Cloud Computing: Application, Impact and Prospects for Libraries

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Abstract

This research paper is used to throw the light on how Cloud Computing is used in library systems and its application, Impact, prospects for libraries. Cloud computing is a new technology for IT services which many businesses and organization are adopting. This paper provides brief information on cloud computing and its application for libraries. Adoption of cloud computing is not an easy task for Indian libraries. This paper provides some basic idea to choose evaluate Cloud services for the library. The benefits and risk feature needs to be seriously considered before putting data on the cloud.

Keywords

Cloud computing,Libraries,Impact,Prospacts

Electronic access

The journal is available at www.jalis.in
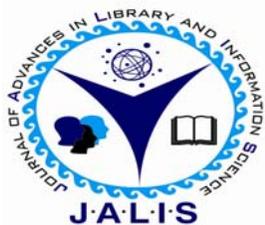
INTRODUCTION

Cloud computing has changed the way of human life. It is becoming the revolution in the field of library and information science. It has changed the computer software fundamental, architecture and tool development, which are used to store information and retrieve. Cloud is providing different ways to retrieve electronic/digital resources. The Cloud computing is a means of access from the computer to the Internet that is users are no longer owners of their computer servers but may gain many services online scalable without having to manage the underlying infrastructure that is often complex. Cloud computing is bringing a super change in IT of its traditional obligations and empower the end users with on demand utility computing. Today libraries are dealing with a large number of resources and users, and cloud computing technology provides that platform in which users can browse a physical shelf of book, CDs or DVDs or choose to take out an item or scan a barcode into his mobile device. Cloud Computing provides easy access to database, rare and important document. Cloud computing brings the opportunity for libraries to shift away from the need to own and operate their own servers to power their core automation applications and to instead shift to gaining similar functionality through web-based services. Cloud computing application are: Web mails (Gmail, Yahoomail), online storage systems (Gdrive,Skydrive,Idrive), and Web-based office tools (Google) Web base readers (Bloglines, Google Reader), entertainment (YouTube, Flicker) Social networking (Facebook, Orkut).

WHAT IS CLOUD COMPUTING

Cloud computing is a type of computing that relies on sharing computing resources rather than having local servers or personal devices to handle applications. In cloud computing, the word cloud is used as a metaphor for "the Internet" so the phrase cloud computing means "a type of Internet- based computing, "where different services- such as servers, storage and applications- are delivered to an organization's computers and devices through the Internet. Cloud computing is an application of traditional supercomputing, or high performance computing power, normally used by military and research facilities, to perform tens of trillions of computations per second, in consumer- oriented applications such as financial portfolios, to deliver personalized information, to provide data storage or to power larges, immersive computer games.

A cloud can be private or public. A public cloud sells services to anyone on the Internet. (Currently, Amazon Web services are the largest public cloud provider). A private cloud is a proprietary network or a data centre that supplies hosted services to a limited number of people. When a service provider uses public cloud resource 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.

DEFINITIONS

According to the IEEE Computer Society Cloud Computing is "A paradigm in which information is permanently stored in servers on the Internet and cached temporarily on clients that include desktops, Entertainment centres, table computers, notebooks, wall computers, handhelds, etc."

According to Hoy, 2012 "most cloud computing applications and infrastructure are built with the assumption that users will access them from the Internet, on multiple platforms and form anywhere in the world."

According to Andrew, 2012 The "Cloud" element of cloud computing can be seen as an acronym that stands for

> *C- Computing resources*
> *L- Location independent*
> *O- Can be accessed via online means*
> *U- Used as a Utility*
> *D- Available on Demand.*

SERVICE MODELS OF CLOUD COMPUTING

In the deployment model, different cloud types are an expression of the manner in which infrastructure deployed. You can think of the cloud as the boundary between where a client's network, management, and responsibilities ends and the cloud service providers begins. As cloud computing has developed, different vendors offer clouds that have different services associated with them. Cloud Providers offer services that can be grouped into three categories.

1. **Software as a Service**: In this model, a complete application is offered to the customer, as a service on demand. A single instance of the service runs on the cloud & multiple end users are serviced. On the customers   side, there is no need for upfront investment in servers or software licenses, while for the provider, the costs are lowered, since only a single application

needs to be hosted & maintained. Today SaaS is offered by companies such as Google, Salesforce, Microsoft, Zoho, etc.

2. **Platform as a Service:** Here, a layer of software, or development environment is encapsulated & offered as a service, upon which other higher levels of service can be built. The customer has the freedom to build his own placations, which run on the provider's infrastructure. To meet manageability and scalability requirements of the applications, PaaS providers offer a predefined combination of OS and application servers, such as LAMP platform (Linux, Apache, MySql and PHP), restricted J2EE, Ruby etc. Google s App Engine, Force.com, etc are some of the popular PaaS examples.

3. **Infrastructure as a Service:** IaaS provides basic storage and computing capabilities as standardized services over the network. Servers, storage systems, networking equipment, data centre space etc. are pooled and made available to handle workloads. The customer would typically deploy his own software on the infrastructure. Some common examples are Amazon, GoGrid, 3 Tera, etc.

FEATURES OF CLOUD COMPUTING
Following features is cloud computing must offer:

1. **On Demand, Self Services:** Computer services such as email, applications, network or server can be provided without involving human interaction with each service provider.
2. **Broad Network Access:** Cloud capabilities are available over the network and accessed through standard mechanism that promote use by heterogeneous thin or thick client platforms such as mobile phones, laptops and PDAs.
3. **Resource Pooling:** The provider's computing resources are pooled together to serve multiple-tenant model, with different physical and virtual resources dynamically assigned and reassigned according to consumer demand.
4. **Rapid Elasticity:** Cloud services can be rapidly and elasticity 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.

