

Use of Cloud Computing In Library

Mamta Kumari

(Librarian) Gobindgarh Public College Alour, Khanna

mamtaahuja2016@gmail.com

Abstract

Latest technology has its impact on every field and library science not exception to it. There is a positive impact of information and technology on library system and on the services provided by the library. This paper describes cloud computing and analyzes the current status of cloud computing in digital library and also describe application of cloud computing in digital library and about improvement that we can make in digital library using cloud computing technology.

Introduction

Libraries are using new technology to develop digital library and optimize library service. With the expansion of cloud computing application this paper proposed to apply cloud computing in digital library. Cloud computing is a completely new information technology and it is also known as third revolution after PC and internet in IT.

Review Of Literature

Literature plays a very important role in research activities as it forms the very

first step of a research pursuit. In this study an attempt has been made to cover few works which have been undertaken

Ghosh (2012) Models of cloud computing and its effective implementation for mid-sized organization is emphasized. Lastly, it has been attempted to explore how cloud computing can extend Library services for better sustainability. **Padhy and Mahapatra (2012)** focused cloud computing entails the reduction of in-house data centres and the delegation of a portion or all of the Information Technology infrastructure capability to a third party. Universities and Colleges are the core of innovation through their advanced research and development.

Subsequently, Higher Institutions may benefit greatly by harnessing the power of cloud computing, including cost cutting as well as all the above types of cloud services. In this paper we discuss problems faced with digital library and development efforts to overcome that problem. Then it proposed to improve current user service model with Cloud Computing. This paper explores the

application of cloud computing in academic library in Digital Libraries.

Sultan (2010) conducted a study under the titled "cloud computing for education: a new dawn". Cloud computing is an emerging computing paradigm which promises to provide opportunities for delivering a variety of computing services in a way that has not been experienced before. It was demonstrated in this article how organizations (both small and large) are already taking advantage of the benefits which this technology is bringing, not only in terms of cost but also efficiency and the environment. This computing approach relies on a number of existing technologies, e.g., the Internet, virtualization, grid computing, Web services, etc. The provision of this service in a pay-as-you-go way through (largely) the popular medium of the Internet gives this service a new distinctiveness.

Buyya (2009) highlighted cloud computing is a new and promising paradigm delivering IT services as computing utilities. As Clouds are designed to provide services to external users, providers need to be compensated for sharing their resources and capabilities. In this paper, authors have proposed architecture for market-oriented allocation

of resources within Clouds. They have also presented a vision for the creation of global Cloud exchange for trading services. They have discussed some representative platforms for Cloud computing covering the state-of-the-art. In particular, authors have presented various Cloud efforts in practice from the market oriented perspective to reveal its emerging potential for the creation of third-party services to enable the successful adoption of Cloud computing, such as meta-negotiation infrastructure for global Cloud exchanges and provide high performance content delivery via 'Storage Clouds'.

Objectives Of The Study

The main objectives of the study were: to explore the concept of cloud computing and what it in relation to library and information centers and its services in institutions of higher education with a main focus on digital libraries.

Methodology

The theoretical methods are used for data collections. In this paper represent few points for the utilizations of Cloud Computing in library and Information centers. The author have collect data and information from national as well as international esteemed research journal

library and information science and various recognized websites.

Definition Of Cloud Computing

Cloud computing is associated with the provision of computing infrastructure at web cloud to reduce the cost associated with managing hardware and software resources. We can also say that it is a desktop for people without computer.

According to NIST(National Institute of standard and technology)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 effort or service provider interaction .cloud computing is the improvement of distributed computing, parallel computing ,Grid computing and distributed databases.

