

New Dimension of  
**Library Science**

**Dr. N. K. Sahu**



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*Editor*  
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## *New Dimension of Library Science*

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## *Contributors*

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**Dr. Dillip K Swain**

Librarian, KIIT University, Odisha

**Dr. K. L. Jena**

Asst. Librarian, CET, Bhubaneswar

**Dr. Sudhir Kumar Jena**

Librarian,

IIM, Shillong, India

**Bijayananda Pradhan**

Assistant Librarian

Central University of Orissa, Koraput

**Mamita Panda**

Assistant Librarian, School of Electronics Engineering

KIIT University, Bhubaneswar, Odisha

**Rajashree Dash**

Guest Lecturer, Dept. of Lib. & Inf. sc,

Jamshedpur Women's College

**Bibhuti Bhusan Pattanaik**

Assistant Librarian

**Devendrappa T M**

Professional Assistant

Jawaharlal Nehru University, New Delhi

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**Dr. N.K. Sahu**

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# CHAPTER 11

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## Cloud Computing Applications in Libraries

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*Bibhuti Bhushan Pattanaik  
Devendrappa T M*

### ABSTRACT

*In this article we have made an attempt to explain what is cloud computing and how libraries can make use of cloud computing technology and its services to build the library new services for web environment, to reach the maximum number of end users. What is the need to move to cloud based services and how cloud computing based tools are effective serve the purposes of library are discussed.*

### INTRODUCTION

With the advancement of Computer communication technology

and web networks technology many changes have been made to library and library services to serve user effectively. One such innovative technology used at recent time in various libraries across globe is “Cloud Computing”. Cloud computing is completely the new and emerging technology which is called as third revolution after inventing the computer and Internet, the prime service it offers is provide storage space and avenue where any organization can capable to store or archive their valuable data and own their data content for access over networks. Because of its advantage characteristics, various kinds of services online for all type of industries such as banking, library and information centre, small and big companies, online selling of goods and e-commerce and governance are using such technology at recent time. Here we can see how cloud computing is helpful for providing better services to library and information centre. Though cloud computing one library can offer their services online in better way without investing more money for infrastructure, hardware and software purpose. Cloud computing is one of the best and very useful platform concerned to library services, because it will take care of all software, hardware, and networking related issues and it provide user friendly user interface, where the library professionals can manage the library automation process such as acquisition, cataloging and classification, transaction and report administration processes. Along with this it offers services such as searching and subscribing of e-books, e-journals, databases, online current awareness services (CAS) and selective dissemination of information (SDI) services. The key advantage of cloud computing is its flexibility and store data contents with them, the third party

service provider take the whole responsibility such as hardware maintenance, backup and other software related issued, so it is economically viable to have such technological solution for library at long run. Through this paper, we can see how cloud computing is helpful for providing better services to library and information centre, before that we can see what is cloud computing and its services, advantages and limitations of cloud computing.

### CLOUD COMPUTING: THE CONCEPTUAL OVERVIEW

As a metaphor for the Internet, “the cloud” is a familiar cliché, but when combined with “computing,” the meaning gets bigger and fuzzier. Some analysts and vendors define cloud computing narrowly as an updated version of utility computing: basically virtual servers available over the Internet. Others go very broad, arguing anything you consume outside the firewall is “in the cloud,” including conventional outsourcing.

According to the definition of NIST (National Institute of

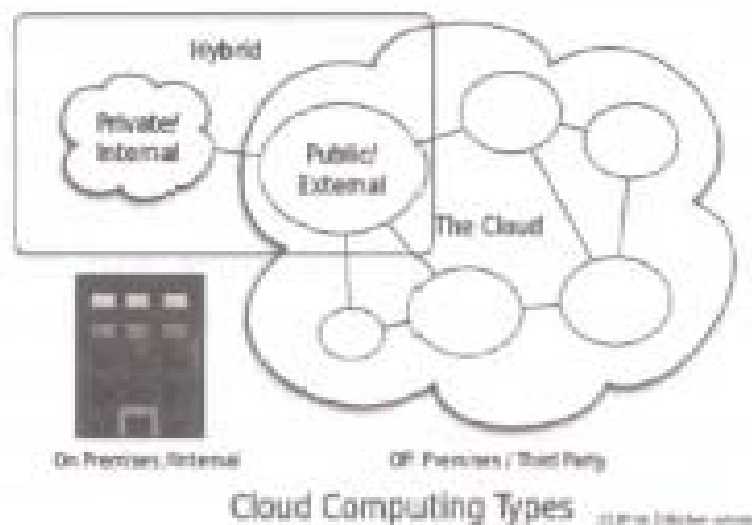


Fig. 1: Cloud Computing Ecosystem

Standards and Technology) "Cloud Computing is a model for enabling 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 and released with minimal management effort or service provider interaction".

