

Cloud Computing

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ABSTRACT

In the recent years the use of the cloud in the business environment has transformed the concept of data storage and resource management but its usage in the field of libraries and information centres is still less widespread. The emerging technology of Cloud Computing has gained a wide influence on Information Technology systems. In the current scenario the libraries have been automated, networked and are now moving towards the stage of paperless or virtual libraries. The technology of cloud computing has come up as a boon for these libraries. It offers ample of opportunities for libraries to connect their services with clouds. The present paper gives an overview of the cloud computing technology, the service models, how this technology can be employed in the libraries and what are the advantages along with the possible challenges which the libraries have to face while hosting and offering various library services on the web based environment. This study may prove to be helpful in the process of identifying the possible challenges and generating cloud based services for libraries.

Keywords

Cloud Computing, IaaS, PaaS, SaaS, Models of Cloud Computing, network, internet, libraries, IT.

INTRODUCTION

In the present times cloud computing has emerged as one of the most popular virtual technology for libraries to deliver various services effectively. Cloud computing technologies include web 2.0, computing, grid computing, unified computing and many more. The various advantages of this technology to libraries is that the library services can be flexibly connected in the new formats. The term flexible signifies payment as per usage model and access as per requirement. The libraries are using cloud computing technology for enhancing their services like corporate cataloguing, acquisition, storage mediums and also for resource sharing on the web. The concept of information explosion wherein the information is available in plenty and is scattered all over has given rise to problems such as accessing the required information, resource sharing and this can be overcome due to cloud computing. It saves the time of the users and staff by making available resources of the library such as networks, servers, storage, applications etc. to a wide variety of end users as pointed out by Swain, C. and Nikhandia, P. (2013). The Cloud computing technology involves an increase in the existing capacities without investing in new infrastructure facilities, training new personnel or licensing new software's. When a person is using internet he is using the cloud computing technology in one form or another like Gmail, Twitter or even while carrying out simple searches with Google scholar.

The increase in the cloud computing technology has also given rise to various problems related to safety and security of data hosted which is ranked as a greatest challenge.

Literature Review

The studies along with some live examples relating to issues of cloud computing have been conducted by Khan (2011) which highlighted the benefits of this technology to libraries. The opportunities, challenges and implications of cloud computing technology on various government and education sectors have been pointed out by Sasikala (2011). The management technique of applying SWOT analysis to libraries through cloud computing has been conducted by Pandya (2012). The study conducted by Venkatesh, P. (2014) on Cloud computing provides a detailed analysis on the various security issues relating to computing and the challenges faced along with the types of services delivered.

Objectives

The objectives for this study include:

1. To define the concept of cloud computing and various library services which can be offered.
2. To study the advantages and the possible challenges faced while making use of the cloud computing technology.

Cloud Computing

The term Cloud computing is derived from the word "Cloud" which refers to the services provided on Network or Internet from a remote location. These cloud networks can be in the form of public, private, community or hybrid clouds through LAN, WAN or VPN. The applications such as e-mail, chatting, video conferencing etc. run through the cloud. A simple example of cloud computing that can be cited is the uploading of photos on facebook instead of home computer. As defined by Kaushik and Kumar (2013) the information stored by using cloud computing technology is in the form of data and these files are uploaded in data centres. It may also be in the form of some software applications which can be accessed at anytime through any device over the internet. As cited by Staten James (2009), Forrester defines cloud computing as: "A pool of abstracted, highly scalable, and managed compute infrastructure capable of hosting end- customer applications and billed by consumption" which means that cloud computing is a rented software which pools the resources together on some common platform and the infrastructure is built up somewhere while the user has to pay only for the services he uses.

The technology of cloud computing is a subscription based service which provides space for network storage and computer applications. The information obtained through the cloud computing is economical as the user has to pay only for the usage while the hardware cost is borne by the management. The cloud services cover the usage of software and hardware technologies that are hidden from the user and managed by third parties at remote locations making the business applications mobile and collaborative. The cloud computing model allows a network based access to information and computer resources. The advancement of technology has reduced the costs of computation, hosting of applications, content storage and delivery. The brief features of cloud computing include self-service on demand which includes the management of computing of resources of the organizations, wide access to networks through internet, pooling and sharing of resources from remote data centres etc. The usage of services can be measured and the users are billed accordingly.

The services offered on a public cloud are owned and operated by a cloud provider which aim at general public like the e-mail, social networking sites etc. In case of a private cloud the infrastructure is for a specific organisation which is managed by a third party while in case of community cloud the service is shared by many organizations and is available only to those groups. The hybrid cloud combines different methods like public and community cloud etc.

