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# Cloud Computing Libraries in the Era of Information Communication Technology

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## **Abstract:**

The Purpose of the Paper is to Study is to the Cloud Computing on Various library Services and also the basic knowledge about the Cloud Computing in the era of information Communication Technology (ICT). This Study adopts theoretical and Practical approach.

### **Introduction:**

The major information and communication technologies (ICTs) transformed and developed the library and information services. These applications have changed application, functions and services of the libraries. Now a day's all libraries are based on cloud solutions services like eresources access such as e-journals/e-books, tracking of usage reports, maintenance of institutional repositories, e-learning packages, library platform that allows access over internet by using desktop computers [1].

Laptops, tablet PCs and smart phones without any software and storage unit. Mobile devices are provided to access information at anytime from anywhere. Mobile cloud Computing is adaptation of the structure of cloud within a mobile environment. Many Organizations use this technology and save time and money, Libraries have been adopting their reference services to the new technology and library function have been moving to the Cloud [2].

# **Meaning of Cloud Computing:**

Cloud computing is a computing platform to distribute the storage information to the end users through the internet. A style of computing in which massively scalable and elastic IT –enabled capabilities are delivered as a service to external customers using internet technologies.

The cloud computing is internet based computing where by shared resources, software and information are provided to computers and other devices on demand through the internet. According to (Wikipedia, 2016) using web services for our computing needs which could include using software for our computing needs which could include using software applications storing data, accessing computing power, or using a platform to build applications, cloud computing is a model for enabling ubiquitous convenient on demand network access to a shared pool of configurable computing resources, networks servers storage applications and services, that can be rapidly provisioned and released with minimal management effort or service provider interaction[3].

# **Cloud Computing Service Models:**

There are three types of cloud service models are there i.e. IaaS, Paas and Saas and these services are interdependent. How these models are made available to the Clients is shown in the figure. 1. The figure 1 shows that the cloud computing service models may have synergies between each other and be interdependent. Pass is a dependent on IaaS because application platforms require physical infrastructure.

The IaaS (infrastructure as a Service) model provides infrastructure components to clients. The PaaS (Platform as a Service) model delivers a Pre-built application platform to the client. SaaS (Software as a Service) Provides ready online software solutions. The cloud computing can be used depends on a number of factors, including, cost/benefit ratio, Speed of delivery, how much capacity you will use, whether your data is regulated [4]. There are three different major implementations of cloud computing. How organizations are using cloud computing is quite different at a granular level but the uses generally fall into one of these three solutions.

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# **Need for Cloud Computing:**

The Emergence of e-publication, digital libraries, internet usage, and web tools applications for libraries. Consortium practices leads to further development in the library profession. The latest technology rend in library science is use of cloud computing for various purposes and for achieving economy in library functions etc. The need has come to move away from traditional core methods to similar functionality through web based services. Librarians face a new challenge today in management of electronic archives. Libraries core competency is to manage, organize and disseminate information and for this cloud computing based services come in handy [5].

As a librarian we had to decide on some tool for information dissemination for managing data some thoughts on this were

- What are the different services available on cloud?
- Will the cloud cost more or less than what I have now?
- What if I decide to stop using a cloud tool can I get my data out?
- Is the convenience of the cloud worth giving up control of many aspects of my system?
- One reason was for this experimentation we used free or low cost tools for LMS

• Cloud computing steps in where there is financial crunch and shortage of personal for use. (It lowers the expense and expertise).

After the analysis, we decided to use the following cloud tools for the library. The services today like drop box, Google docs are some the Services defined in cloud computing. With the help of cloud computing a dynamic, low cost, and simple website can be constructed, with less of IT expertise required in this filed. The user doesn't need to know the technicalities of the usage of cloud computing but on how to use it and its reliability and does it meet the application requirements.

Librarians are using various tools provided by OCLC, ExLibris, Dura space and KB+ which are dedicated to library services. Librarians support the idea of introducing cloud computing into the library and are desirous of various services that can be implemented on the cloud platform. Although, cloud computing is more economic and cos-saving than be traditional computing methods. The question of trust over the cloud service provider, data protection and broadband accessibility hinders its implementation on a larger scale [6]. Further research with a broader scope, or using cluster and /or library has yet declared itself to be cloud based.

# **Cloud Development Models:**

Cloud computing development models represent the exact categorization of the cloud environment and are mainly distinguished by the proprietorship, Size and access. It tells about the purpose and the nature of the cloud. Most of the organization slow willingness to implement cloud as it reduces capital expenditure and controls operating cost. In order to know which deployment model matches ones website requirements, it is necessary to know the four deployment models [7].