Cloud computing is location independent computing application, whereby shared servers provide resources, software, and data to computers and other devices on demand, as with the electricity grid. So it describes as new delivery model for servers and data storage often available to end user over internet with virtualized resources.

Cloud computing is purely Internet based computing service where the shared information, software, resources and platform are available on demand through the network for computer and other communication devices. It uses Web services for our computing needs, applications software, and data storing devices, accessing computing power, or using a platform to build applications. It seems to be a new phrase but looking into the concept, we all have been using its services since quite a long., e.g. e-mail services from Google, yahoo, rediffmail, hotmail or others, Document sharing services such as Google Docs, Video sharing services such as YouTube, and Photo sharing services using Flickr etc. These services are nothing but kind of cloud computing services. These services are afford free we have all using these services from last few decade and we have been putting our personal and important information on our email's, flicker, and now we are started using few social networks such as facebook, Web Blog, Orkut, etc as personal information sharing tools where we

have been sharing or shifting our personal information or data in different formats on the web. All these servers holding our information on the web can be maintained by services providers such as Google, Yahoo, Rediff etc. Here we have trust on them in this service without trust we can't use the cloud service the main base of this service is trust than only we can move forward to use the cloud services. Thus, the technological development of cloud computing is using in many areas such as Business, Academic, Research and Development, Library services and other areas.

## **MAIN COMPONENTS OF CLOUD COMPUTING**

### **SaaS (Software as a Service)**

SaaS represent the application or software, which are delivered as a service to the needed user who can access the program from any online device. Presently some of Web-based applications are available freely such as Hotmail, Google Apps, Skype, and many web 2.0 applications, but most business-oriented SaaS, such as Automation through cloud, digital library on cloud, Amazon ebook store are available on purchase mode. Figure 2, describe the stages of operations and the architecture of SaaS model.

### **Platform as a Service (PaaS)**

PaaS stand for services offered through computing platform, it offers services to user by building, test, and deploy Web-based applications. In the contest of library Platform as a service is provide application software and platform to the library to make automation and build digital library and other

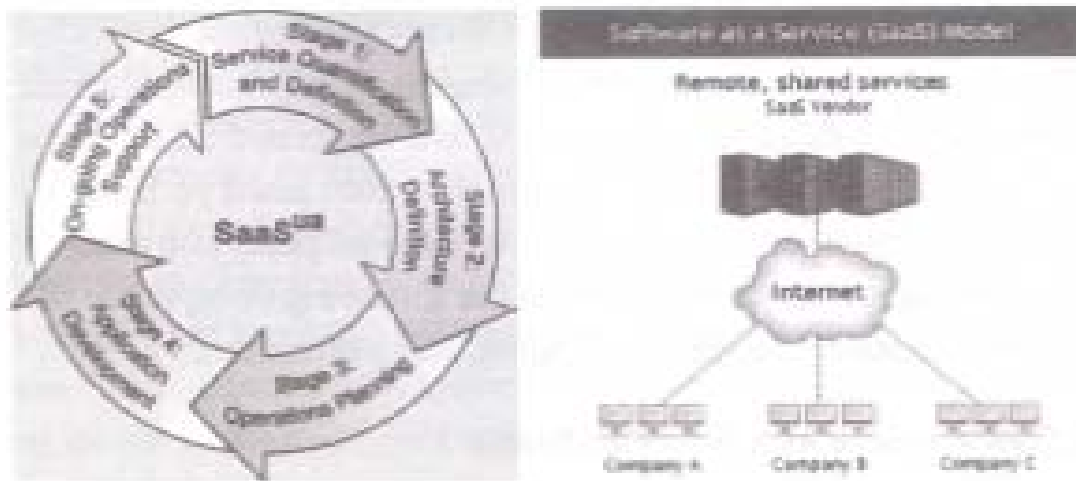


Fig. 2: SaaS Models and Stages of Operation

applications related to library such as Content management using Moodle, Drupal, Joomla software or using blogs etc. Other than these it will provide platform to build the online library services such as Online referral service using meebo, web site design etc. in current date many libraries are lacking of fund and budget allocation, where as the online information collection and services requirement is more, to match the need of user and cater with