History Of Cloud Computing:

The Greek myths tell of creatures plucked from the surface of the Earth enshrined as constellations in the night sky. Something similar is happening today in the world of computing. Data and programs are being swept up from desktop PCs and corporate server rooms and installed in the compute cloud. In General there is a shift in the geography of computation. What is

cloud computing exactly? As a beginning here is a definition " An emerging computer paradigm where data & services reside in massively scalable data centers in the cloud and can be accessed from any connected devices over the internet. Like other definitions of topics like these, an understanding of the term cloud computing requires an understanding of various other terms which are closely related to this. While there is a lack of precise scientific definitions for many of these terms, general definitions can be given.

Cloud computing is an emerging paradigm in the computer industry where the Computing is moved to a cloud of computers. It has become one of the buzz words of The industry. The core concept of cloud computing is, quite simply, that the vast Computing resources that we need will reside somewhere out there in the cloud of computers and we will connect to them and use them as and when needed. Computing can be described as any activity of using and/or developing computer hardware and software. It includes everything that sits in the bottom layer, i.e. everything from raw compute power to storage capabilities. Cloud computing ties together all these entities and delivers them as a single

integrated entity under its own sophisticated management.

Cloud is a term used as a metaphor for the wide area networks (like internet) or any such large networked environment. It came partly from the cloud-like symbol used to represent the complexities of the networks in the schematic diagrams. It represents all the complexities of the network which may include everything from cables, routers, servers, data centers and all such other devices.

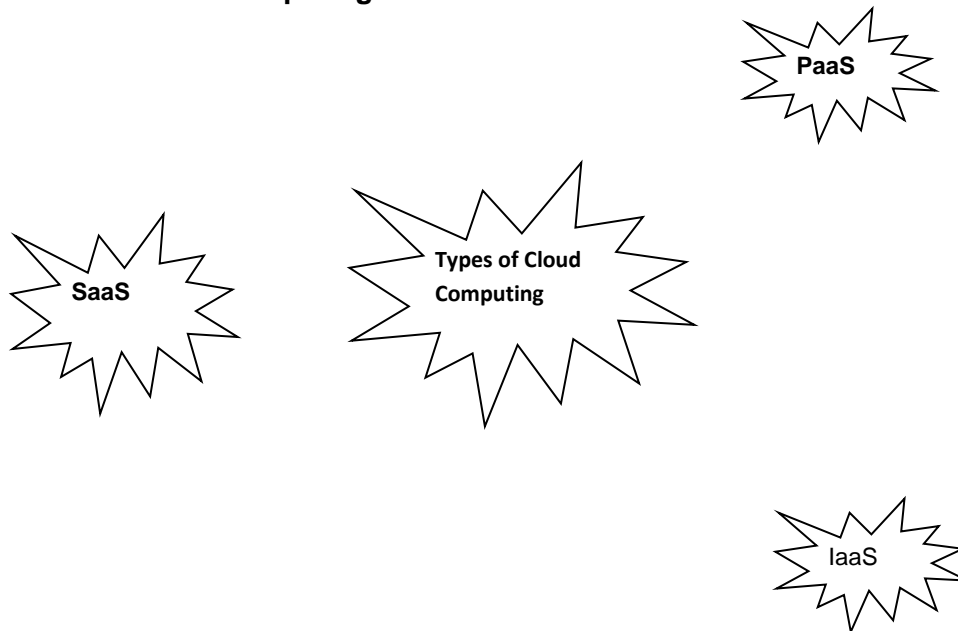
Computing started off with the mainframe era. There were big, mainframe and everyone connected to them via "dumb" terminals. This old model of business computing was frustrating for the people sitting at the dumb terminal because they could do only what they were authorized to do. They were dependent on the computer administrators to give them permission or to fix their problems. They had no way of staying up to the latest innovations. There was a kind of freedom in the use of personal computers. But this was later replaced by server architectures with enterprise servers and others showing up in the industry. This made sure that the computing was done and

it did not eat up any of the resources that one had with him. All the computing was performed at servers. Internet grew in the lap of these servers. With cloud computing we have come a full circle. We come back to the centralized computing infrastructure. But this time it is something which can easily be accessed via the internet and something over which we have all the control.

