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Cloud Computing impact and its applications on libraries

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Abstract
Cloud computing offering great advantages for libraries to connect and access their services from any geographical locations over the network. This paper provide brief information about cloud computing and its application in libraries on the cloud based environment. Cloud computing brings more opportunities for libraries to connect its services with cloud. This study may be helpful to re-invent library services on the cloud in more effective way.

Keywords: Cloud Computing, SaaS, PaaS, IaaS, Development and Service Models, Applications of Cloud Computing on Libraries

Introduction
Cloud computing is a new form of computing which allow you sharing resources and services in the cloud rather on your personal devices. The concept of cloud computing occur to solve the problems of resource sharing, resource management, accessing the information and save the time. In cloud computing you have to pay per use. In cloud computing, businessman can access these services and resources as per business needs. Cloud computing is basically an internet based computing offering opportunities to deliver their services through internet.

Definition of Cloud Computing
Webopedia define "Cloud Computing is a type of computing that relies on sharing computing resources rather than having local servers or personal devices to handle applications. Cloud computing is comparable to grid computing, a type of computing where unused processing cycles of all computers in a network are harnesses to solve problems too intensive for any stand-alone machine."1
NIST defined "Cloud Computing is a model for enabling ubiquitous, 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."2

What Is Cloud Computing
"Cloud Computing is internet based computing where virtual shared servers provide software, infrastructure, platforms, devices and other resources and hosting to customers on a pay-as-you-use basis. Users can access these services available on the internet cloud without having any previous know-how on managing the resources involved."3
Cloud computing is a new form of computing which allows you sharing resources and services in the cloud rather on your personal devices. Most popular use of cloud computing is social networking websites like Facebook, Twitter, Myspace, LinkedIn and many others. When your share the information with people that means you are sharing information who running the service. Web based E-mail service is the biggest Cloud Computing service. Through emails you can access cloud storage which are not available in your computer instead it's on server.''4 You are using cloud computing without realizing it.

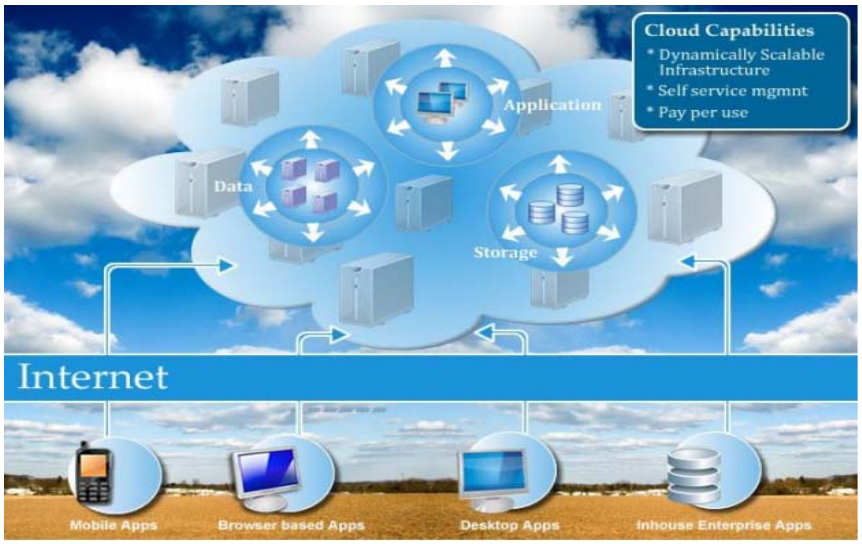


Fig 1: Conceptual view of cloud computing

Characteristics of Cloud Computing
Cloud Computing consists of five essential characteristics.

1. On Demand Capabilities
Without requiring any human interaction with each service provider computing capabilities can be set up whenever required.

2. Broad Network Access
All the cloud capabilities are available over the network can be accessible by means of any client platforms such as workstations, laptops, mobile device.

3. Rsource Pooling
Cloud service providers pools his computer resources to serve multiple customers with different physically resources assigned according to customer demands.

4. Rapid Elasticity
Computing capabilities can be elastically set up to scale rapidly inward and outward commensurate with consumer demand.

5. Measured Service
Cloud system provides transparency of their utilized resources for both the consumer and the provider. You have to pay to the service provider for the resources you consume. Resources are optimized and controlled through metering.

