

Cloud Computing and its Applications and Services in the Library and Information Centre

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Abstract:- In the Present scenario, cloud computing is an emerging trend. It involves different types of techniques and it provides Virtual and IT-related innovative applications and services through the internet. (Rakesh, 2017) In the modern era of cloud computing, the entire library services and applications depends upon cloud computing & also performs as a boon for libraries. Cloud computing is an important thing for users and it plays a vital role in the major fields of library and information centre and library professionals. In this paper, I have described applications and services at library and information centre in the era of cloud computing. (Nagalakshmi et al., 2013) Being the newest technology, cloud computing, had created more interest in library collections, services and applications, and systems will be driven into cloud computing and (Maitra & Mudholkar, 2011) with the quick growth of cloud computing many libraries and knowledge canters are moving towards cloud computing activity...n addition, it also explained both advantages and disadvantages. The purpose of this study may be helpful in classifying and stimulating future developments in the (Kaushik et al., 2013) library and information centre and library services and applications using cloud computing in the modern era.

Keywords:- Cloud computing, cloud services, deployment model, cloud applications.

I. INTRODUCTION

(Jamal, 2020) Cloud computing has become a more significant and most dominant technology to do major & difficult in the era of cloud computing. Cloud computing provide more opportunities and is growing fast due to, be f example, cost savings, time, accessibility as well as flexibility. Cloud computing is a confirmed and efficient technology meant for small to high and also the most recent approach to academia and research. Today, cloud computing is extensively applicable in many areas, such as library and information centre, knowledge centre, virtual library services and applications. Cloud computing is the latest model as an effective technique to sustain and to support implementing library services and applications, software; maintain data through the internet for e-knowledge activities in the tertiary education sector and especially in the library and information centre. Due to the latest library services and applications, library functions can be run and controlled with the help of cloud computing.

II. MEANING OF CLOUD COMPUTING

According to (NIST) the National Institute of Technology and Standards, Cloud computing is a model for enabling convenient on-demand network access to a shared pool of configurable computing resources(Ex. Networks, Server, Storage, Applications and services) that can be rapidly provisioned and related with minimal management effort or service provider interaction.”

III. ESSENTIALS OF CHARACTERISTICS: (Jamal, 2020) and (Dastagiri & Kumar, 2017)

- **Broad network access:** resources are available in the cloud over the internet, Users can access worldwide through devices (Mobile laptop, desktop).
- **On Demand self-service:** Without interaction with human beings or cloud service provider, End users can access resources of computing, for example; serve time, CPU, applications and storage etc.
- **Rapid Elasticity:** Elasticity is the effectiveness, and immediately increasing or decreasing of computing resources. Consumers depend on computing requirements. The service provider even though resources may be involved quick scaling out or quick scaling in as required by the user.
- **Resource pooling:** A cloud service contributors are pooled to support all the users by a multi-tenant model, according to users request, the various demand for physical as well as virtual systems being enthusiastically allocated and reallocated. For example storage, privilege, memory, connectivity, network bandwidth and virtual machines.
- **Measured Service:** Cloud system service provides, pay-per-use concept, The cloud system service is scrutinized and designed for managing by users and service providers for use services.

IV. TYPES OF CLOUD COMPUTING MODELS

There are two types of (Mate, 2016) cloud computing models.

- A. Service models
- B. Deployment models

A. Service models:

It is particularly based on the cloud computing platform; this type of service can access any user. Of these models, there are 3 types. Those are; Saas, Paas and Iaas,

- a) SaaS - Software as a Service:
This service may be accessible on software rental or based on lease.

- Under the cloud computing platform Software encloses as CMR or CAD/CAM can be accessed
- Service providers can manage the cloud infrastructure & platform on which the application is running.
- Based on multi-tenancy architecture.
- One of the latest delivery models in which associates data and software hosted on the cloud platform.
- Cloud suppliers set up and manage software in the cloud computing platform & also users can access application software through the cloud client.

