

## APPLICATIONS OF CLOUD COMPUTING TECHNOLOGIES IN LIBRARY AND INFORMATION CENTERS: ADVANTAGES AND DISADVANTAGES

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### Abstract

*In the past few years, cloud computing has evolved to be a major trend for all levels of computer users and organizations. While it is important to take advantages of cloud based computing by means of deploying it in diversified sectors, the security aspects in a cloud based computing environment remains at the core of interest. This article mainly focused about characteristics, cloud libraries, advantages and disadvantages, use of technology, initiatives of cloud computing.*

**Keywords:** Cloud Libraries, Library Automation, Cloud Applications in Libraries



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### Introduction:

Cloud computing has changed as one of the most popular virtual technology for libraries to deliver the service in an efficient and effective manner. Cloud computing is completely a new trend of Information Communication Technology (ICT) and it is known as third revolution after PC and internet. Cloud computing is a technology, where a large pool of systems are connected in a private or public networks to provide dynamically scalable infrastructure for application, data and file storage. Cloud computing contains features of different technologies including utility computing, grid computing, unified computing, web 2.0 service oriented architecture and so on.

### Definitions:

According to **Wikipedia** "Cloud computing is Internet-based computing, whereby shared resources, software and information are provided to computers and other devices on demand through the Internet".

According to **NIST** "Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources ( e.g. networks, servers, storage, applications and services) that can be rapidly provisioned released with minimal management effort or service provide interaction. This cloud model is composed of five essential characteristics, three service models and four deployment models."

### **Characteristics of Cloud Computing:**

There are the essential characteristics of cloud computing as given below:

**On demand self service:** Computer services such as email, applications, network or server service can be provided without requiring human interaction with each service provider. Cloud service providers providing on demand self services include Amazon Web Services (AWS), Microsoft, Google, IBM and sales force .com. New York Times and NASDAQ are examples of companies using AWS (NIST).

**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 and laptops.

**Resource pooling:** The provider's computing resources are pooled together to serve multiple consumers using multiple- tenant model, with different physical and virtual resources dynamically assigned and reassigned according to consumer demand. The resources include among others storage, processing, memory, network bandwidth, virtual machines and email services. The pooling together of the resource builds economies of scale.

**Rapid elasticity:** Cloud services can be rapidly and elastically 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.

**Measured services:** Cloud computing resources usage can be measured, controlled, and reported providing transparency for both the provider and consumer of the utilized service. Cloud computing services use a metering capability, which enables to control and optimize resource use.

**Virtualized:** The applications in cloud computing are fully decoupled from the underlying hardware. The cloud computing environment is a fully virtualized environment.

### **Applications of Cloud Computing in Library and Information Centers**

Libraries are shifting their services with the attachment of cloud and networking with the facilities to access these services anywhere and anytime. The library system along with cloud computing may be applied on the following areas:

- **Building Digital Library:** An efficient way to manage resources, information and library related services is to maintain a digital library. The user may be facilitated access via network. Many open source software are providing a platform to digital

libraries by hosting them locally. Duraspace uses digital library services using SaaS approach eliminates the need of maintaining a separate server, taking backups and software updates for the same.

- **Searching Library Data:** This could be provided with the help of collaborative platform to help connect more easily. It may include a repository, innovation as well as a discussion platform where resources, ideas and problems may be shared for better decision making.
- **Library Automation:** At present automation in most of the libraries are carried out on local servers by using different types of commercial or open source integrated library management software and managed by internal IT/ library staff. Now-a-days many software vendors offer this on the cloud (SaaS model) which enables the library free from investing on hardware and undertaking maintenance, software updating and backup.
- **Website Hosting:** web hosting is one of the newly adopted example for cloud computing. It preferred to host their websites on third party instead of hosting their own services.
- **Searching Library Data:** Web share management system helps to develop open and collaborative platform in which each library share their resources, ideas, problems etc. with the library community on clouds. OCLC is one of the best example of making use of cloud computing for sharing libraries data. OCLC, WorldCat service is popular service for searching data available on the cloud.
- **File Storage:** To access any files on the internet, cloud computing presents number of services such as Flickr, Dropbox, Jungle Disk, Google Doc, Sky Drive and so on. These services virtually share the files on the web and provide access to anywhere and anytime without any special software and hardware.
- **Searching Scholarly Content:** Knimbus (stands for knowledge cloud which is dedicated to knowledge discovery and collaborative space for researchers and scholars), a cloud based research platform, facilities to discover and share the scholarly content. Library network (INFLIBNET) centre has incorporated Knimbus cloud service into its UGC INFONET Digital library consortium in order to search and retrieve scholarly contents attached thereto.

