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Cloud Computing and Libraries

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Abstract

Cloud computing is a new technology model for IT services which many businesses and organizations are adopting. It allows them to avoid locally hosting multiple servers and equipment and constantly dealing with hardware failure, software installs, upgrades and compatibility issues. Cloud Computing would let libraries maintain more control over the applications and data stores that contain sensitive, private information about patrons. In this paper we discussed an overview of cloud computing and its possible applications that can be clubbed with library services on the web based environment.

Keywords: Information Technology, Internet, Cloud Computing, IaaS, PaaS, SaaS, Models of Cloud Computing.

Introduction

Cloud computing is the delivery of computing services over the Internet. Cloud services allow individuals and businesses to use software and hardware that are managed by third parties at remote locations. Examples of cloud services include online file storage, social networking sites, webmail, and online business applications. The cloud computing model allows access to information and computer resources from anywhere that a network connection is available. Cloud computing provides a shared pool of resources, including data storage space, networks, computer processing power, and specialized corporate and user applications.

Cloud Computing provides computing facilities in the same way as restaurants provide food, when we need computing facilities; we use them from the cloud. The more we use the more we pay. When we stop using them we stop paying. Users are at the mercy of their cloud service providers for the availability and integrity of their data.

What is Cloud Computing?

Cloud computing is not a new technology that suddenly appeared on the web but it is a new form 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.

Characteristics of Cloud Computing

A cloud service has three distinct characteristics that differentiate it from traditional hosting. It is sold on demand, typically by the minute or the hour; it is elastic -- which means that a user can have as much or as little of a service as they want at any given time; and the service is fully managed by the provider (the consumer needs nothing but a personal computer and Internet access). Significant innovations in virtualization and distributed computing, as well as improved access to high-speed Internet and a weak economy, have accelerated interest in cloud computing.

A cloud can be private or public. A public cloud sells services to anyone on the Internet. (Currently, Amazon Web Services is the largest public cloud provider.) A private cloud is a proprietary network or a data center that supplies hosted services to a limited number of people. When a service provider uses public cloud resources to create their private cloud, the result is called a virtual private cloud. Private or public, the goal of cloud computing is to provide easy, scalable access to computing resources and IT services.

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The essential characteristics can be elaborated as follows:

- **On-demand self-service:** Users are able to provision cloud computing resources without requiring human interaction, mostly done through a web-based self-service portal (management console).
- **Broad network access:** Cloud computing resources are accessible over the network, supporting heterogeneous client platforms such as mobile devices and workstations.
- **Resource pooling:** Service multiple customers from the same physical resources, by securely separating the resources on logical level.
- **Rapid elasticity:** Resources are provisioned and released on-demand and/or automated based on triggers or parameters. This will make sure your application will have exactly the capacity it needs at any point of time.
- **Measured service:** Resource usage are monitored, measured, and reported (billed) transparently based on utilization. In short, pay for use.

