

Web based Services of Cloud Computing: It's Application in Libraries and Information Centers (LICs) in Digital Era

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ABSTRACT

The use and application of cloud computing to libraries has an economic advantage to overcome difficulties created by non availability of sufficient funds for technology based services and products. The cloud base for libraries helps to use the available ICT infrastructure for extensive services in the form of SaaS, PaaS, IaaS, CaaS and MaaS. All the cloud computing services and its application in libraries and information centres facilitates quality library services for its clientele.

Keywords

Cloud Computing, Saas, Iaas, PaaS, CaaS, MaaS, Internet, web.

Introduction to Cloud Computing.

Cloud computing is a new emerged technology that allows anyone connected to the Internet for efficient computing by centralizing storage, memory, processing and bandwidth. It has capability to share the networks, network based services, servers, storage devices and various applications. Cloud computing delivers all the ICT enabled capabilities to external customers by making use of internet technologies.

It allows access to its customers to make use of applications without its installation with the ability to access their personal files and data at any computer terminal connected with internet. With the use of internet and centralized servers maintained at remote place, it helps to maintain data and make use of applications for providing various services. This unique feature helps the libraries and information centers to exploit the opportunities to extend the various library services and to improve the impact of it for satisfying the varying informational needs of the readers.

Cloud computing system is the combination of various computers, servers and data storage systems with a central server that helps to administer the system monitoring, traffic and client demands to ensure that everything is running on remote computers to store the data. The process of cloud computing is being done through set of web enabled applications loaded on the server with proper access rights.

Definition of Cloud Computing:

The Gartner Grouped defines cloud computing as “a style of computing in which massively scalable and elastic IT-enabled capabilities are delivered as a service to external customers using internet technologies.”¹

U.S. National Institute of Standards and Technology (NIST) defines 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 efforts to service provider interaction. This cloud model promotes availability and is composed of five essential characteristics, three service models and four deployment model.²

Types of cloud:

There are following different types of cloud computing:

Software as a Service (SaaS)

Access to software applications over the web is the most popular form of cloud computing. It provides access to all features and functionality of an application without involvement in the technical details of how it is hosted on the web. Through a web browser users can access the application, which contains all the data stored at the provider’s servers. Some of these web based applications are free for e.g. Hotmail, Google Apps, Skype and many 2.0 applications. SaaS allows its user to make use of all the functions offered by particular software. SaaS offers

56 / Cloud Computing In Academic Libraries

a much more efficient approach related to traditional locally installed software both for the provider and for the consumer.

The SaaS provider manages all network, Operating System, servers, and applications in the cloud infrastructure. End users can only make use of without having control over cloud infrastructure. E.g. use of mail service, Google Drive, Google Calendar, Windows SkyDrive, and Dropbox etc.

Some of the most well-known SaaS library automation products are :

Serials Solutions (<http://www.serialssolutions.com/>)

This product provides a platform for library services and offers products which are related to the management of and access to electronic resources.

Ex Libris (<http://www.exlibrisgroups.com/>)

It is a popular cloud service provider based in USA. It supports all the software and hardware needed for providing services to the users. It is available for all type of libraries and library consortia. It has unique features like customization capability, compatibility with Unicode font, ability to incorporate change as per the need, data migration capability etc.

Alma (<http://www.exlibrisgroup.com/category/AlmaOverview>):

Alma is a multi tenant SaaS using all web-based clients and will be deployed using IaaS.

Biblionix (<http://www.biblionix.com/>)

a Texas-based company, provides a library automation product called Apollo was designed as a true multitenant SaaS application, with each instance capable of supporting all the libraries that use the said product.

Polaris Library Systems

Polaris as a cloud based library automation system provides standard acquisition and processing system. Integration of various PC's and prints management systems without extra cost. It is based on various library standards like Z39.50, MARC 21, Xtensible Mark- up Language and Unicode. It helps for effective information retrieval and bringing uniformity in bibliographic data.

The Kuali OLE project (<http://kuali.org/ole>)

It is project which is in process to create an open source, enterprise oriented library automation environment for academic and

research libraries, with partial funding through a grant from the Andrew W. Mellon Foundation.

Dura Cloud

Dura Cloud is a cloud solution for digital library services. It offers complete solution for digital library with standard software and hardware solution.

Infrastructure as a Service (IaaS)

With IaaS, access to the unlimited storage space as per need is provided in cloud. Computing capabilities and basic storage as a standardized service over the network is offered by IaaS.

The bottom layer of the cloud is the infrastructure services layer which is a set of physical resources such as servers, network devices and storage disks that are offered as a means of customer service provision. Here, services support the application infrastructure.

Many data storage services provide a very convenient way for individuals to have portable access to their files and to share data with others. Such services are discussed below:

1 Dropbox (<http://www.dropbox.com/>) which is a convenient way for an individual to share files among multiple computers and mobile devices.

1 Windows Live SkyDrive (<http://explore.live.com/windows-live-skydrive>) which offers free storage up to 25 GB to users of Microsoft windows.

1 Amazon Cloud Drive (<https://www.amazon.com/cloudrive/learnmore>): which allows free storage of up to 5 GB of files.

1 Box.net (<http://www.box.net/>) which offers a free personal storage service up to 5 GB

1 ADrive (<http://www.adrive.com/>) provides up to 50 GB free storage for personal use.

Infrastructure as a service is primarily targeted at use by enterprises and integration with data and applications. Infrastructure as a service providers include Amazon, Google, Microsoft, Rack space and IBM.