### **Cloud Computing Initiative in Libraries**

- **OCLC WorldShare Management Services (WMS):** WorldShare Management Services (WMS) an integrated suite of cloud- based library management applications of OCLC offer libraries cost savings, workflow efficiencies and the ability to deliver new value to users by sharing data and work across many member libraries.
- **Ex Libris:** Ex Libris group is a leading provider of library automation solutions, offering comprehensive product suite for the discovery, management and distribution of all materials print, electronic, and digital.
- **3M Cloud Library Application:** The 3M Cloud Library Application is an innovative way to browse borrow and read popular fiction and non-fiction ebooks from local public libraries. Patron should have a valid library card to use the 3M Cloud Library App and the library needs to have a subscription to the 3M cloud library service. Users can use the 3M Cloud Library PC software to transfer ebooks to their Nook Simple Touch, Kobo eReader, or Sony Ereaders. The 3M Cloud library automatically syncs to all your devices that have the 3M Cloud Library App downloaded to them. The application has the ability to transfer content to a personal e-reader using either an existing Adobe ID or using the 3M Cloud Library ID.
- **Dura Cloud:** Dura Cloud is an open source platform developed by DuraSpace. It provides on-demand storage and services for digital content in the cloud for academic libraries, academic research centers, and other cultural heritage organizations. Dura Cloud enables digital preservations, data access, transformation and data sharing. It helps to move copies of content of any shape or size into the cloud and store them with several different providers and offers compute services.
- **LibLime:** LibLime owned by Progressive Technology Federal Systems.Inc.(PTFS), is a commercial entity providing implementation and development services around the open source integrated library system Koha, which is generally considered to be the earliest. It is one of the most innovative technology platforms which bring new realities of open access, interoperability, rapid and flexible development.

### **Cloud Libraries**

Cloud libraries provide flexible e-book lending service through in-library hardware. The touch based terminals at the library provide catalogue searching facility and books selected will be checked out to users along with e-readers if needed. Users can borrow digital books

from their iPads, mobile devices and android based tablets. Cloud libraries use cloud architecture in which internet based on demand service is provided. Cloud libraries are becoming popular with the emergence of 3M's cloud library, Amazon Kindle library and Sony library e-book checkouts. Other service providers are also coming in this line and it is expected that in the near future, Cloud libraries will be an alternative library system all over the world. Some of the cloud libraries are:

- ✚ OCLC
- ✚ Library of Congress (LC)
- ✚ Exlibris
- ✚ Polaris
- ✚ Scribd
- ✚ Discovery Service
- ✚ Google Docs/ Google Scholar
- ✚ Worldcat
- ✚ Encore

#### **Advantages of Cloud computing in Library and Information Centers:**

- **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. The server should be replaced with the new one. In this computing, the storage capacity can be adjusted according to the needs and requirement of libraries.
- **Scalability:** Users can access the resources they need in line with their changing the needs and requirement. Pay as you allowing a more effective and efficient control expenditure.
- **Reduces Hardware/ Software & Maintenance Cost:** There is no need for the user to invest in high end software and hardware or be tied to constant upgrade cycles as cloud based service 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.
- **Cloud OPAC:** Most of the libraries in the global are having the catalogue over the web. These catalogue are available with their libraries local server made it available

over the web. If the catalogue of the libraries made it 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 in Library and Information Centers:**

- **Data Security:** Cloud computing is completely internet based and all cloud based computing uses and stores data using the same network which makes it susceptible to attack by hackers. Porting to the cloud can actually be more secure for smaller organizations offering cloud services use the latest and most sophisticated security methods.
- **Privacy:** Privacy loss is a big concern when the 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 leakage, mismatch, and other failure.
- **Limited Flexibility:** Flexibility may limited in terms of special customization as services on the cloud will be common for all the users.
- **Network Connectivity & Bandwidth:** One of the major drawbacks of every cloud service is the need for stable connectivity with internet. Anecdotal bandwidth at the end might cause errors to creep in and limits the use of cloud services.
- **Cost:** Initially the cost could be higher, but may reduce depending on the usage of services,. However, organizations may end up paying higher charges in the future.
- **Complexity:** While cloud services increase 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.

**Conclusion:** Cloud computing services can enable faster time to market and reduced startup costs through faster IT deployments and end-user-self-service. Cloud computing brings in benefits in multiple ways like improve accessibility to data and storage capabilities, dynamically maintain and upgrade large digital libraries and improve end user experience. Cloud computing can therefore be widely adopted by library professionals to maximize the impact and usage of digital libraries.

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