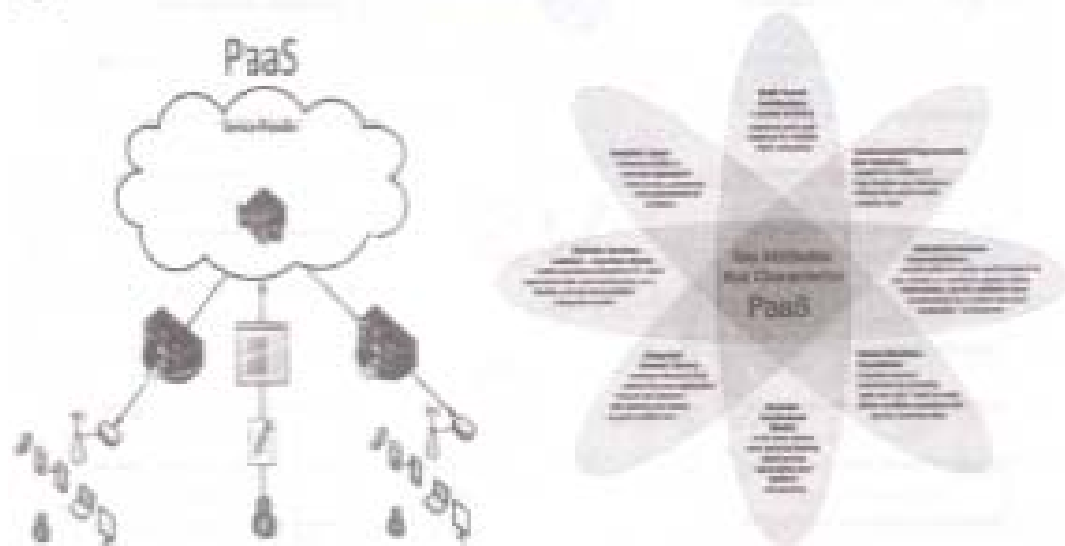


Fig. 3: PaaS Model and Key attributes that characterize PaaS

latest technological implementation library need of such services. Cloud computing facilitated virtual infrastructure for many libraries, where they can make their repository, data banks and offers online services to end user easily. So for that they need to hired or procured virtual server spaces through a third party company or else rent certain space from any of the following companies like Windows Azure, Google AppEngine, and Force.com.

### Infrastructure as a Service (IaaS)

IaaS, refers Infrastructure as a Service called alternative as HaaS (Hardware as a Service), which consist of storage applications and computing technology. Some of the major companies who has provided cloud infrastructure services are Amazon.com, Sun, Microsoft, IBM, Google and so on. Amazon's Web Services offers two main products including the Elastic Compute Cloud (EC2),