Working Of Cloud Computing:

Cloud computing system can be divided it into two sections: the front end and the back end. They connect to each other through a network, usually the Internet. The front end is the side the computer user, or client, sees. The back end is the "cloud" section of the system. On the back end there are various computers, servers and data storage systems that create the "cloud" of computing services. A central server administers the system, monitoring traffic and client demands to ensure everything runs smoothly. It follows a set of rules called protocols. Servers and remote computers do most of the work and store the data.

Models Of Cloud Computing



A. Cloud Service Model

There are three major types of cloud service model:-

(I) Software As A Service (SAAS): Under this any application or software is delivered as a service to the customer, that can be accessed by the customer from any online device. Some of the web-based applications are free i.e. hotmail, google, Apps, skype etc, while most business-oriented SAAS are available on lease on a subscription basis.

Benefits for the subscriber are low Initial cost, (24X7) access to support service, and there is no worry about hosting upgrading, or maintaining the software

(II) Platform As A Service (PAAS): Under this a computing platform is provided which supplies tools and a development

environment to help companies build and deploy web-based applications. Under this business companies they do not need to invest in the infrastructure required for building web and mobile application, but we take on rent the use of platform such as windows azure, google app engine and Force.com

(III) Infrastructure As A Service (IAAS): This service is also referred as (Haas) hardware as a service. It involves both storage services and computing power. Amazon's web service are very popular in this context. It provides EC2 (Elastic compute cloud) which provides computing resources, and simple storage service (S3) for data storage many for the companies are using amazon's web service to host or

backup their website. This cloud service is available on a per usage basis, differing from the SaaS subscription model. It helps to custom scale up or down depending on their need at any given time, and they have to only pay for what they have used.

B. Cloud Deployment Model

Cloud computing can be classified on the basis of location. Where the cloud is hosted, these are public, private, Hybrid and community cloud.

(I) PUBLIC CLOUD: Computing infrastructure is hosted at the provider's location. The client has no visibility over the location of cloud computing. The Infrastructure is shared between organizations.

(II) PRIVATE CLOUD: Computing architecture is dedicated to the client/customer and it is not shared with other organization. Private Cloud is more expensive than public cloud, but it is more secured than public cloud

(III) HYBRID CLOUD: under it client/or organization host their critical application service in private cloud and not so critical application in public cloud. The combination is known as hybrid cloud eg- It is used for the organization, where any organization

uses its own infrastructure for normal usage and cloud is for peak loads.

(IV) Community Cloud: under its cloud is shared by the organization of the same community for eg- all libraries in a city sharing the same cloud, or all the Govt. agencies, or all city shared the same cloud.

Characteristics of Cloud Computing

- (i) Broad network Access: Cloud capabilities are available over the network and accessed through standard mechanism such as mobile phone, laptop etc.
- (ii) Resource Pooling : Provider's Computing resources are pooled together to serve multiple consumers.
- (iii) Measured service: Cloud computing resources can be measured, controlled and reported providing transparency for both the provider and Consumer of the utilized service.

Benefits Of Using Cloud Computing:-

(I) LESS COST: It reduces paperwork, lower transaction cost, and there is minimum investment in hardware. If any organization moves its business to the cloud that also reduces the need for an IT staff.

(II) SELF-HEALING: Any app running in a cloud computing environment has the property of self healing. In case of failure of application there is always a hot back up of

the application ready to take over without disruption.

(III) SCALABLE: Cloud computing service are scalable like electricity bill and water bill, we only pay for the usage of the same.

(IV) EFFECTIVE UTILIZATION:- As it reduces wastage of resources to great extent, so it improves utilization.

(V) FLEXIBLE: Cloud computing service can be used to serve a large variety of work load types vary from small loads to heavy loads.

Demerits Of Cloud Computing

(I) PRIVACY: Data which is being collected by cloud computing companies might be used by that company in some other way.

(II) AVAILABLE: Sometimes cloud service not working for hours or more than this.

