Relevance of Cloud Computing in Academic Libraries

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Abstract

Cloud computing is one of the most recent technology models for IT services which is being adopted by several organizations and individuals.Cloud computing allows them to avoid locally hosting and operating multiple servers over an organization's network and constantly dealing with hardware failure, software installation, upgrades, backup &various compatibility issues which also enables them to save costs. Cloud Computing emerged as a significant advantage to the libraries and is offering various opportunities for libraries to connect their services with Cloud computing. This paper presents an overview of cloud computing and its possible applications that can be clubbed with library services in a web-based environment.

Keywords: Cloud Computing, Academic Libraries

Introduction

Cloud computing is the latest technology model for IT services, which a large number of organizations and individuals are adopting. Cloud computing transforms, the way systems are built and services delivered, providing libraries with an opportunity to extend their impact. Cloud computing is internet-based computing, in which virtual shared servers provide software, infrastructure, platform devices and other resources and hosting to customers on a pay-as-you-use basis. Presently, most of the organizations and individuals use computers to work alone, inside a business or at home by investing on hardware, software and maintenance. This scenario is slowly altering due to the emergence of a new breed of Internet services, popularly known as Web 2.0, through which any individual can use the power of computers at a completely different location, what it is popularly called as '**in the cloud**' or '**Cloud Computing**'.

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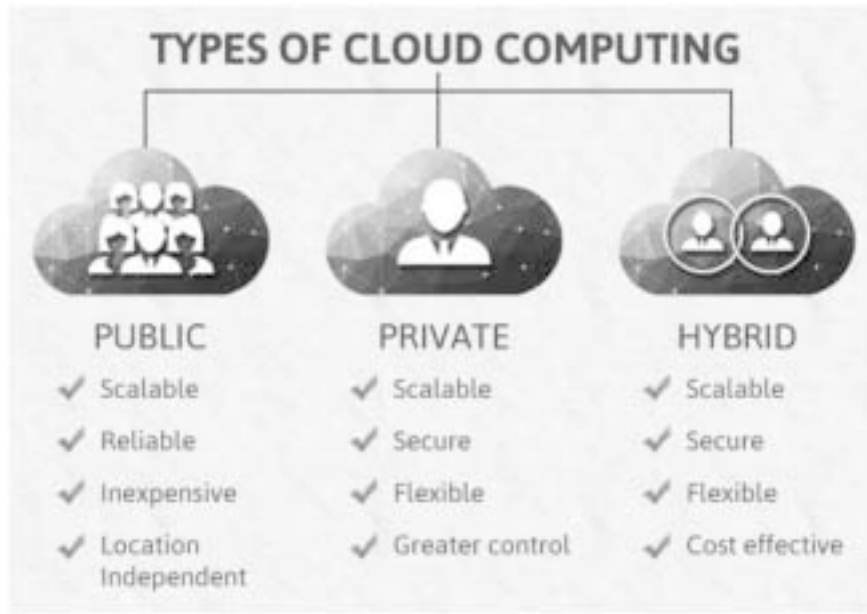Institute of Information Technology and Management

There are various synonyms for Cloud Computing such as, 'On-Demand Computing', 'Software as a Service', 'Information Utilities', 'The Internet as a Platform' besides numerous others.

According to the US National Institute of Standards Technology (NIST), "Cloud Computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources that can be rapidly provisioned and released with minimal management efforts or service provider interaction". [1]

Cloud computing, often referred to as simply "the cloud," is the delivery of on-demand computing resources—everything from applications to data centers—over the internet on a pay-for-use basis.

- Elastic resources—Scale up or down quickly and easily to meet demand

- Metered service so you only pay for what you use

- Self service—All the IT resources you need with self-service access.[2]

Cloud computing refers to the use of web for computing needs which could include using software applications, storing data, accessing computing power, or using a platform to build applications. There is a vast array of utilities ranging from e-mail, to word processing or photo sharing or video sharing where a person can use

TYPES OF CLOUD COMPUTING

PUBLIC	PRIVATE	HYBRID
✓ Scalable	✓ Scalable	✓ Scalable
✓ Reliable	✓ Secure	✓ Secure
✓ Inexpensive	✓ Flexible	✓ Flexible
✓ Location Independent	✓ Greater control	✓ Cost effective

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products that live in the cloud, which are secure, backed-up and accessible from any Internet connection. The best live example of this is Gmail, which is increasingly being used by organizations and individuals to run their e-mail services. Google Apps being free for educational institutions is widely used for running a variety of applications, especially the email services, which were earlier being using on their own computer servers. This has proved to be cost effective organizations since they pay-per-use for applications and services and saves precious time for the computer staff, which they can invest on running other services without worrying about upgrading, backup, compatibility, and maintenance of servers, which is taken care of by Google. Libraries use computers for running services, such as, Integrated Library Management Software (ILMS), website or portal, digital library or institutional repository. These are either maintained by parent organization's computer staff or library staff, which involves huge investments on hardware, software, and helps staffs to maintain the

GOOGLE DOCS NETSUITE FRESHBOOKS GMAIL SALESFORCE BASECAMP	**SAAS**	end customers
FORCE.COM APP ENGINE AZURE	**PAAS**	developers
RACKSPACE.COM GO GRID AWS	**IAAS**	sysadmins

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services and undertake the backups and upgrades, when new version of the software gets released.

Library professionals in most of the cases are not being adequately trained in maintaining servers and often find it difficult to undertake some of these activities without the support of IT staff from within the organization or through external sources. In the present day, Cloud Computing has become the latest buzzword in the field of libraries, which is blessing in disguise to operate various ICT services without any problem since third-party services will manage servers and undertake upgrades and take back-up of data. Currently, some of the libraries have adopted the use of cloud computing services as an emerging technology to operate their services despite the fact that there are certain areas of concern in using cloud services such as privacy, security, etc.