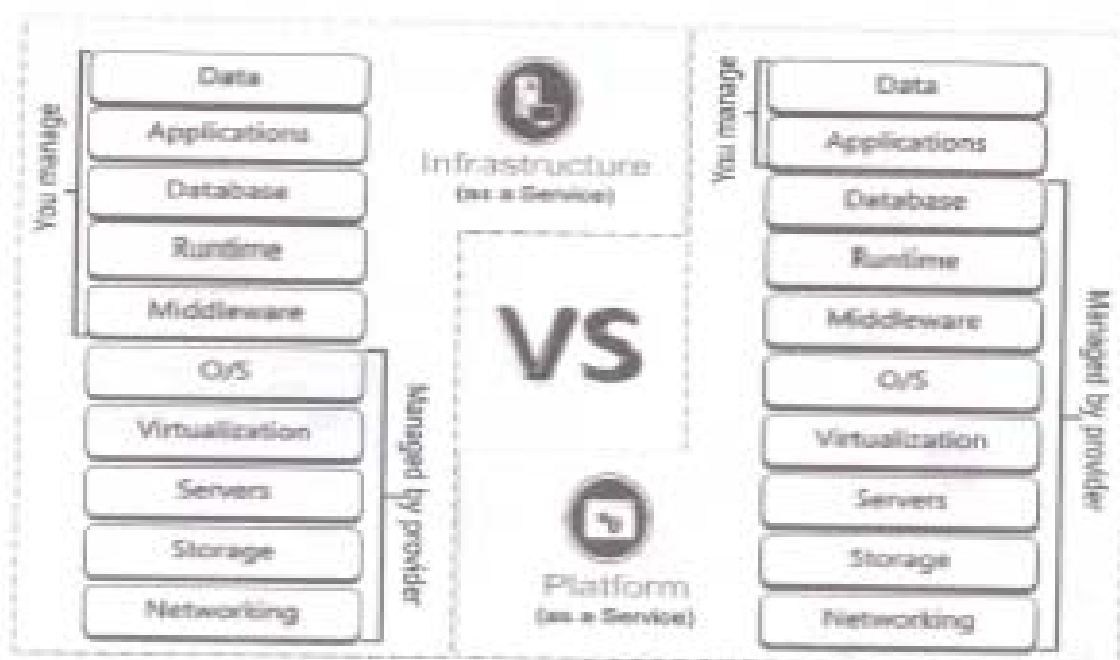


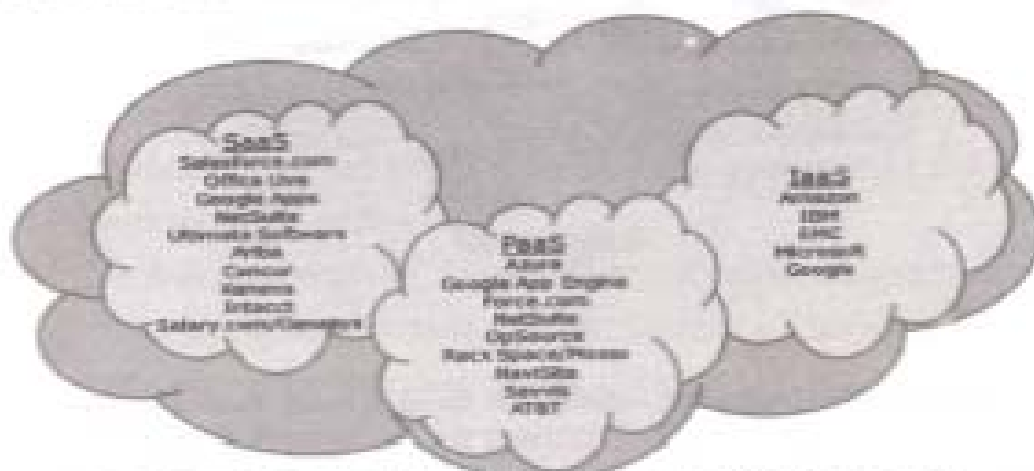
Fig. 4: Cloud Computing Application Management by Developer via IaaS Versus PaaS

which provides computing resources, and Simple Storage Service (S3) for data storage.

Many libraries across the world are using Amazon alike Web Services to build server based infrastructure and store their data content for run their websites, repository, databases and taking backup of those with easy. Most of these cloud services are available on a pay-per-usage basis, differing from the SaaS subscription model, enabling customers to scale up or down depending on their need at any given time and only pay for what they've used.