Cloud Computing Deployment Models
There are four common cloud deployment models.

1. Public Cloud
Public Cloud is publically accessible cloud environment delivered over a network. There is no difference between public cloud and private cloud structural design except in the level of security offered by the cloud hosting provider.
Example of public cloud is Google.

2. Private Cloud
Private Cloud is owned by single organization. Private cloud provides the cloud based secure environment. Access is only authorized users/organizations.

3. Community Cloud
Community Cloud is a cloud shared among several organizations belongs to a specific group. Access outside the community is not allowed.
Example Gov Cloud created hosted and managed by AWS.

4. Hybrid Community
Consists of two or more than two cloud bound together (I.e. public, private or community). In Hybrid Cloud entities remains unique. It is a system through which workload can be shared between two or more than two cloud server as per requirement.

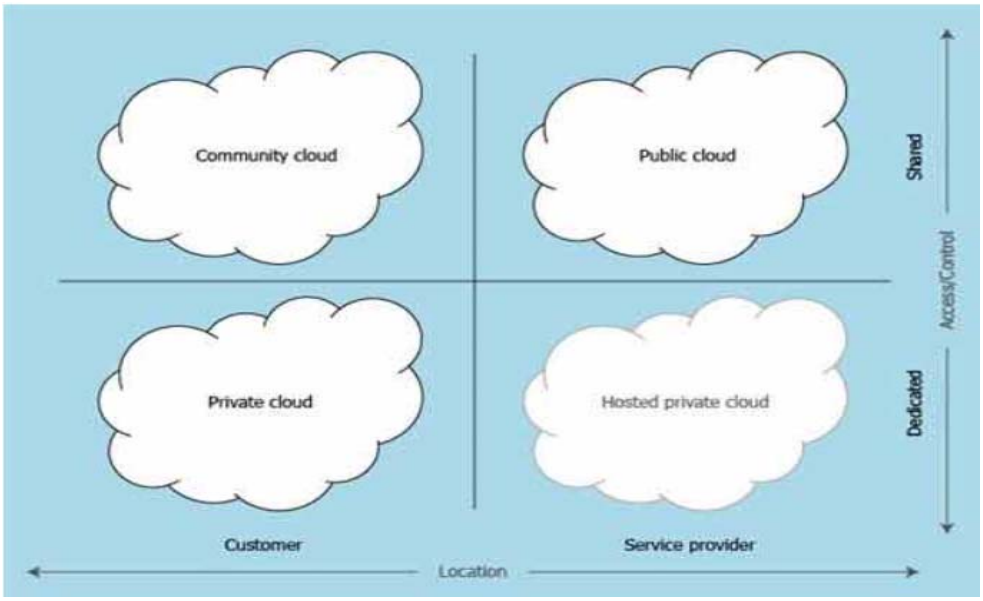


Fig 2: Cloud computing deployment models

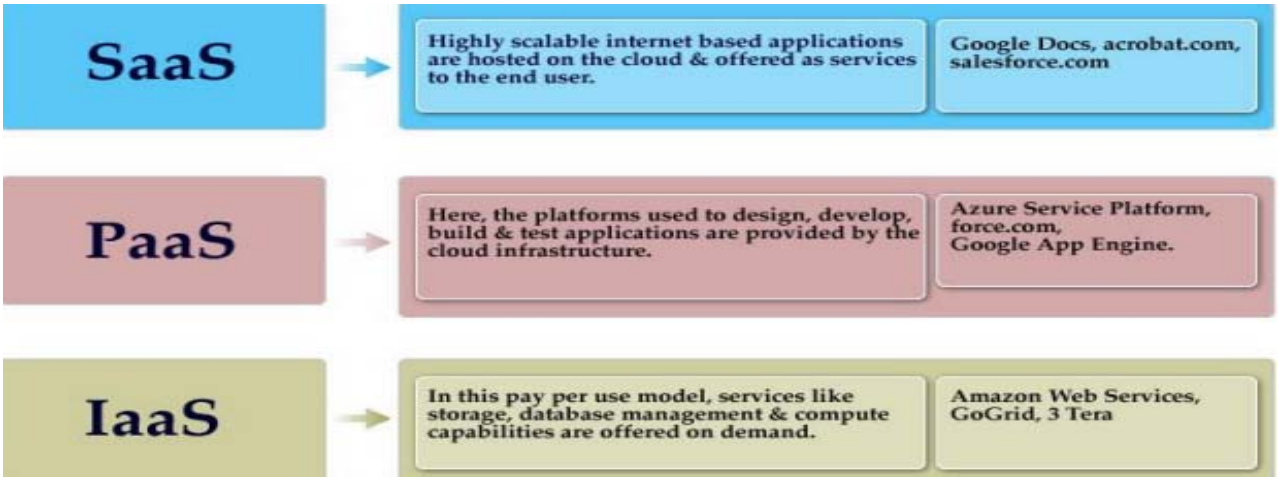
Cloud Computing Service Models

1. Software As A Service (Saas)
In SaaS, a complete software application is provided by the service provider to the customer as per need. Through this service you need not to manage the cloud infrastructure such as server, network, operating system etc.
Examples of SaaS are Facebook, Google, etc.

2. Platform As A Service (Paas)
In PaaS, vendor delivers computing environment such as web server, operating system, database and Programming language execution environment. You are free to build and run his own applications on the cloud infrastructure. Customers do not need to control the cloud infrastructure except control over deployed applications and possible configuration settings for application hosting environment.
Google App engine, Force.com and Microsoft Azure are some of the best examples of PaaS.

3. Infrastructure As A Service (Iaas)
IaaS provide infrastructure like basic storage, computing resources, hard disks, and computers in the virtualized form.

Hypervisor such as Oracle, Virtual Box, KVM runs the virtual machines as guests. Pools of hypervisor can support virtual machines and ability to scale services according to customers varying requirements.



Applications of Cloud Computing In Libraries

In present situation cloud computing can play an important role in our libraries. One can access the cloud services of the libraries over the internet anywhere from any locations. You can store the information in the cloud and recall as and when required through web based system. Cloud computing and its applications may be applied in the libraries in the following areas:

1. Digital Libraries/Repositories

Now a day's every library wants to build a digital library/repositories to efficiently manage their resources and services and provide access over the network. Building digital library/repositories provides opportunity to everyone to contribute to the institutions by submitting scholarly materials to promote research. There are many cloud based digital library software available in the market.

