Cloud Computing Technology: A Boon for Library and Information Services

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Abstract

Information technology has changed the lifestyle of mankind in every manner. Application of Information technology has influenced every area of specialization, library and information centers are no exception. Right from the beginning of its inception, libraries are found embracing the new technologies to improve its services and perform effectively to satisfy the information needs of its end user. As the readers are expecting more efficiency in services, Library and Information Centers are adopting new trendy technologies to cater the needs of its users. As a result, efforts are being made to adopt the internet, mobile technology many more.... in the field of library and information services. The next generation of internet i.e, web 2.0 has had a novel influence on how people interrelate and connect with each other, both from the individual view point and a business. Now in the era of digital libraries, a new concept is emerging called Cloud Computing, which offers information retrieval systems, particularly digital libraries and search engines, a wide variety of options for growth and reduction of maintenance needs and encourages efficient resource use. In simple terms, it is the ability to use resources and tools through the internet without really owning or being near them. This paper reveals the basic features of the emerging technology, its service models, its benefits to the libraries and some novel examples of selected libraries worldwide where cloud computing technology is adopted.

Key word: Cloud computing technology; ICT; Digital library.

Introduction

In this era of information technology, the facets of work and personal life are moving towards the concept of availability of everything online. Understandings this trend, the big and giant web based companies like Google, Amazon, Salesforce.com came with a model named 'cloud computing' the sharing of web infrastructure to deal with the internet data storage scalability and computation. The National Institute of Standards and Technology defines the cloud computing 'a model for on-demand network access to a shared pool of configurable computing resources that can be rapidly provisioned and released with minimal management effort service provider interaction'.

Cloud computing is an online service model by which hardware and software services are delivered to customers depending upon their requirements and pay as an operating expenses without incurring high cost. Basically cloud computing is a set of services that provide infrastructure resources using internet media and data storage on a third party server.

The term 'cloud' is used to indicate the whole of computing services accessible via the Internet. It is an all-encompassing description of the complex internet connected networks that exist in datacenters all over the world that power services and applications behind the scene.

As a metaphor for the Internet, ''the cloud'' in a familiar cliché, but when combined with ''computing'', the meaning bigger and fuzzier. In recent years the term 'cloud computing', has been vital in the world of information technology. Cloud computing are changing

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the way. Information technology is implemented in organizations today, transforms a way we design, build and deliver applications and the architectural consideration that enterprises must make when adopting and using cloud computing technology.

Cloud computing is rather a new approach to the use of shared computing resources, a substitute to having local servers handle applications. A large number of computer servers and other resources are group together and offers their combined capacity on an on-demand and, pay-per-use basis. The end users usually do not have any idea where the servers are positioned, they just only login. Cloud computing, a new technology is basically originates to serve-up the high-tech industries and corporate enterprises which are encouraged to implement various state-of-the-art information technologies to improve their business operations because of rigorous market competition and a vividly changing business. Libraries now a days are changing unaffected by the new technology which a serving a lot to the firms and high-tech industries with its beneficial applications and services. Adopting new technology like cloud computing to the libraries can promote them in its core areas such as technology, Data hosting archives, information and community.

To summing up, we can say that, cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (eg, networks, servers, storage, applications and services) that can be rapidly provisioned and released with minimal management effort of servies provider interaction.

The Concept of Cloud Computing

The cloud computing is considered as fifth generation of computing with reference to mainframe, personal computer, client server computing and the web. In other words, cloud computing is a construct that allow us to access applications that actually reside at a location other than the computer or other Internet-connected device, like distant datacenter. It allows the users to use applications and access the information from any computer with internet access. The benefits of cloud computing lies in the fact that, other company hosts the application and handle the costs of servers and manage the software updates, and on the basis of contract one will pay less for services.

Features of Cloud Computing

Cloud Computing have following characteristics.

1. Availability of Infinite computer resource on demand:- Cloud vendors bring emergence of large computing infrastructure availability. Organizations acquire these on demand basis. The advantage is that organizations donot need to set up servers for their requirements.

2. Ability to pay for the use of computing resources:- Cloud billing model is very different from the traditional billing techniques. Typical billing models include per-user billing, per –GB billing or per user billing.

3. Cloud computing does not involve long-term commitment to use the computing infrastructure:- The vendor does not enforce long-term usage of services.

4. Cloud computing does not comprehend any eloquent capital expenditure for any organization:-   In cloud computing organizations just use the computing services without buying it. i.e. hiring the computing resources instead of buying them.

5. Location independent resources:- Services are available from any location, i.e. ubiquitous network access, which enables the resources to be accessed from any where.

