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CLOUD COMPUTING TECHNOLOGY AND ITS APPLICATION IN LIBRARIES

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Abstract

Cloud computing is computing paradigm where a large pool of systems are connected in private or public networks to provide dynamically scalable infrastructure for application, data and file storage. The advent of this technology has reduced significantly the cost of computation, application hosting and content storage. Cloud computing provides a fascinating possibility for libraries that helps to increase data storage capacity, reliability, performance, and reduce technology cost. It is useful for libraries to provide services to its users at different remote locations at a low cost. The aim of this paper is to create awareness among library and information science professionals about application of cloud computing in the libraries and information centers in providing services and their management.

Keywords: Cloud, Computing, Cloud-computing, Cloud services, Library, Cloud models

1.0 Introduction

Advances in the field of information and communication technology (ICT) have its impact and application in the field of libraries and information centers. In the recent few years cloud computing has become a buzz word not only in the field of computer science and engineering but also many other field including library and information science due its wide applicability in providing services at different remote locations. Cloud computing is very new development in the field of computer systems technology or information and communication technology. Till recently organisations or individuals use computers to work alone, inside a business or home by investing hardware, software and maintenance but slowly this scenario is changing due to emergence of new breed of Internet based services popularly known as Web 2.0, due to which now power of computers can be used at entirely different location, which is called as cloud computing. Some other synonymous used for cloud computing are 'on demand computing' 'software as a service' 'Internet as a platform' and 'information utilities' and many more. The best example of cloud computing is our email account. If we have a Gmail or yahoo account then we are already using cloud computing. We don't know where the email and contacts are stored and access the account via the Internet in a very easy way on our PC or on a smartphone. Cloud Computing provides options like bandwidth and computing power on demand, with elastic abilities usually paid for as a metered service or chargeback. Cloud computing makes the library managers free from managing technology and they may concentrate more on collection building, improved services and innovation.

1.1 Definition of Cloud Computing

Cloud computing is computing paradigm where a large pool of systems are connected in private or public networks to provide dynamically scalable infrastructure for application, data and file storage. It is a process that provides services on virtual machines. Through the cloud the information can be stored permanently on the cloud servers which can be accessed by the Internet. The advent of this technology has reduced significantly the cost of computation, application hosting and content storage. Cloud computing is a practical approach to get direct cost benefits and it has potential to transform a data center from a capital-intensive set up to a variable priced environment.

The National Institute of Standards and Technology (NIST), U.S. has given definition of 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', (Mell & Grance, 2011)

According to Mcdonald (2010) Cloud Computing is managed, shared applications, development platforms or computing infrastructure accessible via a network such as the Internet

2.0 MODELS OR TYPES OF CLOUD COMPUTING

Cloud computing models are generally divided in four models of service i.e. public clouds, private clouds, community clouds and hybrid clouds.

Public Clouds

Public Clouds generally feature clients from more than one organization sharing the same infrastructure. In this model a third party service provider sells shared computing resources. Public cloud service provider provisions e.g. applications and storage to users over the Internet. This cloud computing is publically accessible and the computing service is offered by the service providers either free or pay-per-use model.

Private Clouds

Private Clouds are provisioned so that only one organisation or entity has control over the infrastructure, and shared resources are solely for the benefit of the organisation exerting that control. This is dedicated cloud infrastructure for the organisations. Private clouds permit only specified users to host applications in the cloud in secure cloud based environment. An example of this may be a private wiki site that only allows access to members of the same organisation.

Community Clouds

A community Cloud is a group united by a common cause or purpose. These clouds are shared by various organisations having similar cloud requirements working together to achieve their goals. An example could be a public–private partnership site that hosts collaborative efforts to help airlines improve maintenance practices. Membership is limited to industry and government, but the overall portal is hosted by an industry trade group.

Hybrid Cloud

Hybrid Clouds are mix of the three above mentioned clouds models or share features with the three models. An example is transportation clearing houses where some information is public, some is private and some may be shared with allied members such as travel booking sites, but not with individual consumers.

3.0 Packs of Cloud Computing

The three generally accepted modes of types of service offered are as follows

Software as a Service (SaaS)

Software as a service, or SaaS, provides software applications over the Internet. Software as a service is admired in cloud computing world because of its easy to use model. There is no need to for installation and running it on personal computers. SaaS provides Cloud based software services such as customer resources management or enterprise resources management.

Platform as a Service (PaaS)

Platform as a service, or PaaS, offers computational resources through a platform. It provides a development environment. This may seem a bit like SaaS and technically it is same, but industry has agreed generally that developers use PaaS and consumers use SaaS. One example would be a webhosting platform.