2. Website Hosting

Due to dearth of technical manpower most of the libraries prefer to host their website on third party provider rather than maintain their local hosted server. Website hosting allowing multiple library users to access site simultaneously from any geographical locations.

3. Searching Library Data

OCLC World Cat plays an important role for sharing library data by using cloud computing infrastructure. OCLC World share management system helps to develop a collaborative platform for library users to share your resources and services on the cloud based environments.

OCLC World Cat discovery service helps to increase the visibility on the web by connecting people directly with the relevant information as they required.

4. Library Automation

At present libraries using open source integrated library management software or commercial software to automate their libraries. Automation process of these libraries is carried out on locally hosted servers. Now many vendors such as Ex-libris offer this service on cloud free of cost without investing on hardware devices.

5. Storage

At present libraries store and access different types of electronic documents on locally hosted server. Cloud storage services offer opportunities to share their documents in the cloud with zero cost irrespective of any geographical locations. Cloud storage is overall responsible for keeping the data accessible whenever required. Data stored in the cloud provide access to multiple users simultaneously.

6. Building Social Network

Cloud computing technology create a platform for libraries and information professionals and other organizations to share their interest, activities, innovative ideas by using networking tools such as Facebook, twitter, you tube etc. which play a very vital role in building social network.

Conclusion

It is concluded from the above study that cloud based applications play a very vital role to manage the resources of the libraries and improved the quality of services without managing the hardware and software devices. Cloud computing centralizing the computing resource and making available to those who need of it and its virtualization make accessible the same resource simultaneously to multiple users.Cloud computing services are accessible on a pay per use basis and offers flexibility to rent infrastructure on temporary basis. Cloud computing decreases the costs involved in computing equipment. In India, libraries are providing to their users cloud based services but cloud computing security, are still a major issue in the cloud based environment. Although Cloud Computing got success to running their services in some areas of libraries such as OCLC services, building digital repositories, Google based services but due to lack of technical manpower in libraries it is not easy to handle the advanced technology.

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