6. Free of contracts:- Cloud computing can be ordered online without detailed formal contracts.

Types of Cloud

There are three major categories of cloud services available, they are,

Software as a service (Saas)

Applications or software is delivered as a service to the customer who can access the program from any online device. An instance of software runs on the cloud and services multiple end users or client applications. The most extensively known example is salesforce.com. Google Apps also offering basic business services including email and word processing. Services like Quicken online, various search engines, social networks, wikipedia, encyclopedia Britannica on the internet are also falls into this category. There is usually little customization or control available with these applications. However, subscribers benefit from low initial costs, 24x7 support services, and free of hosting, installing, upgrading or maintaining the software.

Platform as a Service (Paas)

With this, a computing platform is provided which supplies tools and a development environment to help companies build, test, and deploy web-based applications. This is the newest entry where an application platform is offered to developers in the cloud. Developers write their application to a more or less open specification and then upload their code into the cloud where the application is run, being able to scale up automatic ally as usage for the application grows, Mosso, Heroku, Google App engine, Engine yard, Joyent, force.com falls under this type of cloud. Applications which are built using these provider's services, however, are usually locked into that one platform.

Infrastructure as a Service (IaaS)

This type of cloud computing is also referred to as HaaS or Hardware as a Service and it involves both storage services and computing power-over the network i.e. Internet. Amazon's Web Services, One of the major players in this area, offers two main products including the Elastic Compute Cloud (EC2) which provides computing resources and Simple Storage Services (S3) for data storage. Other than this, Eucalyptus, Gogrid, Right Scale and Linode are some examples of IaaS. Developers and system administrators obtain general compute, storage, queuing and other resources and run their applications with the fewest limitations. This is the most powerful type of cloud, in which virtually any application and any configuration fits the internet can mapped to this type of service.

Infrastructure Models of Cloud Computing

There are about Four basic service Modes of cloud computing viz.,

Private Cloud

The cloud infrastructure is provisioned for exclusive use by a single organization comprising multiple consumer (e.g., business units). It may be owned, managed, and operated by the organization, a third party, or some combination of them, and it may exist on or off premises.

Community Cloud

The cloud infrastructure is provisioned for exclusive use by a specific community of consumers from organizations that have shared concerns (e.g., mission, security requirements, policy and compliance considerations). It may be owned, managed, and operated by one or more of the organizations in the community, a third party, or some combination of them, and it may exist on or off premises.

Public Cloud

The cloud infrastructure is provisioned for open use by the general public. It may be owned, managed, and operated by a business, academic, of government organization, or some combination of them. It exists on the premises of the cloud provider.

Hybrid Cloud

The cloud infrastructure is a composition of two or more distinct cloud infrastructures

(private, community, or public) that remain unique entities, but are bound together by standardized or proprietary technology that enables data and application portability (e.g., cloud bursting for load balancing between clouds).

The cloud in the Library

Libraries information centers have the greater opportunity to improve their services and relevance in present day situation i.e., information society. Cloud computing is one avenue for this move into the future. It can bring several benefits for libraries and give them a better and different future.

The cooperative effect of libraries using the same, shared hardware, services and data-rather than hosting hardware and software on behalf of individual libraries-can result in lowering the total costs of managing library collections and enhancing both library users experience and library staff workflows.

While local library systems served an important purpose earlier in library automation now represent a tremendous duplication of effort. Each library builds and maintain a database, buys equipment and installs and updates the software. Infact, some libraries can get stuck in perpetual upgrade mode, while involves lots of testing and retesting and time-consuming customization.

Cloud computing and Libraries

Libraries have been using cloud computing services for over a decade. Online Databases are accessed as cloud applications. Large union catalogs can also be defined as cloud applications. Apart from this, library community can apply the concept of cloud computing to amplify the power of cooperation and to build a significant, unified presence on the web. This approach to computing can help libraries save time and money while simplifying workflows.

The potential areas of improvement could include

- Most library computer systems are built on pre-web technology
- Systems distributed across the Net using pre-web technology are more expensive to integrate.
- Libraries store and maintain much of the same data hundreds and thousands of times.
- With library data scatter across distributed systems the library's web presence is weakened
- With libraries running independent systems collaboration between libraries is made difficult and expensive
- Information seekers work in common web environments and distributed systems make it difficult to get the library into their workflow.

In simple words, we would say that, the main use of cloud services by libraries is either taking advantage of freely available applications for internal use in the library or for social networking purposes within their own community. It did not reveal a move to use the cloud for building the larger library community into a force on the web. From the viewpoint of librarians, they have begun to consider the advantages of cloud computing for efficiency and collaboration, but the types of services being used imply this is only efficiency and collaboration within their own libraries, again, not taking advantage to reach out across the community to build system-wide efficiencies and collaboration.

Library community can apply the concept of cloud computing to amplify the power of cooperation and to build a significant, unified presence on the web. This new, unified presence has the potential to give libraries significant scale and impact on the web in a manner similar to major search engines, online booksellers, and social networking sites.