5. **Measured Service:** The use of cloud system resources in measured, audited, and reported to the customer based on a metered system. A client can be charged based on a known metric such as amount of storage used, number of transactions network I/O (Input/Output) or bandwidth, amount of processing power used, and so forth. A client is changed based on the level of services provided.

6. **Multi Tenacity:** Multi tenacity is the other feature 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 models for different consumer constituencies. Consumers might utilize a public cloud provider's service offerings or actually be form the same organization.

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, service and data rather than hosting of hardware and software on behalf of individual libraries can result in cut the total costs of managing 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.

CLOUD COMPUTING FOR LIBRARIES

Libraries are also not left bare with emerging technology i.e. cloud computing. Cloud-based services are set transform the technique of libraries work; release the librarians from the admin burden to focus on services for students and researchers. As with ' Cloud' based library solutions, such systems allow for libraries community can apply the concept of cloud computing to strengthen the power of cooperation and to build a significant, unified presence on the web. In effect this is no longer the domain of the of the systems librarian, and a major benefit of such developments is the library staff time which can be made available and deployed more effectively as a result of remote hosting of services. Furthermore it can concurrently make workflows improved end-user customer services with highly developed library discover means and assist them online through a large network of collaborating librarians globally.

APPLICATION OF CLOUD COMPUTING IN LIBRARY

Application of cloud computing can play very effective role in libraries in term of following points:

i.   It can reduce the cost of technology
ii. It is most reliable and performance is far better
iii. Library users can access data or information from anywhere
iv. Physical space of libraries can be saved
v.   It is users friendly. Users can access required information throughout the world within time
vi. Data management within library possible

Libraries are mainly dealing with academic and research activities. Library serves the users with their services. Traditionally services were based on library resources which were available within the library. Today libraries are considering hub of information and it is duty of the library to provide authentic, accurate and up-to-date information for its users. Libraries are becoming IT based and providing a large number of resources for its users throughout the world within time. Cloud computing is a new technology which is very helpful for users as well as for library staff. It provides lot of accessibility to its users for satisfying their needs.

IMPACTS OF CLOUD COMPUTING IN THE LIBRARIES

Cloud computing gives following impacts:

Cost savings: Cloud computing offers price savings due to economics of scale and the fact that we are only paying for the resources you actually use.

Flexibility and enhancement: Libraries do not have to decide between devoting their limited server resources to the OPAC's overflow traffic and a new mobile web application that one of your colleagues wants to develop. If they are both hosted in the cloud, the resources devoted to each will shrink and expand as traffic rises and drops.

General IT skills: Systems librarians have to manage complex projects and evaluate competing vendors on a variety of criteria. Holding vendors accountable is especially important when they mange a significant chunk of our online data and IT infrastructure. Therefore, as long as cloud security remains a significant concern, techies may be called upon to help write binding, enforceable contracts that hold vendors to certain standards with regards to reliability and security of their services.

Cloud OPAC: over the past year, more and more vendors have started offering cloud-hosted versions of their products. OCLC joined several other vendors last year when they began offering a cloud –based tool that complement their existing cataloguing tools.

Different types of Cloud: Libraries may soon be building and managing their own data centres. In addition to all the hype and optimism surrounding cloud computing, there are still significant fears and doubts a hybrid cloud is primarily based in a privately-owned and operated data centre, but it can shift some of its traffic and data processing requests to public cloud vendors such as Amazon or Rackspace on an as needed basis. This hybrid model would let libraries maintain more control over the applications and data stores that contain sensitive, private information about consumers.

ADVANTAGES OF CLOUD COMPUTING:
1. Cost Reducing
2. adaptability
3. Easy of operation
4. Eminence of Service
5. Reliability
6. Outsourced IT management
7. Easy maintenance and upgrade
8. Flexible and pioneering
9. User Oriented
10. Openness
11. Transparent
12. Interoperability
13. Representation
14. 24X7 Availability
15. Connective and Converse
16. Create and collaborate
17. Backup and Recovery
18. Cloud is Environmentally Friendly
19. Scalability and Performance
20. Quick Development

DISADVANTAGE OF CLOUD COMPUTING:
1. Security and privacy
2. Dependency and vendor lock-in
3. Technical difficulties and downtime
4. Limited control and flexibility
5. Increased vulnerability

Examples of Cloud Libraries:
1. OCLC
2. Library Of Congress
3. Google Apps
4. Onlive
5. Marketo
6. Casengo
7. Trade Card
8. Exlibris
9. Polaris
10. Scribd
11. Discovery Services
12. Google Docs/ Scholar
13. World Cart

CONCLUSION

The vision is to use cloud computing to deliver library resource, services and expertise at the point of need, within user workflow and in a manner that users want and understand. It should free libraries from managing technology so they can focus on collection building, improved services and innvation. 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 for libraries on the web and give users a local, group and global

reach. 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. Although study of cloud computing is still in the initial stage now, impacts brought by cloud computing are obvious. With the introduction of cloud computing to library, services of libraries will have a new leap in the near future. It also discusses how cloud computing solutions could be valuable to libraries in reduction of cost and mange an important chunk of our online data and IT infrastructure. Cloud computing has the potential to become a front runner in promoting a secure, virtual and economically viable IT solution in the future.

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