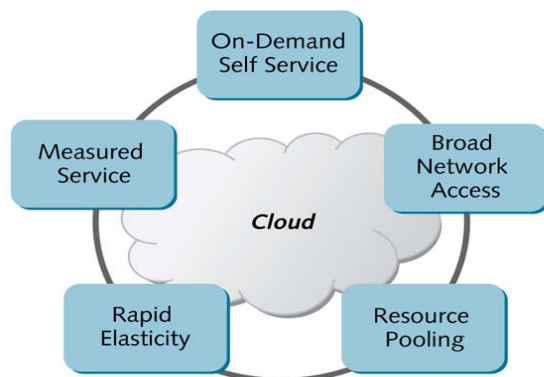


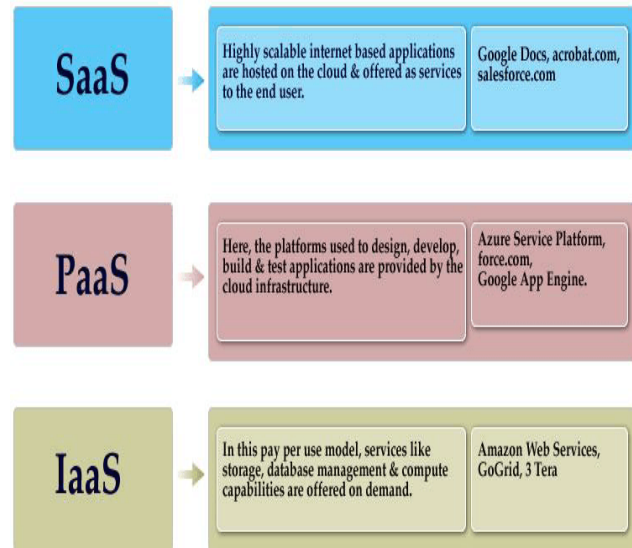
Figure 1.2 The essential characteristics of cloud computing

Cloud Computing Models

Cloud computing can be divided into three service models:

- Software as a service (SaaS)
 - Platform as a Service (PaaS)
 - Infrastructure as a service (IaaS)
- **Software as a service (SaaS):** In the SaaS model, cloud providers install and operate application software in the cloud and cloud users access the software from cloud clients. The cloud users do not manage the cloud infrastructure and platform on which the application is running. This eliminates the need to install and run the application on the cloud user's own computers simplifying maintenance and support. This is typically end user applications delivered on demand over a network on a pay per use basis. The software requires no client installation, just a browser and network connectivity.
 - **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. Amazon Elastic Cloud, EMC Atmos, Aptana and Go Grid 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.

- **Infrastructure as a Service (IaaS):** Primary objective of an organization is to reduce time & money required to procure, provision, and install new hardware systems. IaaS fulfills this primary objective i.e. equipment is outsourced to support operations. This is a provision model in which service provider is responsible for the housing, running and maintenance of the equipment. Organizations can be developed entire infrastructure on demand. e.g. Amazon Web Services, Rackspace, Savvis, HP, IBM, Sun and Google.



Advantages of Cloud computing in libraries

1. Cost saving
2. Flexibility and innovation
3. User centric
4. Openness
5. Transparency
6. Interoperability
7. Representation
8. Availability anytime anywhere
9. Connect and Converse
10. Create and collaborate

Examples of Cloud libraries

1. OCLC
2. Library of Congress (LC)
3. Exlibris
4. Polaris
5. Scribd
6. Discovery Service
7. Google Docs/Google Scholar
8. Worldcat
9. Encore

Applications of Cloud Computing In Libraries

Managing a digital and physical library can be a challenge. Many of today's libraries feel constrained by limited budgets, and are stretched to deliver information services for a diverse range of stakeholders. This can leave little time for an organization to capitalize on the full benefits of the library's technology.

Cloud computing offers a low risk solution to this familiar issue. Hosted solutions liberate the library from IT constraints and offer cost and efficiency savings. This

reduces time spent on auxiliary issues and enables library staff to focus on client-facing services and developing service enhancements. In the field of library and information science some major areas cloud computing services and applications may be applied.

In Searching Library Data: OCLC is one of example of cloud computing for sharing libraries data. For instance OCLC World Cat service is one of the popular service for searching library data now is available on the cloud.

In 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.

In 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. Besides cost- benefit, the libraries will be free from taking maintenance viz. software updates, backup and so on.

Building Digital Library/Repositories: In the present situation, 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 softwares 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.

File Storage: To access any files on the internet, cloud computing present number of services such as Flickr, 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.

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 which play a key role in building community power. This cooperative

effort of libraries will create time saving, efficiencies and wider.

Conclusion

We know that library is not only a knowledge ocean; its ultimate aim is to provide satisfactory services for all the people. So in the new era, library should improve itself constantly by adopting many new IT technologies. 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 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.

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