# **Applications of Cloud Computing in Librar**ies:

In recent times, libraries are shifting their services with the introduction of cloud and networking facilities that provide access to these services from anywhere in world and anytime. The possible areas identified for cloud computing service are

- Building Digital Library/repositories
- Searching Library Data
- Website Hosting
- Searching Scholarly Content
- File Storage
- Building Community Power
- Library Automation

# **Present Status of Cloud in Libraries:**

At present Cloud computing in libraries is found to be in development phase.

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Libraries are trying to provide cloud based services to the user. Some services such as digital libraries, web documentation and using web2.0 technologies are running on successful modes. The successful cloud computing libraries include Dura Cloud, OCLC services and Google based cloud services. In recent times, many commercial as well as open sources vender (i.e. OSS) have bundled the cloud computing technology into their services and products [8]. However cloud computing technology is still some years away from reaching their optimal application in the library sector. But needless to say it has great future due to its flexibility simplicity as well its universal acceptability.

# **Types of Clouds:**

There are different types of cloud based services made available to individual, group of individuals depends on their requirements and some of them are

# **Public Cloud:**

It is open clod and it can be access any subscriber through internet. e.g. Movies general information etc.

## **Private Cloud:**

It is restricted and paid service to specific group of organization. e.g. online resources through consortium to the group of libraries.

# **Community Cloud:**

it is shared among two or more organizations e.g. various library consortium sharing the data's among their members group, who have similar cloud requirements.

# **Hybrid Cloud:**

A hybrid cloud is essentially a combination of at least two clouds, where the clouds included are a mixture of public, private, or community.

## Libraries need to look at:

- \* File Sharing -Drop Box, Slide share, Google drive
- \* Collaboration devices-Google docs, office 365
- \* Library Management Koha, ever green
- \* Information dissemination- feedly creative commons for publishing articles
- \* Forums Social Networking Face Book
- \* Information collection Google forms
- \* Calendar Google Calendar
- \* Mailing Services Gmail etc

- \* Video & Presentation You Tube
- \* Software and Application Delicious
- \* Operating System Cloud
- \* Office application Google doc

## Use Cloud Computing in Library and Information Science:

Cloud Computing offers many interesting possibilities for libraries that may help to reduce technology cost and increase capacity reliability, and performance for some type of automation activities. Cloud computing has made strong inroads into other commercial sectors and is now beginning to find more applications in library science. The cloud computing pushes hardware to more abstract levels. Most of us are acquainted with fast computing power being delivered forma systems that we can see and touch.

### **Security issues in Cloud Computing:**

Security is provided as a service (Secaas) to the applications to any information remotely through internet. In a simple way, it can also be said that it is provided as a service (Secaas) form the cloud without the need of on premises hardware. Security plays a vital role in any area. While dealing with confidential information. In Cloud computing technology data is being accessed from the cloud by the customer through the internet, so there is a need provide security to the data in processing, data in transit and data at rest, that is while storing also. The term cloud security can also call internet based security [9]. To provide security to the cloud it is important to know about five important things who is logged in, what are they going to access how are they authorized in what are they going to access how are they authorized where is the device and when was asset changed. The various security issues regarding cloud computing are data segregation and protection, identity Management, Availability Management Vulnerability Management, Access Control Management.

# Advantages of Cloud Computing in Libraries:

#### • Cost Saving:

Ability to increase or decrease the consumption of hardware or software resources immediately and in some cases automatically.

#### • Reduces Storage Space:

In the traditional system, if the server is less than what we have.



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The server should be replaced with the new one. In this computing the storage capacity can be adjusted accounting to the needs and requirement of libraries.

# • Reduces Hardware/Software & Maintenance Cost:

There is no need for the user to invest in high end hardware and software or be tied to constant upgrade cycles as cloud based services utilize hardware and software on the cloud. Usually only system capable of running a web browser is required at the user end.

### • Support Included:

Enjoyment of the most advanced security procedures, availability and performance of providers with experience and knowledge in this type of service.

### • More Computing Power:

Computing is done on cloud, and hence large scale computations can be managed by better machines.

#### • Cloud OPAC:

Most of the Libraries in the global are having the catalogue over the web this catalogue are available with their libraries local server made it available over the web. If the catalogue of the libraries made it available through cloud. It will be more benefit to the users to find out the availability of materials.

## **Disadvantages of cloud Computing**

## • Need for Constant Connectivity:

One of the major drawbacks of every cloud service is the need for constant connectivity with internet. Varying bandwidth at the end might cause errors to creep in and this limits the use of cloud services.

## • Complexity:

While cloud services enhance and ease library performance they are initially complex to understand. Hence employees and users have to be trained for better utilization of cloud based services.