Platform as a Service (PaaS)

It provides a platform for building and running custom web-based applications. It supports the building and delivering web applications and services available from Internet without downloading the softwares. It creates the connection between the SaaS and IaaS services of cloud computing. PaaS helps to provide computer platform which supplies

58 / Cloud Computing In Academic Libraries

tools to build, test and deploy Web-based applications. Such a platform would offer a complete technology stack, including support for a programming language or applications programming interface, database functionality, data stores, computational resources, and other components needed to create a complete web based application.

Examples of this service are Windows Azure, Google AppEngine, Force.com

The platform services allow consumers to make sure that their applications are equipped to meet the needs of users because it provides an application infrastructure based on demand.

Some of the most well-known PaaS offerings include the following

Google App Engine (<http://code.google.com/appengine>) support programming languages such as Java, Python, and Go (an open source programming language created by Google).

1 Amazon Web Services (<http://aws.amazon.com>) includes a complex set of products spanning both IaaS and PaaS.

1 Force.com (<http://force.com/>) is the underlying platform for salesforce.com that can be used to create custom applications, primarily through a web-based development environment.

1 Bungee Connect (<http://www.bungeeconnect.com/>) is a platform for the development of cloud-based apps that will be deployed on IaaS such as Amazon's EC2.

1 Heroku (<http://www.heroku.com/>) is a PaaS for the Ruby programming language, including both development and a fully management environment.

Communication as a Service (CaaS)

It is an outsourced enterprise communication solution. The CaaS vendor manages the hardware and software required for delivering Voice over IP (VoIP), Instant Messaging (IM) and video conferencing capabilities.³

In libraries, CaaS services can be effectively used to utilize advanced communication functionality such as video calling, chat, real time presence, voice mail, web collaboration with advanced calling features like caller ID, three way conference calling etc. Particularly, this platform is more useful for extending the use of digital library services. Since, communication and use of communication technology is must for delivery of search results to readers, the CaaS can be used effectively

for offering guaranteed quality of the library services. With a CaaS solution, libraries can offer communication services without building premises based solution of their own.

Monitoring as a Service (MaaS):

It is the outsourced provisioning of security that leverages the internet to conduct business. In libraries, this cloud based application can be used to protect libraries from cyber threats. A security team secures and maintains the confidentiality, integrity and availability of OT assets. It provides protection to libraries from internal and external threats by assessing the system performance and providing recommendations for improvements.

Cloud Computing in the libraries

Libraries are expected to select, collect information from variety of sources, analyze, sort, repackage and consolidate the information for providing information in the desired format for readers. With all these functions, libraries try to offer timely, efficient and cost - effective services for its users. Instead of keeping data on the own hard drive or updating applications for their needs, Libraries and information centres can use the cloud computing services over the internet, at another location, to store the information or use its application. Libraries can use software and hardware that are managed by third parties at remote locations. They can make use of file storage, social networking sites, webmail and online library applications. As cloud computing allows access to information and computer resources from anywhere that a network connection is available, it plays a crucial role in library networks.

Cloud computing can effectively be used in libraries. In libraries, by using cloud computing, user would be able to browse reading materials available on shelves, make access to contents on CD's or DVD's or scan can effectively use library networks . The scanning of documents, storing the scanned files in the databases, searching the files from the databases and providing multiple access points to scanned documents are greatly facilitated by cloud computing applications in libraries. Linking of online catalogues to consortium for sharing library resources is additional feature of cloud based library services.

Cloud computing facilitates e-mail communication among LIS professionals, enable faster document sharing, storing of collections in variety of formats, hosting of library website, OPAC, or creation and maintenance of digital repositories.

60 / Cloud Computing In Academic Libraries

Cloud computing helps to reduce technology cost and increase capacity reliability, and the performance of automated activities of the libraries.

Cloud computing resources can help -

1. To reduce software licensing expenses.
2. To provide Local support for collaborative learning.
3. To enhance teaching and research with low investment of ICT infrastructure and software applications.
4. To save time involvement and expenditure allowing students and teachers to access scholarly contents of files located at remote and different locations.
5. Make experiments more standardized and easier to replicate.
6. To access specialized software from cloud hosts as needed.

Digital libraries, virtual libraries, development of institutional repositories, creation of library portals etc. have changed the nature of traditional libraries to modern libraries. They provide the information in various forms and formats suitable for delivery of information in electronic and digital forms and ways. These services and products are offered by libraries by making use of open source softwares like greenstone, DSpace, E-Prints, Fedora Commons. Koha etc. for providing open access to scholarly contents. With cloud computing application, there is no separate need for own servers, and data backup function with security and privacy. Use of social networking and collaboration like You Tube, facebook, Twitter, Hike Etc. can help to deliver the information for end user access.

Conclusion

In the cloud revolution, libraries are expected to turn towards cloud computing application as low cost means of delivering quick time solutions for library operations and services. Its increased mobility for global access, flexible infrastructure availability of high performance applications with the ability of developing the data centre have paved new ways for libraries and information centres to bring about change in library services with ICT applications with reduced maintenance cost.

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