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Importance of Cloud Computing Technology in Library Systems

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ABSTRACT

Cloud computing technology is the fifth generation of computing and the biggest thing since the Web, came up as a boon for library systems and is offering various opportunities for libraries to connect their various services with clouds. There is potential for a lot of confusion surrounding the definition of cloud computing. This paper mainly presents an overview of cloud computing, cloud service models and its burning applications that can be clubbed with library services on the web based environment. This study may be helpful in identifying and generating cloud based services for libraries.

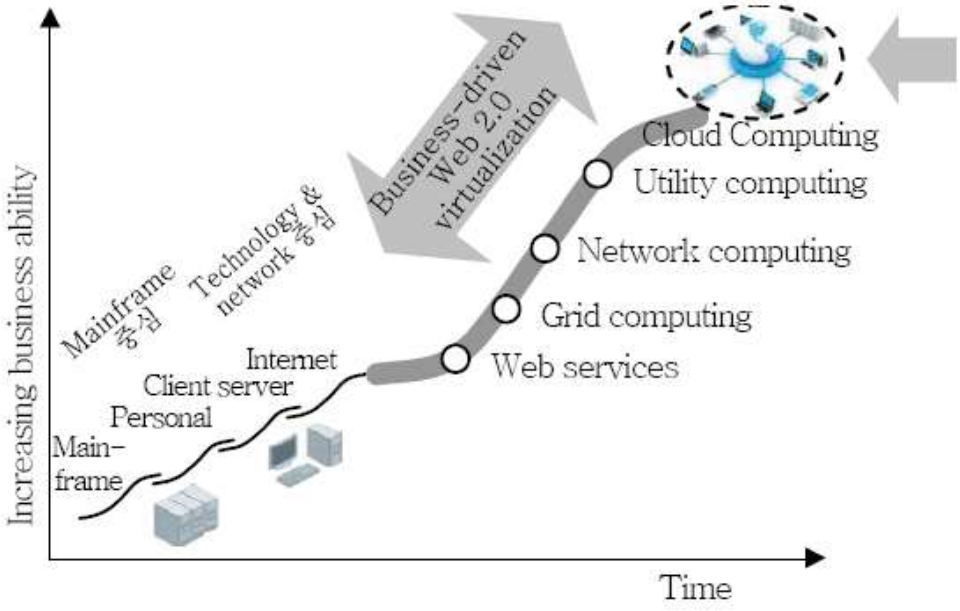
Keywords: Cloud Computing, IaaS, PaaS, SaaS, Models of Cloud Computing, Grid Computing Unified Computing, Internet Computing, OCLC.

INTRODUCTION

Cloud computing can be defined as "A model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources that can be rapidly provisioned and released with minimal management effort or service provider interaction" . Cloud computing to put it simply means ***Internet computing*** i.e. computation done through the Internet. With cloud computing users can access database resources via the internet from anywhere, for as long as they need, without worrying about any maintenance or management of actual resources. In present scenario, web enabled technologies developed on virtual platforms and generating large opportunities and virtual paths to use their services for the various purposes. Nowadays, cloud computing is emerged as one of the most popular virtual technology for libraries to deliver the services in an effective manner. Cloud computing contains features of different technologies including utility computing, grid computing, unified

computing, web 2.0, service oriented architecture and so on. Cloud computing technology is offering great advantages for libraries to connect their services not only promptly but also in new formats with the flexibilities such as pay as you use model, access any where any time and so on. Nowadays libraries are using cloud computing technology for enhancing the services by adding more values, attracting the users and cost effectiveness. In the cloud computing environment, clouds are vast resource pools with on demand resource allocation and a collection of networked features. The need of cloud computing may occur due to the information explosion, problems in accessing the information, save the time of the users and staff, resource sharing problems, problems in library resources management, complex demand of users and attraction of users towards cutting edge technologies.

History of Computing



What is Cloud Computing?

Cloud computing is not a new technology that suddenly appeared on the web but it is a new form of fifth generation of computing. Cloud computing is a kind of computing technology which facilitates in sharing the resources and services over the internet rather than having these services and resources on local servers/ nodes or personal devices. The combination of servers, networks, connection, applications 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. According to Wikipedia, Cloud Computing is Internet-based computing; whereby shared

resources, software, and information are provided to computers and others devices on demand though the internet. According to Ellyssa Kroski, Library Journal (09/10/2009) Cloud Computing means using the Web services for our computing needs which could include using software applications, storing data, accessing computing power, or using a platform to build applications.

According to McKinsey, Clouds are hardware-based services offering compute, network and storage capacity. Buyya3 defined '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.'