Fig. 5: Examples of Cloud Computing Services Companies and Applications

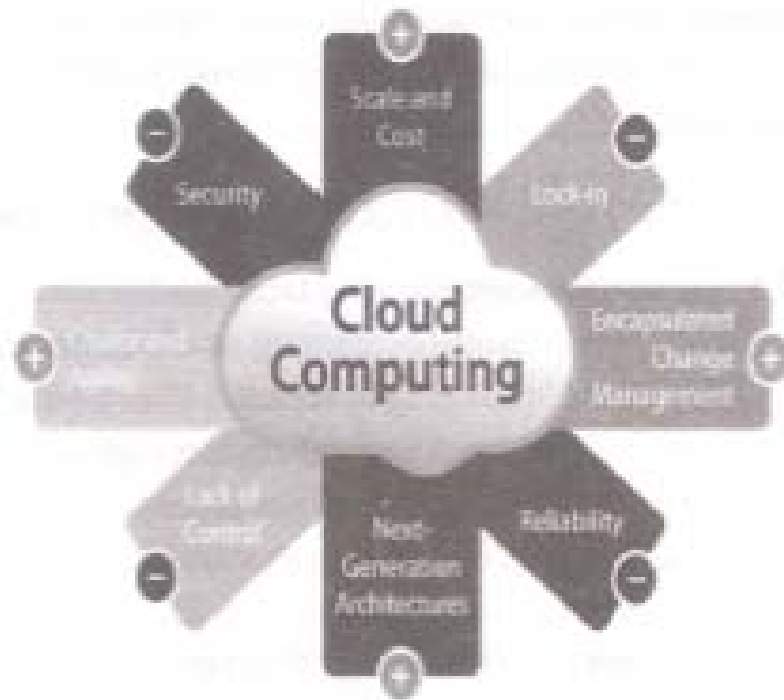
### UTILITY AS A COMPUTING SERVICES (UAACS)



Cloud Computing Enablers - VMware, Adobe, Citrix, Akamai, Sun, Dell, HP, Red Hat

The combination of all the three, i.e. SaaS, PaaS and IaaS in Cloud Computing is getting new life from Amazon.com, Sun, IBM, and others who now offer storage and virtual servers that can access on demand. Also many other such providers are also available in software markets, who can offers scalable solution that help to create virtual data centre and servers. Few of them are namely as 3 Tera's AppLogic and Cohesive





computing System. To use those infrastructure one should not bother about the license, the solution provider take whole responsibility of this.

- **No backup worry?** Another very important aspect of cloud computing applications is the facility of backup and data recovery of particular application.
- **Refined usage of personnel:** One can effectively and efficiently use the services of cloud computing and the concern facilitator can able to focus freely about the personnel value of services and can focus on delivering value rather than maintaining hardware and software.
- **Robust scalability:** Cloud computing also provide scalable solution to all the consumer who have run this services in their organization.
- **No need to wary about server down:** Because the data can be stored in distributed environment.

- **Easy to upgrade or migrate:** This will help the users to update the services with the changing environment and invention of new technology.

### **CLOUD COMPUTING PROMOTE LIBRARY SERVICES**

Presently library services are moving from traditional method to highly advance ICTs methods in serving user community; such services are Web OPAC (Catalogue search), Electronic journals, E-Books and Online Database providing through online. Other than these now a day's some other services such as Current awareness service (CAS), Selective Dissemination of information (SDI), Bulletin board service, Alerting service through mail and using RSS feeds, Instant messaging (IMs) etc services are using in library for better service to their users, these are the kind of services which we can called web based library services. Apart from these the ICT professionals are introduced many new service which we called cloud computing. Through which library professionals are able to get the Library materials and Library services on demand anywhere and anytime.

We can see the various library services offered by cloud computing below;

#### **Cloud Based Library Automation**

Still there are some of the libraries are working without automating their collection and they are using manual method, card cataloguing system for searching their collection. In some places like rural and remote areas, some of the small school / college libraries and library professionals are interesting to move to make automation but they are struggling with insufficient of fund

to buy the hardware, software, and other resources necessary to convert their library holdings to an online system. For such kind of problems cloud based library automation is the solution where the users are not required to buy any software, hardware, back devices, and other resources. Through these libraries can share web based catalogue and ILL services they can make online ordering and purchasing of books and other library resources. Presently some of the cloud based automation services are available from the Services providers which are listed below:

- Library World - [www.libraryworld.com](http://www.libraryworld.com)
- MuseGlobal - [www.museglobal.com](http://www.museglobal.com)

### **Cloud Based Digital Library Services**

We know what is digital library and how it will help in getting the resources, but building digital library collection, providing infrastructure for accessing the digital library serves to user community is the risky and very expensive task, where the institutions should buy number of systems, server, software packages, network connection and network tools and technical staff, for school and small colleges it is very difficult to provide all these facilities to overcome these problems cloud based digital library is the solution and it got more advantages compare to traditional library system. Presently HP solutions and other companies are stepping to build digital library on cloud.