Types of Cloud Computing

There are four types of Cloud Computing:

1. Private/Internal Cloud: Cloud operated internally for a single enterprise.

2. Public/External Cloud: Applications, Storage and other resource materials that are made available to the general public by the service providers.

3. Community Cloud: A Public Cloud tailored to a particular community.

4. Hybrid Cloud: A Combination of the internal and external cloud. This type of hybrid cloudin the Community clod and Hybrid Cloud are used interchangeably.

Cloud Computing Models

Cloud Computing Providers offer their services which can be grouped into three categories:

1. **Software as a Service (SaaS):** In this model, a complete application is offered to the customer, as a service on demand. A single request of the service runs on the cloud & multiple end users are serviced. Today SaaS is offered by the companies that are: Google, Salesforce, Microsoft and Zoho.

2. **Platform as a Service (PaaS):** In this model, a layer of software or development environment is

condensed and offered as a service, upon which other higher levels of service can be built. The customer has the freedom to build his own applications, which run on the provider's infrastructure. To meet manageability and scalability requirements of the applications, PaaS providers offer a predefined combination of OS and application servers, such as LAMP Platform (Linux, Apache, MySql and PHP), restricted J2EE, Ruby, Google's App Engine, Force.com, which are some of the popular PaaS examples.

3. **Infrastructure as a Service (IaaS):** IaaS provides basic storage and computing capabilities as standardized services over the network. Servers, storage systems, networking equipment, data center space are pooled and made available to manage workloads. The customer would typically deploy his own software on the infrastructure. Some of the common examples are Amazon, GoGrid, 3 Tera, et al.

Application of Cloud Computing in Libraries

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:

1. **Building Digital Library/Repositories:** In the present situation, every library requires a digital library to offer their resources, information and services at an efficient level to ensure access via the network. Therefore, every library has a digital library that is developed through the use of any digital library software.

2. **Searching Library Data:** OCLC is one of the best examples for utilizing cloud computing for sharing libraries data for years together. OCLC World Cat service is one of the well-accepted services for searching library data that now is available on the cloud. OCLC is offering various services pertaining to circulation, cataloguing, acquisition and other library related services on the cloud platform through the web share management system. A Web share management

system facilitates in the development of an open and collaborative platform in which each a library can share their resources, services, ideas and problems with the library community on the clouds. On the other hand, the main objective 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.

3. **Website Hosting:** Website hosting is one of the earliest adoptions of cloud computing as numerous organizations including libraries prefer to host their websites on third party service providers rather than hosting and maintaining their own servers Google Sites, which serve as an example of a service for hosting websites externally of the library's servers and allowing for multiple editors to access the site from varied locations.

4. **Building Community Power:** The Cloud Computing technology offers tremendous 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. One of the most well-known social networking services, such as, Twitter and Facebook play a dominating role in building community power. This cooperative effort of libraries will create time saving efficiencies and a wider recognition, cooperative intelligence for better decision-making and provides the platform for innovation and sharing the intellectual conversations, ideas and knowledge.

5. **Library Automation:** For library automation purpose, Polaris offers 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 a majority of the software vendors such as Ex-Libris, OSS Labs are also offering this service on the cloud and third party services providing hosting of this service (SaaS approach) on the cloud to save libraries from investing in hardware for this purpose. Besides cost-benefit, the libraries will be free from taking maintenance that is software updates, backup and other facilities.

Advantages and Disadvantages of Cloud Computing in Libraries

Advantages	Disadvantages
• Cost	• Libraries have to be conscious of bandwidth requirements, backup storage costs
• Great Efficiency	• Privacy, espcially patron data
• Security and Data Protection	• Loss of Control
• Collaboration Easier	• Data Ownership
• Information Flow and open access topic easier	• Copyright and fair use
• Hardware and Software Complications reduced and no purchase of Servers	• Academic integrity
• Vendor Deals with hardwares, Operating system upgrades and system upgrades	• Power outages and lack of infrastructure in some parts of the world
	• Interoperability not always guaranteed

In the present situation of Indian Libraries in India, cloud computing in libraries is in the development phase. Libraries are attempting to offer their users cloud-based services however in reality they are not fully successful mainly due to lack of good service providers and technical skills of LIS professionals in the field of library management using advanced technology. Yet some of the services such as digital libraries, web documentation and using Web2.0 technologies are operating on a successful mode. Some of the excellent examples of successful cloud computing libraries include Dura cloud, OCLC services and Google-based cloud services. In the current state, countless 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 totally accepted in the Indian libraries although they are trying to develop themselves in this area.

Conclusion

Cloud Computing represents an exciting opportunity to bring on-demand applications to Digital Library in an environment of reduced risk and enhanced reliability. However, it is important to understand that existing applications cannot just be unleashed on the cloud as they are in existence. A careful attention to the design detail will help in ensuring a successful deployment. Certainly cloud computing can bring about strategic, transformation and even revolutionary benefits fundamental to digital libraries. As regards to organizations providing digital libraries, with significant investment in traditional software and hardware infrastructure, migration to the cloud will highlight considerable technology transition; for less-constrained organizations or those with infrastructure nearing end-of-life, adaptation of cloud computing technology may be more immediate.

No doubt, libraries are shifting towards cloud computing technology in the present times and taking advantages of these services, especially in building digital libraries, social networking and information communication with manifold flexibilities yet some issues related to security, privacy, trustworthiness and legal issues are still not completely resolved. Therefore, it is high time for libraries to think seriously before clubbing libraries services with cloud-based technologies and provide reliable and rapid services to their users. Another responsibility of LIS professionals in this virtual era is to make cloud based services a reliable medium to disseminate library services to their target users with ease of use and trustworthiness.

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