

## Cloud Computing Applications in Libraries

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### Abstract

Cloud computing technology came up as a boon for libraries and offering various opportunities for libraries to connect their services with clouds. In the modern internet Era, Cloud computing plays a prominent role. Today, no longer need to save all your documents on one particular device. Instead, one can access files and resources from at any terminal any time. This is all possible only with "cloud system". The new technology concept will minimize the cost of hardware and software applicable to libraries. Cloud computing has been exerting a strong gravitational pull its own entire one has been attracting a mass of money. This paper presents an overview of cloud computing and its possible applications that can be clubbed with library services on the web based environment. This study may be useful in identifying and generating cloud based services for libraries.

**Keywords:** Cloud Computing; Academic Libraries; Library Automation; Information Technology; Library Services.

### Introduction

Today, we are living in the age of information. Information technology plays a very vital role in library science. With the advent of information technology, libraries have become automated which is a basic need towards advancement followed by networks and more efforts are towards virtual libraries. The emergence of e-publications, digital libraries, internet usage, web tools applications for libraries, consortium practices leads to the further developments in library professions. By collecting large quantities of information and resources stored in personal computers, mobile phones and other equipment. Cloud computing is capable of integrating them and putting them on the public cloud for serving users. Cloud computing is a process where the data and applications are stored, accessed and shared on the network. Wikipedia claimed that the concept of cloud

computing was emerged back to the 1960's, when John McCarthy opined that computation may someday be organised as a public utility. Chellappa gave the first academic definition of the term cloud computing in 1997 and later on in the year 2007 the term cloud computing came into popularity and firstly used in this context when Kelvin Kelley opined that eventually we will have the inter-cloud, the cloud of clouds. Since cloud computing is a new and core area the professionals should be aware of it and also the application of cloud computing in library science.

#### *What is Cloud Computing?*

According to Andrew 2012 The "cloud" element of cloud computing can be seen as an acronym that stands for

- C- Computing resources
- L -Location independent
- O- can be accessed via online means
- U- Used as a Utility
- D- Available on Demand

Cloud computing is a kind of computing

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technology which facilitates in sharing the resources and services over the internet rather than having these services and services on local servers/nodes or personal devices. The combination of servers, networks, connection, application and resources is defined as 'Cloud'. Cloud computing is acting as a resources pooling technology for accessing infinite computing services and resources as per demand of users and can be compare with models of pay as you use or utility model same as used for mobile services usages and electricity consumption.

#### *Key Characteristics of Cloud Computing*

Various key characteristics of cloud computing technology include Agility, cost, Device & Location independence, Multi Tenancy, Reliability, Scalability, Security, Sustainability and Maintenance.

#### *Basic Components of Computing*

Client, Servers, Application, Platform, Storage and Infrastructure.

*Software as a Service (SaaS), Platform as a Service (PaaS), Infrastructure as Service(IaaS)*

#### *Types of Cloud computing*

There are four important type of cloud deployment models in the cloud community.

#### *Public Cloud*

Public Cloud meant for general public use and open to all. This kind of deployment model of cloud computing developed by any clouding agency and having own policy, value, and profit, costing and charging models. Some Popular public cloud services include Amazon EC2, S3, Google App Engine and Force.com

#### *Community Cloud*

It is joint venture of several organizations come together to build a cloud infrastructure as well as policies through which cloud services will be rendered. In the community cloud model, cloud infrastructure may be hosted by a third party vendor or within one of the organizations in the community.

#### *Private Cloud*

This kind of deployment model solely developed

and managed by a single organization or a third party regardless whether it is located in premise or off premise.

#### *Hybrid Cloud*

This type of cloud made from more than one cloud deployment model that may be public, private, community and other models also, bound together with by standardized or proprietary technology that enables data and application portability. The Hybrid cloud model is widely used by institutions and organizations because this model provides more facilities and flexibilities in making optimum use of their resources and accomplishing the tasks.

#### *Advantage of Cloud Computing*

##### *Cost Saving*

Pay What you use: Cloud computing technology is paid incrementally thus saving costs for organizations.

##### *Easy on Installation and Maintenance*

No need to worry about constant performance server, monitoring and updates on available latest technology.

##### *Increased Storage*

We can store more data on cloud than our personal network as it has unlimited storage capacity.

##### *Highly Automated*

The cloud service provider takes care of updating software as and when new version is released. When the server is updated everyone using the service also get access to the new version without updating anything on their end.