Following are the advantages of cloud based digital library services:

- Online access of full text e-books and bibliographic details via network connected devices such as Computer, Mobile

- device, network connected e-book readers etc.
- It provides online subscription of e-books according to user demand.
- It helps for sharing of e-books between libraries on ILL bases.
- It provides application software; storage space, search interface for building the digital library collection and it provide access facility for 24/7 throughout the year.
- No need to worry about data lose, because the data can be stored in different places if the data of one server lost also we can access the data from other servers without any modification in search or access procedure, The technical relating issue of such problem will be handled by cloud serves providers only.
- The issues related to copyright, Software license, and other issues are handled by the service providers only. In case if we are set upping our own Cloud that time we need to take care of all these issues.
- Once we build the digital library on cloud means it is easy to access, manage, add, remove or modify the content or books on cloud and it helps library professionals to share the collection with other libraries.
- Presently so many online digital library are available and Amazon.com is the example for cloud based digital library.

### **Cloud based SDI/CAS Services**

For providing these services the cloud computing is the very innovative and best platform, where the library users and

library professionals can communicate each other without any trouble from anywhere and anytime.

Following are the type of services provided through cloud computing:

- Through this platform we can provide user needed information such as selective dissemination of information where we can form the user interesting groups and we can share the information among them using the freely available sources such as Mediawiki, Orkut groups, Group mail, Blogs, Wikipedia etc. Where users can get the interesting group and peoples on specific area of subject so that they can share and exchange the information / ideas etc.
- Presently the RSS Feeds, Blogs are serving in this context.
- For providing current awareness services cloud computing is the best place because it helps users to get the latest and updated information based on area of interest, and based on the required format for the device such as computer, mobile, Mail alerts, RSS Feeds for both compute and mobile devices instant messaging etc.

### **Cloud based E-Resources and Data Base Management System**

For managing the in-house and subscribed e-resource on shared bases, cloud computing is the best place where we can give the access permission based on the institute policy and type of user and their needs. With this we can add the web 2.0 based applications to help the user in getting the updated and current information on available resources and services using SaaS, PaaS and IaaS.

- In cloud environment we can manage e-resource based on the following method: Login based resources access and sharing within and among the organization for various purposes.
- For managing the Databases of varies type cloud is the right place because the single database can be used for various purposes in this context it is use full and the library database can be used maximum. If it is available for public through the public cloud and it is help users to know the importance of resources sharing and they will try to share the information among the users community.

Here are some of examples who are using the cloud services for effective library services.

- The OhioLINK library consortium is using the Amazon's Web Services to host a handful of their Digital Resource Commons repository instances such as Kent State's Centennial Collection, and is testing server administration in the cloud, as well as the limits of DSpace repository software.
- The District of Columbia Public Library is using Amazon's EC2 service to host their website and according to Director of Information Technology, Chris Tonjes, "This provides us with rapid scalability, [and] redundancy (if one Amazon data center fails, a mirrored version of our site is on another and can come online in less than 30 minutes)."
- They are also using Amazon's S3 service to backup their ILS, their upcoming digital repository uses Flickr, and Amazon EC2, and the District of Columbia government will soon be adopting the GAPE version of Gmail as its enterprise mail platform. Tonjes adds that "Server virtualization + cloud computing give us great speed and

flexibility and typically are significantly cheaper than enterprise data center-based infrastructure”

- The Eastern Kentucky University Library is using Google Docs to collect responses to web forms, Google Calendar for instruction and meeting rooms, and Google Analytics to collect statistics about their website, catalog and blogs.

## **CLOUD BASED RESOURCES SHARING**

For resource sharing of library the cloud computing is one of the best platform, which helps in avoiding subscription of multiple copies to library and helps to save the document processing time, subscription cost for multiple copies to library and the resource sharing helps libraries needn't subscribe all the resources which is available on market. If the libraries are started sharing the resources among them in a planned manner they can serve user community very effectively using the existing cloud based resources sharing tools such as Google Docs, Amazon web storage etc.

## **CONCLUSION**

After seeing these cloud based services we can say that cloud computing is one of the very effective technology to implement the library services very lively on web environment and to provide the library services to the end users throughout the year on 24X7 bases. The users can get the 100% benefit of the library services. But in the context of security this technology is not with favor of user but if the user are ready to believe on the service provider concern to the content, data and services related issues than we can really make best use of the cloud computing technology in library services for providing the

best of the best services to end users.

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