survey and out of which 82 (52.2%) institutes are government institutes, 64 (40.8%) institutes are private and remaining 11 (7%) institutes are others such as deemed university, autonomous etc.
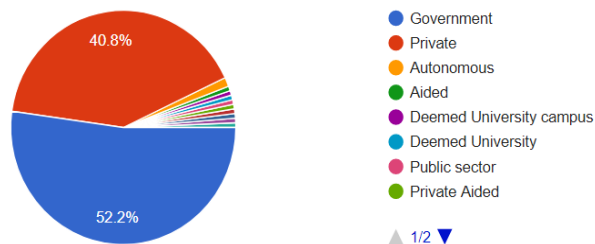

Fig. 1. - Nature of Institute

B. Use of Software for Data Management in Library:

Only 153 respondents responded out of 157 in which 87 (56.9%) institutes are using *koha* open source software for library data management, 56 (36.6%) are using DSpace for Institutional Repository, 12 (7.8%) are using EPrints for IR, 5 (3.3) are using Greenstone for IR, 15 (9.8%) institutes are using Joomla for content management, 25 (16.3%) are using WordPress for content management for managing web applications, 9 (5.9%) institutes are using Subject Plus for managing library guide in the library and similarly the other software like VTLS, Drupal, Librarian, SOUL, E-Granthalaya SHARP, Easylib, TLSS etc. are also being used by different institutes.

C. Management of Software for Library:

Different libraries are managing the software either off-line (self-server) or through cloud service providers. Based on survey, 106 (67.5%) libraries are managing their data management / library software off-line means having their own server. Only 51 (32.5%) libraries are using cloud service for the management of software on cloud.
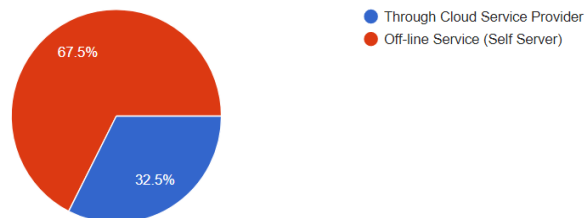

Fig. 2. - Management of Software

D. Kinds of Data Shared with Public:

Different libraries shared their different data with public. Out of 157 libraries, 48 (30.6%) libraries share their research data with public, 133 (84.7%) share bibliographic data of documents through online public access catalogue and 43 (27.4%) share other types of data also.
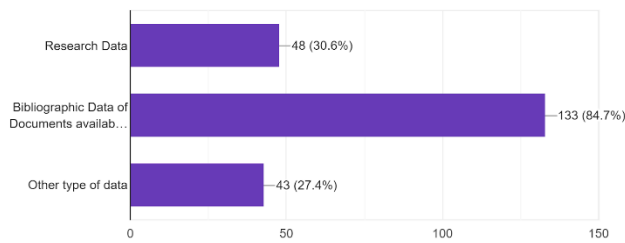
Fig 3. - Kinds of Data Shared with Public

E. Which one is better for managing the data / content of library?

Libraries shared their mixed opinions in order to manage the data / content of library. 80 (51%) libraries mentioned that both - cloud and off-line service are better for data management. However, 19 (12.1%) libraries have been in favour of using off-line (self-server) and remaining 58 (36.9%) have been in favour of using cloud services for data management.
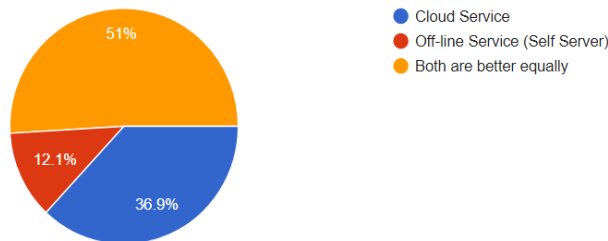

Fig. 4. - Which one is better for Data Management

F. Is shared bibliographic data safe on Cloud?

Data safety is more important when libraries share their data in public as libraries share research and original data. In this regard, different libraries have different opinions about use of could services. Out of 157, 76 (48.7%) libraries think that the shared is safe and not safe means they are in doubtful situation and don't have clarity about sharing the data on cloud. 60 (38.5%) libraries are having positive opinion about using of cloud service and say that shared data is safe on cloud and rest 20 (12.8%) libraries are having negative opinion and say it is not safe to share data publicly on cloud.
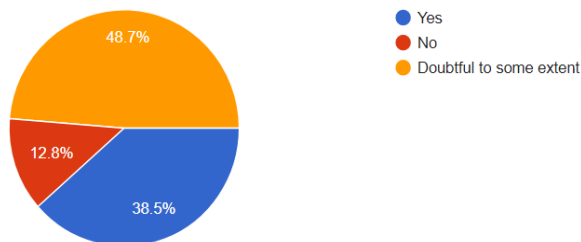

Fig. 5. - Is shared data safe on cloud?

