Cloud Computing in Libraries

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ABSTRACT   *Cloud computing technology came up as a boon for libraries and is offering various opportunities for libraries to connect their services with clouds. It is an evolving technological paradigm that facilitates conveniently, on-demand network, access to a shared pool of configurable computing resources like network, servers, storage, applications and services, that can be presented as a service and released with minimal management effort. This paper presents an overview of cloud computing and its possible applications that can be clubbed with library services in the web based environment. This study may be helpful in identifying the advantages and disadvantages of cloud based services for libraries.*

1. INTRODUCTION

Cloud Computing is known as third revolution in the field of Information Technology. Cloud computing can transform the way systems are built and the services delivered. It offers a new dimension in computing. In cloud computing data and services reside in social data centers in the cloud. It can be accessed through a web browser. Cloud Computing is capable of collecting large quantity of information and resources stored in personal computers and other equipment and integrate them and put them on the cloud for serving users.

Cloud computing has emerged as one of the most popular virtual technologies for libraries to deliver the services in an effective manner. It is a technology that offers great advantages for libraries to connect their services. It not only helps share data but also gives flexibility for providing the service any time from any where.

Nowadays libraries are using cloud computing technology for enhancing the services by adding more values. It attracts the users and is cost effective. In the cloud computing environment, clouds are vast resource pools with on-demand resources and a collection of network features.

The basic principle of Cloud Computing is to distribute the work in large numbers of distributed computers. The tasks are not in local computers or remote servers. It integrates them and puts them on the public domain for users. The concept of cloud and libraries has generated a new model called cloud libraries though the usages of cloud computing may vary within the libraries' nature, services and information needs. The common usages of cloud computing within libraries can be development of digital libraries, corporate cataloging, acquisition, storages and sharing the resources on virtual environment on the web.

2. WHAT IS CLOUD COMPUTING?

Cloud computing is a technology on the web. Cloud computing is a kind of computing technology used for sharing the resources and services over the internet rather than having these services and resources on local servers. The combination of servers, networks, connection, applications and resources is defined as *'cloud'*. Cloud computing is a resource-pooling technology for accessing infinite computing services and resources as per demand of users.
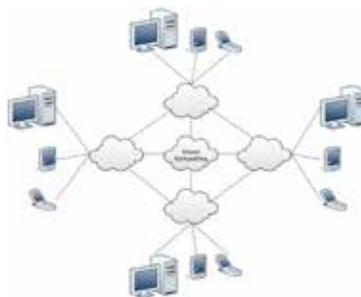
Source:- www.smartdraw.com

As per Wikipedia the concept of cloud computing emerged way back in the 1960s, when John McCarthy opined that computation may someday be organized 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 was first used in this context when Kevin Kelly opined that eventually we would have the inter-cloud, the cloud of clouds.

NIST2 provides a very good 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'. Buyya said that 'Cloud computing is a parallel and distributed computing system consisting of a collection of inter-connected and virtualized computers that are dynamically provisioned and presented as one or more unified computing resources based on Service Level Agreements (SLA) established through negotiation between the service provider and consumers'.

3. TYPES OF CLOUD COMPUTING

There are three types of cloud computing:-

A. Software as a Service (SaaS)

Under this service a user after registration is allowed to use softwares through net and use it for some purpose. The related data and work may be stored on local machines or with the service providers. SaaS services may be available on rental basis or on per use basis.

B. Platform as a Service (PaaS)

Under this a computing platform such an operating system is provided to a user on a *monthly rental basis*. Some of the major cloud computing vendors are Amazon, Microsoft, and Google etc.

C. Infrastructure as a Service (IaaS)

The cloud computing vendors offer infrastructure as a service. One may avail hardware services such as processors, memory, networks etc. on agreed basis for a specific duration and price

4. CHARACTERISTICS OF CLOUD COMPUTING

The following are characteristics of cloud computing:-

- Self-Healing
- Self Service Interface
- Pay Per Use (No Ongoing Commitment, Utility Prices)
- Service-oriented
- Service Level Agreements (SLA) Driven
- Flexible

5. OBJECTIVES

- To define the concept of cloud computing.
- To discover the library services that are clubbing with cloud computing technology.
- To investigate present situation of libraries in order to adopt cloud computing into their library services.

6. CLOUD COMPUTING DEPLOYMENT MODELS

Deploying cloud computing can differ depending on requirements, Basically there are four deployment models:-

Private Cloud:- It is a cloud infrastructure deployed, maintained and operated for a specific organization. The Operation may be in-house or with a third party on the premises.