The common characteristics of cloud computing noticed from above definitions are:

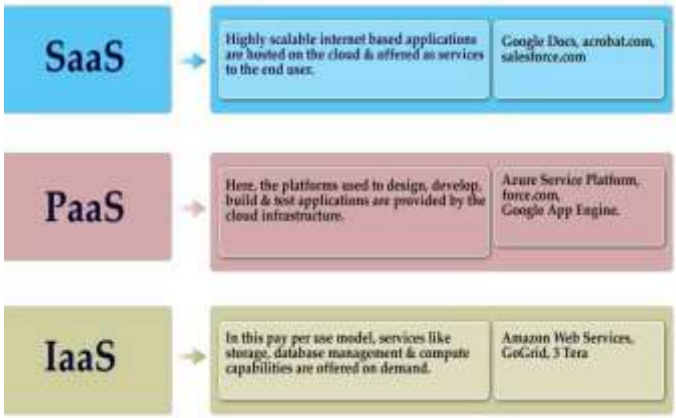
1. Pay Per Use (No Ongoing Commitment, Utility Prices)
2. Elastic Capacity and the Illusion of Infinite Resources
3. Self Service Interface
4. Resources that are Abstracted or Virtualized.

OBJECTIVES

1. To define the concept of cloud computing.
2. To discover the library services that are clubbing with cloud computing technology.
3. To investigate present situation of Indian libraries in order Models of Cloud Computing

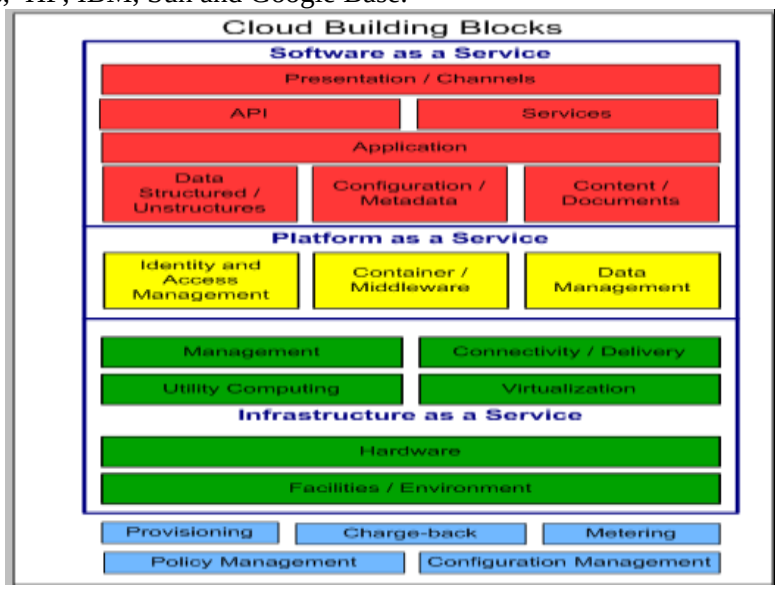
Service Models

Though, there are various service models originated on the web but three service models widely used for delivering the different cloud based services that described below:



a. Infrastructure as a Service (IaaS)

It is the capability provided to the user to enable processing, storage, networks, and other fundamental computing resources where the user is able to deploy and run arbitrary software, which can include operating systems and applications. This service model comprises a wide range of features, services and resources which support to build a virtual infrastructure for computing. Organizations can be developed entire infrastructure on demand. e.g. Amazon Web Services, HP, IBM, Sun and Google Base.



b. Platform as a Service (PaaS)

Platform as a Service model helps in generating the computing platforms to run the software and other tools over the internet without managing the software and hardware at the end of user side. Paas provides an application platform as a service on which developers can build and deploy customs applications. Amazon Elastic Cloud, EMC Atmos, Aptana and GoGrid are the examples of PaaS model which providing platforms to users in maintaining and supporting their IT infrastructure without spending huge amount for buying hardware, software and related technology.

c. Software as a Service (SaaS)

In this model applications are accessible from various client devices through a thin client interface such as a web browser & users can avail the facilities to access and use any software available with cloud vendors. However, it is not necessary for the users to buy the software, install and run, maintenance the applications on their own servers. The cloud users need not to manage the cloud infrastructure and platform on which the application is running. This service model provides online email applications, free services, limitless storage, and remote access from any computer or device with an Internet connection.

Cloud Deployment Models

Currently, four types of cloud deployment models have been defined in the cloud community:

1. Private Cloud

It is a basically an organization that needs more control over their data than they can gets by using a vendor hosted service. 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. There are several reasons behind the development of private cloud for an organization some key reasons include optimize utilization of existing in-house resources, security concerns including data privacy and trust also make private cloud an option for many firms, data transfer cost from local IT infrastructure to a Public Cloud is still rather considerable, organizations always require full control activities that reside behind their firewalls and for research and teaching purposes.