Service models

There are basically three service models of cloud computing: Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS). In SaaS model, a complete application is offered to the customer along with required software, operating system, hardware and network. For eg. Google, Microsoft etc. In PaaS, an operating system, hardware and network are provided and the customer has the freedom to build his own applications which are run on the providers' infrastructure. For eg. Google's app engine, Linux, Apache. The IaaS model provides basic storage and computing facilities over the network while servers, storage systems, networking equipment etc are pooled and made available. The customer installs or develops its own operating systems, software and applications. For eg. Amazon, GoGrid etc. (Harris, T.).

Working mechanism of Cloud Computing system

Gosavi et. al. (2012) in their study have studied the system can be divided it into two sections namely the front end and the back end which are connected to each other through a network which is the Internet. The front end is the user and the back end is the cloud consisting of various servers, computers and data storage systems. The administration work by keeping a control on the traffic and satisfying the demands of the users is done by a central server.

Role of Cloud computing in libraries

The technology of Cloud computing has large potential for libraries as they can put more content on the cloud. As pointed out by Thimmaiah and Kumara (2014). The catalogues of the libraries can be linked to the consortium which will facilitate resource sharing. The user may be able to browse a book, CD or DVD physically. By scanning the rare documents a comprehensive database can be prepared and made accessible to the researchers. In a digital library storage of data is the main function which includes the backup and maintenance of files as well as reproduction as per user demands and this can put a stress on

124 / Cloud Computing In Academic Libraries

the local servers. Due to the cloud computing technology the users' demands can be satisfied at a greater speed and it also reduces the cost of updation and maintenance. As pointed out by Goldner (2010) the librarians do not have to indulge in technological aspects and can concentrate on collection building, user satisfaction and innovative practices to attract the users.

Advantages of Cloud computing in libraries:

Few advantages of cloud computing technology can be derived as under:

1. The applications can be manipulated and configured at any time.
2. It does not require any specific software's to access or manipulate the data.
3. It gives an independent access to any type of clients without any geographical boundaries.
4. It also does not require any interaction with the cloud service provider.
5. It is cost effective and requires only an internet connection. The billing is done as per the usage.
6. It provides an increased storage space which can store large volumes of data.
7. It is flexible and enables speedy delivery of information.

Cloud Computing Challenges

Few challenges faced in this technology have been listed as:

1. There is a fear of losing the data in this age of competition. The business data which has to be handed to external service providers by using someone else's CPU and putting data on the hard disk is very risky.
2. The agreements of service level like transactions and logs monitoring, maintenance, recoveries during disasters like crash of hard disks etc. and performance management have to be taken good care of. If any of the service is under served by a cloud provider then it would result into a bad impact and severe damage.
3. There are many cloud providers but still the management of a standard platform and required infrastructure has to be figured out. The existing features can be more enhanced if they are managed effectively.
4. There are some regulatory and compliance problems also like in some European countries the government does not allow personal information of the clients to be physically placed outside the home country. In such cases the cloud providers are required to set up a data centre within the country to comply with these regulations.

5. This technology is totally internet dependent and hence the speed of internet is very important. There may be an unpredictable delay in putting an application on a cloud due to delay in internet.

6. The cloud computing models may prove costly due to the high cost of data communication.

7. The agreement between the service providers and end users is very essential which will ensure the smooth functioning of issues pertaining to quality, reliability and level of performance. The specifications must be clearly defined but different models which may give rise to problems of implementation for the cloud providers.

8. At present each cloud has its own way in which the end users interact with the cloud. This also forces the vendors to lock the resources which prohibit the users to choose resources from other vendors.

Conclusion

The technology of cloud computing proves very beneficial to the organizations and individuals. The only main concern is issues of privacy which is required to protect the interest of the clients as their personal information may be displayed to anyone and anywhere. It is also necessary to review the service agreements and ensure that the providers meet your requirements. The library services can be improved and enhanced. It will prove helpful and economical to the libraries in the present age of resource sharing wherein the hardware, services and software costs are cut down. The librarians can concentrate on providing better services to the users as the costs of managing the library collections are reduced. The cloud computing will also reduce the duplication work of each library like maintaining databases, buying and updating the required software's. The fourth law of library science "Save the time of the reader" can be satisfied due to cloud computing as the library resources and services along with expertise can be delivered at the required time and convenience of the user. The users can access the resources at local, national and global levels as per their requirements. But again the security risks and challenges in the cloud computing technologies must be careful understood. The paper highlights the advantages and challenges faced in the present age of cloud computing. Cloud computing in libraries is in development phases in India. Libraries are trying to provide cloud base services to the user but in real sense the libraries are not fully successful to providing this type of services. Thus, cloud computing technology will prove an economical solution to the web and virtual world of IT.