(III) OWNERSHIP: After we decide to stop using cloud service can we get all the data back from the cloud computing company.

Role Of Cloud In Library

Cloud computing has large potential for libraries. Libraries can put more and more content in Cloud. Many library have only catalogues in digital libraries, large digital

files can stress local infrastructure. The files need to be back up, maintain and reproduce for the patrons.

Earlier the librarian rarely consider the demand of user, as they depend on the sources available in their own library. But today's digital library has changes their view point. Now a days librarian need to collect more and more information to meet their user's demand.

The ultimate goal of digital library is to offer appropriate, comprehensive and multi level services for it users. By use of cloud computing in libraries, library services become more user centric, more professional and more effective.

Cloud computing enable organization and libraries to use external resources to deliver complex services and it remove the need for the organization to invest in server infrastructure and lower the cost for the organization for the computing the resources. Library are using cloud computing for the electronic Journal access management, and for digital library hosting.

Use Of Cloud Computing Can Be Beneficial To The Library In The Following Context.

(I) COST SAVING: There is acute shortage of funds in the library Budget. The

maintenance of the software & hardware and other Technical resources is the main expenditure of every library. Cloud computing offer price saving as we have to pay for the resources that we actually use.

(II) INNOVATION: More risk can be taken for the creative and Innovative Ideas as the new application will run on providers infrastructure. Libraries they don't need to bother about bandwidth and traffic etc.

Demerit Of Using Cloud Computing In The Library:-

(I) SECURITY ISSUE: Security Issue is the main problem of using cloud computing for the Libraries.

(II) RELIABILITY: If any library stop using that cloud computing, will the companies give back the data to the library which has stopped using cloud computing.

Future Improvements in Digital Library Using Cloud Computing

Technology

In an era of shrinking budgets, it gets harder with each passing year to justify the purchase and maintenance of servers that are not in use all the time. Cloud computing offers price savings due to economies of scale and the fact that you're only paying for the resources you actually use. Organization of all sizes can take more risks when it

comes to creative, innovative technology ideas when the new application will run on some one else infrastructure.

Digital libraries do not have to decide between devoting their limited server resources to the OPAC's overflow traffic and new mobile web application that one of your colleagues want to develop.

Furthermore, creating and configuring new virtual server instances is fast and easy in the cloud.

These concerns are leading some companies to build their own private or hybrid clouds. A hybrid cloud is primarily based in a privately-owned and operated data center, but it can shift some of its traffic and data processing requests to public cloud vendors such as Amazon or Rack space on an as needed basis. This hybrid model would let digital libraries maintain more control over the applications and data stores that contain sensitive, private information about patrons. Moreover, digital libraries can continually adjust and fine-tune the balance between the tight control of a private Information Technology infrastructure, and the flexibility and savings of cloud-hosted infrastructure. Just as digital libraries presently cooperate with one another to buy Information Technology equipment,

bandwidth and the services of Information Technology professionals, Digital libraries may soon cooperate in the building and management of data centers. Alternately, if enough digital libraries express interest, a company such as Google, Amazon, Microsoft or another cloud vendor might create a digital library Cloud similar Government Cloud. Or, a library vendor with deep Information Technology resources (e.g. OCLC) might build digital library-centric cloud services on top of cloud infrastructure leased from one of the more established players.

CONCLUSION

Cloud computing is a emerging computing service, which promises to Provide for delivering a variety of computing service in a way that has not been experienced before cloud computing which is applied to digital libraries.

Further security, privacy and reliability are the matter of concern for organization/libraries that are using cloud computing services.

To mitigate the fears of the Libraries, Libraries can choose hybrid cloud model, where libraries can store their user information and other sensitive data in

private cloud and other information about the Library on public cloud.

The drawback is same in maximum Institutions including libraries also. There is a huge fear of putting over information in the hands of third Parties. This fear arises due to issues such as confidential Information theft, loss etc.

Any Institution can progressively move toward cloud computing by uploading their application or data which are not so sensitive.

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