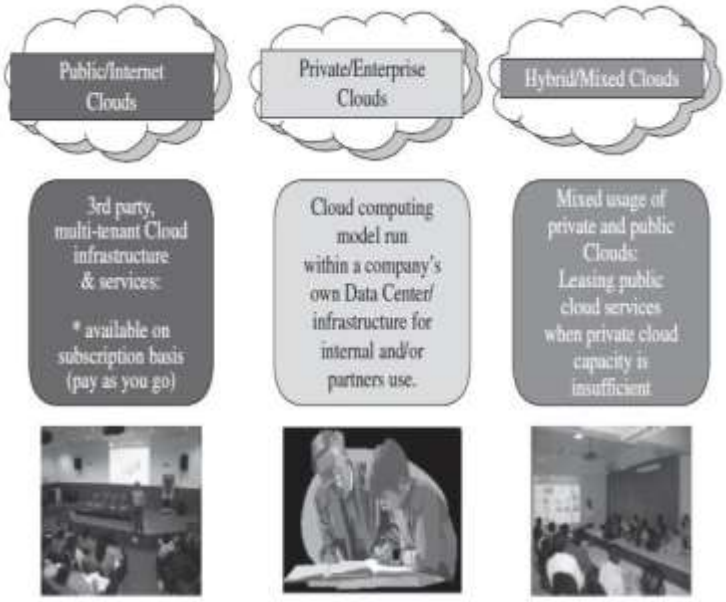
2. Community Cloud

It is a joint venture of several organizations come together to build a cloud infrastructure as well as policies through which cloud services will be rendered. This type of cloud deploy model helpful in developing of economic scalability and democratic equilibrium.

3. Public Cloud

Public cloud is meant for general public use and open to all i.e. use to anyone who wants to sign up and use them. This kind of deployment model of cloud computing is developed by any cloud computing agency and having own policy, value, and profit, costing,

and charging model. Some popular public cloud services include Amazon Web Services, Google App Engine.



(Cloud Deployment Model)

4. Hybrid Cloud

It combines both public and private cloud models. This type of cloud made from more than one cloud deployment models 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.

Importance of Cloud Computing in university library System

Libraries are shifting their services with the attachment of cloud and networking with the facilities to access these services anywhere and anytime. In the libraries, the following possible areas were identified where cloud computing services and applications may be applied:

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. In connection to cloud based digital library software, Dura space is having two software's namely Dspace and Fedora

Commons but Dspace is widely used for building digital libraries/ repositories relative to Fedora Commons. Dura cloud provides complete solutions for developing digital libraries/ repositories with standard interfaces and open source codes for the both software.

b. Searching Library Data

OCLC is one of the best example for making use of cloud computing for sharing libraries data for years together. For instance, OCLC World Cat service is one of the popular service for searching library data now is available on the cloud. OCLC is offering various services pertain to circulation, cataloguing, acquisition and other library related services on cloud platform through the web share management system. 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 the broaden collaboration in the community.

c. 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 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.

d. 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. Knimbus is currently used in over 600 academic institutions and R&D labs by scholars, researchers and scientists as well as over 50,000 researchers. Knimbus is a collaborative platform for researchers to discover and share knowledge with peers and facilitates to find and access millions of journal articles, patents and ebooks, for the users tagging, sharing and discussing of these contents with their peers. At present, Knimbus proposed a free offer to get registered to empower the libraries for dynamic searching and also for single point search interface, maximizes 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 has been incorporated Knimbus cloud service into its UGC INFONET Digital Library Consortium in order to search and retrieve scholarly contents attached therein.

e. File Storage

To access any files on the internet, cloud computing present 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 to anywhere and anytime without any special software and hardware. Therefore, libraries can get advantages of such cloud based services for various purposes.

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 Face book which play a key role in building community power.

g. Library Automation

For library automation purpose, 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 standards such as MARC21, XML, Z39.50, Unicode and so on which directly related to library and information science area. Apart from this, nowadays many of the software vendors such as Ex-Libris, OSS Labs are also offering this service on the cloud and third party services offering hosting of this service (SaaS approach) on the cloud to save libraries from investing in hardware for this purpose.

h. Present Situation of Indian Libraries

In India, cloud computing in libraries is in development phases. Libraries are trying to provide to users cloud based services but in real sense they are not fully successful owing to the lack of good service providers and technical skills of LIS professionals in the field of library management using advanced technology. But some services such as digital libraries, web documentation and using web2.0 technologies are running on successful modes. Some good examples of successful cloud computing libraries include Dura cloud, OCLC services and Google based cloud services.

Advantages/Disadvantage of Cloud Computing:

Some common advantages and disadvantages of cloud computing over library system are as follows. Some advantages are:

1. Assured maximum availability of your data, application and infrastructure.
2. Need to pay only for what has been used i.e. bandwidth, resources, etc.
3. Relieves burden of IT staff within organization, as routine jobs are being handled by service providers.
4. Easily scalable as per requirement of organization.

Another benefit of cloud computing is that it addresses resource management in profoundly better ways and lastly the new resources requested by a user can be delivered much faster.

General Disadvantages of cloud are dependency upon network connectivity, security, legal issues, latency etc.

By using cloud computing technologies, library services can be made online without worrying about correct versions of platforms. Cloud computing reduce energy consumption significantly and involves centralizing the computing resources on the Internet and making these available to those who need it, when needed.

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. Also discussed about the various advantages & disadvantages of cloud computing in library system. No doubt, libraries are moving towards cloud computing technology in present time and taking advantages of cloud based services especially in building digital libraries, social networking and information communication with manifold flexibilities but some issues related to security, privacy, trustworthiness and legal issues were still not fully resolved. 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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