#### • Latency:

Latency, an obvious issue is the time taken for the user system to interact with machines in the cloud. Cloud based apps will have higher latency than the native apps installed on a user system. Further, higher traffic and un favorable geographical location can aggravate the problem.

#### • Security:

Cloud Computing is completely internet based and all cloud based computing uses and stores data using the same network which makes it vulnerable to attack by hackers. Porting to the cloud can actually be more secure for smaller companies as companies offering cloud services use the latest and most sophisticated security methods.

#### • Privacy:

Privacy loss is a big concern when we talk about cloud based services. Data stored or shared on the cloud by large social networking sites are usually protected and can be accessed by only authorized people, but there is always a chance of accidental data leakage, mismatch and other failures.

# **Cloud Computing and IT Based Library Services:**

In the era of ICT applications to the library. The acquisition and utilization implementation of new information and communication tools and technologies sets an enabling environment for innovative methods of operation in both the library and the entire institution. The revolutions of ICT in libraries have become one of the spaces in which most academic institutions use the cloud cope with the new information environment in meeting the needs of patrons. Libraries need to made available their resources and services in the virtual environment preferred by their clients [5]. To make speedy and reliability of their resources libraries need to move to the cloud and deliver available resources and services in the libraries to the users via electronic gadgets like Smartphone's, laptops, ebook readers and social media networks. Further as scale put is, there is a need to understand better why users prefer internet tools and services such as web search engines, e-mail, blogs, and RSS feeds despite their respect for and trust in the library's resources in redesigning services.

#### **DATA:**

Bibliographic, Full text, Technical Access, Licensed, Purchased etc,

#### **CONTENT:**

Library Collections, Print or Non Print materials, publishing.

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# **SERVICES:**

Library Services Including Access, distribution, in house developed 9Institutional Repository) and Preservation.

# Library adopting Cloud Computing

- OCLC
- Library Thing
- Reed Elsevier
- Google Apps
- OCLC 's Web scale
- Ex Libraries Cloud
- Amazon
- Google
- Kindle
- Dura Space
- Library of Congress (LC)
- World Cat

### **Importance of Cloud Computing:**

Cloud computing is a completely new in technology and it is known as 3rd revolution after PC and internet. Cloud computing is an enhancement of distributed computing, parallel computing grid computing and distributed databases. Among these, grid and utility computing are known as predecessors of cloud computing. Cloud computing has large potential for libraries. Libraries may put more and more content into the cloud. Using cloud computing user would be able to browse a physical shelf of books, CDs or DVDs or chose to take out an item or scan a bar code into his mobile derive [3]. All historical and rare documents would be scanned into a comprehensive, easily searchable database and would be accessible to any researcher. May libraries already have online catalogue and share bibliographic data with OCLC. More frequent online catalogues are linked to consortium that share resources.

## **Cloud OPAC and Cloud LMS:**

In the age of information Communication Technology (ICT) most of the libraries are automated with integrated library systems (LMS) and the bibliographic databases can be accessed with printed indexes. The includes a world based search using Boolean operators that can narrow down a search to meet very specific needs. Further, features of these systems are periodic list of recent additions to the library WEB OPAC [6].

#### **Conclusion:**

The revolutionary change in information Communication and technology and its applications, there is a vast development and transformations in the structures and functions of the libraries, especially library automation, digital library ect, Users may not be happy all the times about library as internet is providing lost more information at finger tips. Since libraries are competing for user attention, the current challenge is to provide immediate seamless access to sources and information in order to remain in game.

These e-resources shall be accessible on all days (24 x 7) remotely from their houses. If we give remote access to subscribed and free resources, users might benefit from this facility and usage will be naturally more, it is only through cloud computing having said that the electronic resources are in increasing demand in an electronic age, the usage of the licensed resource to the maximum extent is important. The efficiencies of cloud computing can help institution keep pace with ever growing resources requirements and energy cost and involves centralizing the computing resources on the internet and making these available to those who need and when with multiple access simultaneously.

Cloud computing is an entirely new form of computing which many enterprises such as Google, Yahoo. Microsoft, Amazon, Zoho and sales are adopting for infrastructure solutions. Cloud computing is attracting enterprises and now libraries due to number of reasons. The concept is that it shift the bulk of the responsibility for infrastructure support out to another vender basically outsources all data centers and software support to configurable and trustworthy resources through its architectural layers such as infrastructures as a service (lassS), Platform as a service (PaaS) and Software as a Service (SaaS). Cloud computing have various benefits such as the reduced cost ease of maintenance, sharing of resources, etc. Cloud computing that exists remotely, often gives users increased capacity and less need for updates and maintenance, and has gained wider acceptance among libraries.

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