Community Cloud:- This cloud infrastructure is shared among a number of organizations with similar interests and requirements. It helps limit the capital expenditure costs for its establishment as the costs are shared among the organizations. The operation may be in-house or with a third party on the premises.

Public Cloud:- In this type of cloud infrastructure is made available to the public on a commercial basis by a vendor or service provider. This enables a consumer to develop and deploy a service in the cloud with very little cost compared to the capital expenditure requirements normally associated with other deployment options.

Hybrid Cloud:- The cloud infrastructure consists of a number of clouds of any type. All the clouds have the ability through their interfaces to allow data and/or applications to be moved from one cloud to another. This can be a combination of private and public clouds that support the requirement to retain some data in an organization, and also the need to offer services in the cloud.

7. ADVANTAGES OF CLOUD COMPUTING

- Cost efficient
- Flexibility and innovation
- User centric
- Openness
- Transparency
- Mobility
- Backup and Recovery
- Availability anytime anywhere
- Storage and Scalability
- IT Innovation

8. DISADVANTAGES OF CLOUD COMPUTING:

- Lack of Control and Reliability
- Lack of Security, Piracy and Compliance
- Lack of Compatibility
- Unpredicted Cost
- Contracts and Lock Ins

9. Applications of Cloud Computing In Libraries

Libraries are shifting their services with the attachment of cloud and networking with facilities to access these services anywhere in world and anytime. The possible areas identified for cloud computing services are:-

A Building Digital Library/Repositories

Every library needs a digital library to make their resources, information 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 library software. For the cloud based digital library software used are Dspace and Fedora Commons.

B Searching Library Data

OCLC is one of the best examples for making use of cloud computing for sharing libraries data. OCLC World Cat service, one of the popular services for searching library data, now is available on the cloud.

C Website Hosting

Website hosting is one of the cloud computing processes as many organizations including libraries preferred to host their websites on third party service providers rather than hosting and maintaining their own servers

D Searching Scholarly Content

Knimbus, a 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. At present,

Knimbus proposes a free offer to get registered to empower the libraries for dynamic searching and also for single point search interface, maximizing the usage of all e-resources; customized search across selected sources reduces noise and highlights relevant content and tools to support the complete research lifecycle. Currently, Information and

Library Network (INFLIBNET) Centre (http://www. inflibnet. ac.in) has incorporated Knimbus cloud service into its UGC INFONET Digital Library Consortium in

order to search and retrieve scholarly contents attached thereto.

E File Storage

To access any files on the internet, cloud computing presents a number of services such as Flicker, Dropbox, Jungle Disk, Google Doc, Sky Drive and so on. These services virtually

share the files on the web and provide access anywhere and anytime without any special software and hardware.

F Building Community Power

Cloud computing technology offers great opportunities for libraries to build networks among the library and information science professionals as well as other interested

people including information seekers by using social networking tools. The most famous social networking services viz. Twitter and Facebook play a key role in

building community power.

G Library Automation

Library Automation in Internet Computing includes all forms of computation, and the hardware and software needed. Internet 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). These can be rapidly provisioned and released with minimal management effort or service provider interaction.

For library automation purpose, Polaris provides variant cloud based services such as acquisitions, cataloging, process system, digital contents and provision for inclusion

of cutting edge technologies used in libraries and also supports various standards such as MARC21, XML, Z39.50, Unicode and so on which directly relate to library and

information science area.

10. PRESENT SITUATION OF LIBRARIES

Cloud computing in libraries is in development phases. Libraries are trying to provide to users cloud based services. Some services such as digital libraries, web documentation and using web2.0 technologies are running on successful modes. The successful cloud computing libraries include Dura cloud, OCLC services and Google based cloud services. Nowadays many commercial as well as open sources venders (i.e. OSS) are clubbing the cloud computing technology into their services and products. However, cloud computing technology is not fully accepted.

11 . CONCLUSION

This study provides cloud computing concepts and implications of cloud based applications in libraries in order to enhance their services in a more efficient manner. No doubt, libraries are moving towards cloud computing technology at the present time and taking advantage of cloud based services especially in building digital libraries, social networking and information communication. There are some issues related to Control on server, security, privacy, trustworthiness and legal issues which are still not fully resolved. Therefore the libraries should think seriously before clubbing libraries services with cloud based technologies for providing reliable and rapid services to their users.

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