G. Challenges faced while using Cloud Services

Using cloud services for libraries will never be easy as the technology is new and having faith in sharing data and also getting the management support is challenging. Based on survey, different libraries have different opinions. 62 (40.3%) have mentioned that cloud based services are very expensive in nature and managing the limited budget is difficult. 55 (35.7%) libraries only get management support for setting up the infrastructure. However, 51 (33.1%) libraries say that renewal of cloud service is required every year and consider this as a challenge for libraries. 69 (44.8%) out of 157 libraries mention that technical staff is required for smooth functioning of the services. If the staff does not have technical skill, it will become challenging to manage cloud based services. And the most challenging feedback was dependency on service provider for installation of add-on software on server by 81 (52.6%) libraries. At the same time, few libraries submitted their different feedback such as cloud services are costly, high speed internet is required, data is not safe and regular interaction with service provider is required.
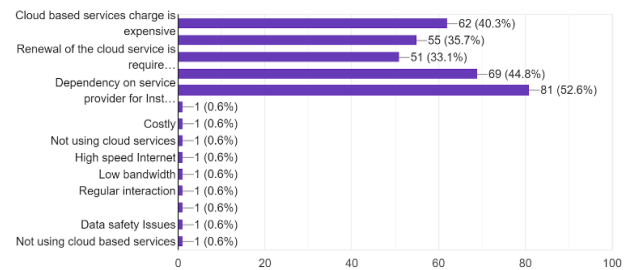

Fig. 6. - Challenges faced while using Cloud Services

H. Advantages of Cloud Services in Library

With challenges, different advantages were also noticed by different libraries. 66(43.1%) out of 157 says that hardware is not required for installation of software. This seems quite good for libraries as procurement of hardware involves huge cost. 69 (45.1%) libraries say that there is no issue of installation of software. The service provider installs the software and provide the platform. 74 (48.4%) mentions that libraries do not required technical manpower for day to day operations of cloud based services. 76 (49.7) are in the opinion that maintaining data is quite easy for libraries. The most important is access of the information in very quick and available all the time and 83 (54.2%) libraries are having positive opinion about cloud based services. 44 (28.8%) libraries mention that cloud service providers assist on for additional add-on, if required. 34 out of 157 (22.2%) submitted their opinion about charges which are manageable and not very high. Libraries can easily afford the charges. And, further the most important is data safety and 77 (50.3%) mention that cloud service provider ensures data backup on a regular basis and there is no fear of data loss in any case.
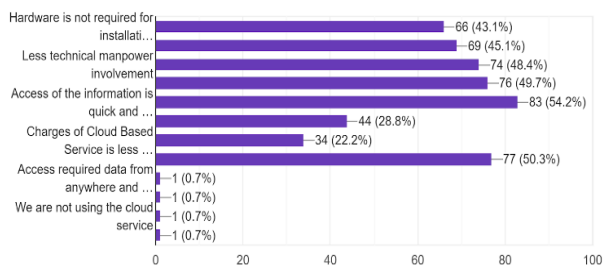
Fig. 7. - Advantages of Cloud Service in Library

VIII. CONCLUSION

The cloud computing has left major impact on different services provided by institutes or libraries. This technology has created an opportunity for libraries and institutions to serve without fear of data loss and involvement of huge cost in building the infrastructure and it leads towards service oriented architecture with high flexibility and many other things. The libraries are more comfortable in using cloud computing as it allows for resource sharing such as hardware, software and data as well which lowers the total cost involvement in managing the library activities effectively. The most impressive advantage is to have libraries on the internet and provide global access to resources. Though the implementation is bit expensive but libraries are moving slowly towards cloud computing and being treated in libraries as boon in digital era undoubtedly.

REFERENCES

1. A. Kaushik and A. Kumar (2013) "Application of cloud computing in libraries", International Journal of Information Dissemination and Technology, Vol. 3 Issue 4, pp. 270-273.
2. S. Khan and S. Galibeen (2011) "Cloud computing an emerging technology: Changing ways of libraries collaboration", International Research: Journal of Library and Information Science, Vol. 1 Issue 2.
3. M. Pandya (2012) "Cloud computing for libraries: A SWOT analysis", 8th Convention PLANNER-2012 Sikkim University, Gangtok, pp. 387-394
4. M.R. Goldner (2010) "Wind of change: Libraries and cloud computing", BIBLIOTHEK Forschung und Praxis, Vol. 34 Issue 3, pp. 270- 275.
5. K. Srivastav and A. Kuma (2011) "A new approach of cloud: Computing infrastructure on demand", TRIM, Vol. 7 Issue 2, pp. 145-153.
6. D. Murley (2009) "Law libraries in the cloud", Law Library Journal, Vol. 101 Issue 2, pp. 249-254.
7. P. Sasikala (2011) "Cloud computing: Present status and future implications", International Journal Cloud Computing, Vol. 1 Issue 1, pp. 23-36.
8. S. Goyal (2012) "A comparative study of cloud computing service providers", International Journal of Advanced Research in Computer Science and Software Engineering, Vol. 2 Issue 2, pp. 1-5.
9. J. Jordon (2011) "Climbing out of the box and into the cloud building web-scale for Libraries", Journal of Library Administration, Vol. 51 Issue 1, pp. 3-17.
10. W.Y.C. Wang, A. Rasid and H.M. Chung (2011) "Toward the trend of cloud computing", Journal of Electronic Commerce Research, Vol. 12 Issue 4, pp. 238-241.