



An Overview of Using Cloud Computing in Libraries

KEYWORDS

Cloud Computing, Cloud Computing and Libraries, SAAS, PAAS, IAAS.

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ABSTRACT *Cloud computing is a new technology model for IT services. This technology is mainly used by many businesses and organizations. It facilitates its users to avoid locally hosting multiple servers, devices, equipments and constantly dealing with hardware failure, software installs, upgrades and compatibility issues. For many organizations, cloud computing can simplify processes and save time and costs and workflows they have. This article defines cloud computing, its characteristics, service models and deployment of cloud services, its advantages in libraries and the potential areas mainly technology, data and community for improvement.*

Introduction

Cloud computing technology has grown very fast in the last few years in IT sector and shown its high growth rate. With the use of Internet and centralized remote servers, this technology maintains data and applications for providing services. Cloud computing has given access to its consumers and businesses to use applications without installation and access their personal files at any computer with internet access. This technology allows for much more efficient computing by centralizing storage, memory, processing and bandwidth. This revolutionary technology is the result of the continuous advancement of the data management technology. Cloud computing is used by almost those all who have accessed and connected to the Internet on a regular basis. Whether they are using Google's Gmail, organizing photos on Flickr or searching the Web with Bing, they are engaged in cloud computing. Over the last few years businesses have started to see the value of cloud computing causing it to become a major technology solution for businesses and organizations around the world. Cloud computing has become a major topic of discussion and debate for any business or organization which relies on technology. Cloud computing can transform the way systems are built and services delivered, providing libraries with an opportunity to extend their impact.

What is Cloud Computing?

In term 'cloud computing', the word 'cloud' is a metaphor for the Internet. With the use of cloud computing, anyone can gain access at any time through any device, via the Internet, to data and files which you have uploaded, or to software applications which you need to use for personal or professional use. Today the phrase 'cloud computing' is being used more and more in business. It is important for any professional to understand what it is all about.

According to Wikipedia, cloud computing is the delivery of computing as a service rather than a product, whereby shared resources, software and information are provided to computers and other devices as a utility (like the electricity grid) over a network (typically the Internet).

The Gartner Group 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.

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 effort or service pro-

vider interaction. This cloud model promotes availability and is composed of five essential characteristics, three service models, and four deployment models.

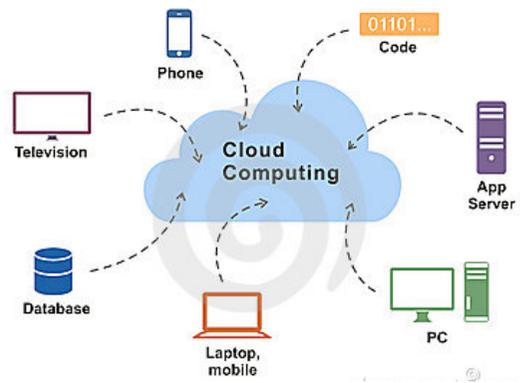


Figure 1. Cloud Computing

Characteristics of Cloud Computing:

There are some characteristics of Cloud Computing are mentioned as under:

- On demand self services:

Computer services such as email, applications, network or server service can be provided without requiring human interaction with each service provider. Cloud service providers providing on demand self services include Amazon Web Services (AWS), Microsoft, Google, IBM and Salesforce.com.

- Broad network access:

Cloud Capabilities are available over the network and accessed through standard mechanisms that promote use by heterogeneous thin or thick client platforms such as mobile phones, laptops and PDAs.

- Resource pooling:

The provider's computing resources are pooled together to serve multiple consumers using multiple-tenant model, with different physical and virtual resources dynamically assigned and reassigned according to consumer demand.

- Rapid elasticity:

Cloud services can be rapidly and elastically provisioned, in some cases automatically, to quickly scale out and rapidly released to quickly scale in. To the consumer, the capabilities

available for provisioning often appear to be unlimited and can be purchased in any quantity at any time.

- Measured service:

Cloud computing resource usage can be measured, controlled, and reported providing transparency for both the provider and consumer of the utilised service. Cloud computing services use a metering capability which enables to control and optimize resource use. This implies that just like air time, electricity or municipality water IT services are charged per usage metrics – pay per use.

- Multi Tenacity:

It is the 6th characteristics of cloud computing advocated by the Cloud Security Alliance. It refers to the need for policy-driven enforcement, segmentation, isolation, governance, service levels, and chargeback/billing models for different consumer constituencies.

Models Deployment of cloud:

Cloud services are typically made available via a private cloud, community cloud, public cloud or hybrid cloud.

In general, services provided by a public cloud are offered over the Internet and are owned and operated by a cloud provider. Some examples include services aimed at the general public, such as online photo storage services, e-mail services, or social networking sites. However, services for enterprises can also be offered in a public cloud. In a private cloud, the cloud infrastructure is operated solely for a specific organization, and is managed by the organization or a third party.