Infrastructure as a Service (IaaS)

Infrastructure as a service, or IaaS, provides the physical hardware and software required by companies on the Internet. In this model consumers use the facility of virtual desktop while consuming resources like storage, network and virtualized services etc. The basic requirement for the consumer is to send a provisioning request for the number of servers with data storage requirements. The servers are provisioned and the access to the servers is granted by the service provider. The user will need to perform substantial customization of IaaS services.

4.0 Applications of Cloud Computing in Libraries

Cloud computing technology has its wide applicability in the libraries to provide services to its users. It encourages libraries and their users to participate in a network and community of libraries by enabling them to reuse information and socialize around information. The cloud computing techniques and methods applied to libraries can improve the quality of services and better utilisation of resources. It enables the libraries and information centers to enhance their resources infrastructure and provide better services to their user community in a cost effective way and also helps the libraries to increase data storage capacity, reliability, performance, and reduce technology cost. With the application of cloud computing technology library services can be provided to its users anywhere anytime in a cost effective manner. As it is still in its infant stage so it is only few libraries in the world are involved in cloud computing technology. OCLC and Library of Congress etc. could be the example of cloud libraries. The followings are the few possible areas where cloud computing may be used to provide services to the users:

- Building digital libraries or institutional repositories: in the present era digitization is growing very fast and widely being applied in various sectors including libraries. It is the need of the time to create and develop digital contents in the libraries i.e. digital library or institutional repository to provide access to these contents over network. Therefore, such digital libraries have been developed by using of any digital library software. In relation to cloud based digital library software, 'Duraspace' is having two softwares namely Dspace and Fedora Commons but Dspace is widely being used for building digital libraries/ repositories instead of Fedora Commons. Dura cloud provides complete solutions for developing digital libraries/ repositories with standard interfaces and open source codes for the both software.

- Website hosting: Most of the organisations including libraries have adopted cloud computing very early in their website hosting. Many organizations including libraries preferred to host their websites on third party service providers rather than hosting and maintaining their own servers, Google Sites serves as an example of a service for hosting websites outside of the library's servers and allowing for multiple editors to access the site from varied locations.

- File storage: a number of services such as Flicker, Dropbox, Jungle Disk, Google Doc, and Sky Drive etc. are available to access files on the Internet. These services virtually share the files on the web and provide access to anywhere and anytime without any special software and hardware. Therefore, libraries can get advantages of such cloud based services for various purposes. For instance, LOCKSS (Lots of Copies Keeps Stuff Safe), CLOCKSS (Controlled LOCKSS) and Portico tools are extensively used for digital preservation purpose by libraries and other organizations.

- Library automation: cloud computing is also used in automation of library services and operations. Now many service providers on cloud are available for library automation and few of these provides such services free of cost also. Polaris provides variant cloud based services such as acquisitions, cataloguing, process system, digital contents and provision for inclusion of cutting edge technologies used in libraries and also supports various international standards. Best Book Buddies is also an example of library

- Searching library data: cloud computing has enabled libraries to share data, resources and services for their benefits. OCLC is one of such example for making use of cloud computing for sharing libraries data. The OCLC is offering various services pertain to circulation, cataloguing, acquisition and other library related services on cloud platform through the web share management system. The OCLC World Cat service

which is available on the cloud is one of the popular services for searching library data. Web share management system facilitates to develop an open and collaborative platform in which each library can share their resources, services, ideas and problems with the library community on the clouds. On the other hand, the main aim of web- scale services is to provide cloud based platforms, resources and services with cost benefit and effectiveness to share the data and building.

5.0 Conclusion

Libraries and information centers have to keep pace with the growing call for improved and enhanced forms of information resources. New publications are increasing very rapidly in all the forms of information due to information explosion and the libraries have always budget constraints to acquire all the publications to keep track with the latest available literature. Cloud computing may help libraries to share their resources and infrastructure and to fulfill the information needs of the users. It may help in avoiding duplication of resources, infrastructure and human efforts in library and information centers in serving the users and save efforts and money which may be utilized for any other purpose or service. Cloud computing technology has great advantages for libraries like to connect their services not only promptly but also in new formats with the flexibility such as pay as you use model, access anywhere any time and so on. It is still in evolving stage and requires some careful consideration before organisations like libraries to think about hosting of their services. There are legal and technical issues like security of data and secrecy etc. which needs to be taken into consideration while going for cloud based library and information services. Quality ICT infrastructure and Internet speed are also the associated issues related to the cloud application. In spite of the above issues and limitations it can be said that this technology has certain advantages for the libraries which may relieve the library staff from managing their servers.

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