##### *Flexibility*

Cloud computing offers much more flexibility than other local network computing systems and saves time plus cost for organizations. It is possible for organizations to expand the services anytime, by requesting for an additional space on the servers.

##### *Better Mobility*

The staff and the user of the library can connect to the library servers from anyplace or from wherever

they are, rather than having to remain present at their desks by having a PC and internet access.

#### *Shared Resources*

Cloud computing will allow people within and outside the organizations to have access to have access to the resources at any time and anywhere in the world, as long as the connection of internet with good bandwidth is available. A group of libraries can come together and can put their resources at any place, which in turn will enable them to provide access to more number of resources to their end users.

#### *Back up and Restoration*

Back up of the cloud can protect all kinds of our library data from loss of owing to fire, flood or any other natural or man-made computer related disaster that could cause data to disappear. We can easily restore our data if back is done and placed at the safest place.

#### *Disadvantages of Cloud Computing*

##### *Data Security*

The biggest concerns about cloud computing are security especially if the organizations are dealing with sensitive data such as credit card information of customers. If the proper security model is not yet in place, then the data stored on the cloud is vulnerable to attacks from viruses, theft, etc.

##### *Network Connectivity and Bandwidth*

Since the Cloud computing is offered over the internet, if the connection goes down due to any reason then the organizations suffer from loss of data connectivity till the time it is set. Also the service requires more bandwidth, as it may not work on low-speed internet connection.

##### *Dependence on outside Agencies*

The cloud services being offered by third party service over the internet, it is virtually difficult to have any control on the maintenance levels and the frequency. Migration to other service provider is also an issue, if the uniform standards are not followed by the host.

##### *Limited Flexibility*

Flexibility may be limited in terms of special

customization as services on the cloud will be common for all the users.

##### *Cost*

Initially, the cost could be higher, but may reduce depending on the usage of services. However, organizations may end up paying higher charges in the future.

##### *Knowledge and Integration*

Deeper knowledge of cloud computing is essential at working of the service is totally dependent on the service providers.

##### *Privacy*

Privacy loss is a big concern when we talk about cloud based services. There is always a chance of accidental data leakage, mismatch and other failure.

#### *Application of Cloud computing in Libraries*

Building Digital Library/Repositories in the present situation, every library needs a digital library to make their resources and services at an efficient level to ensure access via the network. Therefore, every library is having a digital library that developed by using any digital software.

##### *Searching Library Data*

OCLC is one of the best example for making use of cloud computing for sharing libraries data for years together. 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.

##### *Searching Scholarly Content*

Knimbus is cloud based research platform facilitates to discover and share the scholarly content. Knimbus stands for knowledge cloud which is dedicated to knowledge discovery and collaborative space for researchers and scholars. Currently, Information and Library Network (INFLIBNET) Centre has been incorporated Knimbus cloud service into its UGC INFONET Library Consortium in order to search and retrieve scholarly contents attached therein.

##### *Website Hosting*

Website hosting is one of the earliest adoptions of

cloud computing as many organizations including libraries preferred to host their websites on third party service providers rather than hosting and maintaining their own servers.

#### *File Storage*

To access any files on the internet, cloud computing present number of services as Flickr, Drop box, Jungle Disk, Google Doc., Sky Drive and so on. These services virtually share the files on the web and provide access to anywhere and anytime without any special software and hardware.

#### *Building Community Power*

Cloud computing technology offers great opportunities for libraries to built networks among the library and information science professionals as well as other interested people including information seekers by using social network tools.

#### *Library Automation*

For library automation purpose, Polaris provides variant cloud based services such as acquisitions, cataloguing, process system, digital contents and provision of cutting edge technologies used in libraries and also supports various standards such as MARC 21, XML, Z39.50, Unicode and so on which directly related to library and information science area.

#### **Conclusion**

Cloud computing will help the integration of libraries in a painless easy manner. Libraries will be able to share their electronic data resources which shall lead to reduction of duplicate data resulting in cutting down the overall budget of libraries. Stability of cloud computing will also help in saving money. Libraries will also become greener by embracing the cloud. Some good examples of successful cloud computing libraries include Dura cloud, OCLC

services and Google based cloud. Every librarian should use and implement the services of cloud computing in their respective libraries. Librarian Should be aware to users about the cloud Computing and services. Therefore it is time for libraries think seriously before clubbing libraries services with cloud based technologies and provide reliable and rapid services to their users.

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