Information Services Using Cloud Computing

Novel instances of libraries where cloud computing adopted for providing effective services are as follows:

Online Computer Library Center

Online Computer Library Center is a nonprofit, membership, computer library service and research organization dedicated to the public purposes of furthering access to the world's information and reducing the rate of rise of library costs, that means OCLC has been functioning us a cloud computing vendor. They provide cataloging tools over the internet and allow member institution to draw on their centralized data store. This centralized database allows for the sharing of catalog records between libraries and greatly reduces the time spent in cataloging in coming material.

Worldcat is another example of cloud computing architecture drawing on the union catalog infrastructure they have built up over the years.

Library Thing

One of the site that combines aspects of social networking and cloud computing is library thing. This offers services which are just like social networking site, authorizes people to contribute information and suggestion about books and allows them to interconnect globally to share interests. This site also contributes web services for libraries after paying a nominal fee, allows them to draw on the vast database of recommendation and other users in library thing.

Amazon and Google

These are among the leading enterprises also providing solutions for libraries by having partnerships between library automation vendors. Amazon has been developing for year's large web services architecture and they now offer hosting services for data which are priced at GB per month and CPU per hour rates. Users have to pay what they actually use.

Google for years is working for the dissemination of information also taking interest in library solutions going to implement

" App engine" which provides a hosted service for application within their server farms and on massive and highly redundant storage system. IBM is showing curiosity in the world and has begun developing as infrastructure known by the name " Blue Cloud"

Kindle and Mobile Me Services

In the e-book arena, Amazon is providing some reading services with "kindle". If one have wireless connection, can purchase and read a rapidly growing list of books and periodicals from the kindle no matter for the location with this service largest text can be downloaded in spur of seconds.

Another service is "Mobile Me" provided by Apple computing. The concept is distributed calendaring and messaging no matter which device is being used. Modifications made via one device are instantly reflected on all of the devices and computers that are tied into "Mobile Me". This has many applications in the library world for eg., with the library acting as the gatekeepers, institutions could provide mobile access to say a list of articles to their students simply by selecting them and giving them a code which would bring up the lists of articles from a vendor's cloud. The same cloud works for preprint archives, data archives and digital object repositories.

Reed Elsevier

It is a service provider for scientific information working with hospitals to provide just in time information to medical technicians as they need the information. It is capitalizing on the cloud computing model. There is the possibility to place monographic and article content or even technical manuals. So that technician and other medical personnel can get assistance exactly when they need it. This utilizes the cloud computers and other devices used in the medical profession can be tied into the data and application provided by Elsevier from anywhere.

Seer Suite

This was developed as a result of extensive research and development with the aim of enabling efficient dissemination of scientific information and literature, Seer Suite refers to a collection of open source tools that provide the underlying application software for creating academic search engines and digital libraries such as CiteseerX., which is an application instance of Seer Suite, a framework for building digital libraries, repositories and search engines. This autonomous citation indexing and extensive document metadata from documents crawled from the web across computer and information science and related fields. Cloud computing is particularly attractive choice of CiteseerX as it offers information retrieval systems, particularly digital libraries and search engines, a wide variety of options for growth and reduction of maintenance needs and encourages efficient resource use. The dynamic and elastic provisioning features of a cloud infrastructure allow rapid growth in collection size and support a larger user base, while reducing management issues.

DuraSpace

Dura Space is a hosted service and open technologies to help organizations and end users effectively utilize public cloud services. Built upon existing cloud services that can work on Amazon, Atmos, Sun, Rackspace and other cloud services.

Chronopolis Project

Chronopolis Project is designed primarily on a preservation storage system. Chronopolis tools also monitors files and does auditing.

Terrapod

Terrapod is a digital video library, which allows us to outsource, upload and collection of data to the creators of the content.

Advantages of Cloud Computing for Library and Information Center

The advantages of cloud computing includes,

- Helpful in participate in the web's information landscape
- Increased visibility and accessibility of collections
- Reduced duplication of effort from networked technical services and collection management
- Streamlined workflows, optimized to fully benefit from network participation
- Co-operative intelligence and improved service levels enabled by the large-scale aggregation of usage data
- Make libraries greener by sharing computing power thus reducing carbon footprints.

The major vision is to use cloud computing 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 should free libraries from managing technology so that they can focus on collection development, improved services and innovation. The cloud computing model will encourage 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 of libraries on the web and give a local group and global reach.

In the concluding remarks we can say that, apart from having many advantages, several difficulties must be overcome for cloud computing to be used on a large scale: the first one is the standardization of services offered by cloud vendors. Secondly, the limited support to relational database offered by current cloud solutions. And finally, privacy of data located in a cloud. Once all of these difficulties will be surmounted, cloud computing will have the possibilities to be a massively used paradigm.

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