In a community cloud, the service is shared by several organizations and made available only to those groups. The infrastructure may be owned and operated by the organizations or by a cloud service provider.

A hybrid cloud is a combination of different methods of resource pooling (for example, combining public and community clouds).

Cloud Computing Service-Delivery Models

The following figure shows the various types of cloud services as three distinct models: Infrastructure as a Service, Platform as a Service, and Software as a Service,

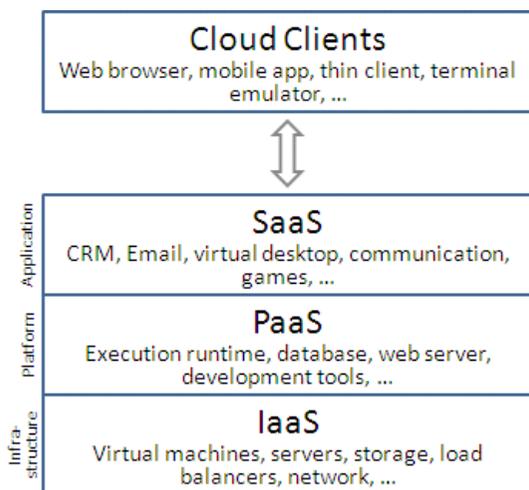


Figure 2. Cloud Computing Service Models

- Software as a Service (SaaS) is the delivery of business applications designed for a specific purpose. Software as a Service comes in two distinct modes:
- Simple multi-tenancy: Each customer has its own resources that are segregated from those of other customers. It

amounts to a relatively inefficient form of multi-tenancy.

- Fine-grain multi-tenancy: This offers the same level of segregation but is far more efficient. All resources are shared, but customer data and access capabilities are segregated within the application.

Examples: Google Apps, Microsoft Office 365, Online, Marketo, Casengo and TradeCard.

- Platform as a Service (PaaS) includes the delivery of more than just infrastructure. It delivers what you might call a solution stack — an integrated set of software that provides everything a developer needs to build an application — for both software development and runtime.

Examples: Heroku, Force.com, EngineYard, Mendix, OpenShift, Google App Engine

- Infrastructure as a Service (IaaS) is the delivery of computer hardware (servers, networking technology, storage, and data center space) as a service. It may also include the delivery of operating systems and virtualization technology to manage the resources.

Examples: Amazon EC2, Azure Services Platform, DynDNS

Benefits of Cloud Computing in Libraries:

The benefits of a cloud computing approaches in libraries are like as to take advantage of emerging technology to fully participate in the Web’s information landscape, increased vision and access of collections, reduced duplication of effort from networked technical services and collection management, to streamline workflows, optimize to fully benefit from network participation, sharing intelligence and improved service levels enabled by the large scale aggregation of usage data, to make libraries greener by sharing computing power thus reducing carbon footprints.

The participating libraries in networked environment using the same, shared hardware, services and data rather than hosting of hardware and software on behalf of individual libraries can result in cut the total costs of managing library collections and enhancing the both library user’s experience and library staff workflows.

The vision of using cloud computing in libraries is to deliver library resources, services and expertise at the point of need, within user workflows and in a manner that users want and understand. It will free and ease libraries from managing technology so that they can focus on collection building, improved services, innovations and initiatives practices. The cloud computing model will promote libraries and their users to participate in a network and community of libraries by enabling them to reuse information and socialize around information. It can also create a powerful, unified presence for libraries on the web and give users a local, group and global reach.

We can sum up the following advantages of Cloud computing in libraries.

- Cost saving
- User centric
- Openness
- Interoperability
- Representation
- Availability anytime anywhere
- Connect & Converse
- Create & collaborate
- Flexibility and innovation
- Transparency

Potential areas for improvement in Libraries through Cloud computing:

When we move towards the cloud computing in libraries, we can consider some broad areas like as technology, data and community where we can get solutions through Cloud Computing. The following potential areas of cloud computing in libraries have been mentioned briefly here:

1. Most library computer systems are built on pre-Web technology.
2. Systems distributed across the Net using pre-Web technology are harder and more costly to integrate.
3. Libraries store and maintain much of the same data hundreds and thousands of times.
4. With library data scatter across distributed systems the library's Web presence is weakened.
5. With libraries running independent systems collaboration between libraries is made difficult and expensive.
6. Information seekers work in common Web environments and distributed systems make it difficult to get the library into their workflow.
7. Many systems are only used to 10% of their capacity. Combining systems into a cloud environment reduces the carbon footprints, making libraries greener.

Examples of Cloud computing in 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

Conclusion:

The Cloud computing offers numerous benefits for different organizations, individuals and in libraries also. There are also privacy and security concerns. If any library consider to provide cloud services, it has to think about its personal information, and that of its' users, can best be protected. Carefully review the terms of services or contracts, and challenges the provider to meet its needs. In today's information society, libraries have the opportunity to improve their services with the help of Cloud computing. It is one path for this move into the future which brings numerous advantages for libraries.

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