For example: Google mail and SalesForce.com

Benefits: No extra cost for hardware, automated updates, accessible from any location, pay only for what you use.

- b) PaaS - Platform as a Service:
Platform as a service is also one of the cloud computing service. It is entitled PaaS. This provides services and products to end users or customers on a monthly rental basis.

- Cloud vendors offer services and products, for example, online operating environment, programming language implementation, online data base and online message.
- No need to buy and manage the hardware and software layers by customer
- Provide for software testing and development.
- Integration of offline development Tools and cloud.
- Automation online development and debugging.
- Can be specialized in a specific area like content management

The most important cloud computing vendors like Google, Amazon, Microsoft etc.

Benefits: Google App Engine for this, we need to invest in physical infrastructure, and panel various locations can work together: it suggests security, adaptability etc.

- c) IaaS – Infrastructure as a service:
Infrastructure as a Services, It is also one of the most important and basic cloud computing service models. It is designed for specific duration and price on an agreed basis
- Most basic hardware services such as physical resource networks etc.
 - Provider's offer computers, as physical or virtual machines, bock storage, firewalls, load balances, like switches and router.
 - Users install operating systems and application software
 - Maintaining & patching the OS and Application software users is responsible.

For Example: Amazon web services.

Benefits: On demand self-service, Exact Services and Broad Network Access etc.

B. Cloud Deployment Models:

(Maitra & Mudholkar, 2011) This refers to the location and management of the cloud infrastructure, in these models there are 4 types. Those are; private, public, hybrid and community

- a) Private Cloud deployment model:
- On-Demand Infrastructure, Owned by individual users Who manage and controls the applications.
 - Excellent selection for companies dealing with service level issues and data protection.
 - An Organization purchases physical resources & it provides them users to access.

For examples: UEC- Ubuntu Enterprise Cloud Powered by Encalyptus, Amazon VPC - Virtual Private Cloud, Microsoft ECI data center, VMware Cloud Infrastructure Suite

- b) Public Cloud deployment model:
Infrastructure made available to the public.
- Services are free or pay per use
 - (Gosavi & Shinde, 2012) Owned by an organization selling cloud

For example: Google App Engine, Amazon EC2, IBM Smart Cloud and Microsoft Window Azure.

- c) Community cloud deployment model:
- Several organizations can share Cloud infrastructure
 - This can be run by a third party or organization.
 - Compared to private cloud, costs will be more for end user

For example; (Gosavi & Shinde, 2012) Google Apps designed for Government Microsoft Government community cloud.

- d) *Hybrid Cloud Deployment model:* (Maitra & Mudholkar, 2011)
- Combine two or more clouds (Private, public or community)
 - Bound together with Proprietary or standardized expertise that allows data and application

For Example: Window Azure and VMware vCloud.

V. ADVANTAGES OF CLOUD COMPUTING (Maitra & Mudholkar, 2011)

- **Cost Efficiency:** Cost efficiency is, one of the most important methods in the cloud computing. It is very easy to maintain, utilize and upgrade.
- **Unlimited storage:** cloud computing provides unlimited storage capacity.
- **Recovery & Backup:** The entire technique of backup & recovery is very easy, compare to the traditional process of data storage. cloud based service suppliers usually handle data recovery & backup.
- **Easy to access:** In the cloud computing concept, information is very easy to access. If the user is not registered in the cloud, he /she cannot access, if the registered users can access the information from anytime, anywhere.
- **Location and Devices:** In cloud computing, location and devices, independence can be achieved that enables the users to access a system from any device, any location.
- **Create and collaborate:** Cloud libraries are also can build their own library services and simultaneously collaborating with other library services.
- **Resource File Sharing:** Cloud computing is useful for groups of libraries that can collaborate & they can store their resource documents and files in one place. For their end users, lots of resources enable them to give access
- **User centric:** In this situation, cloud computing is very helpful. While providing library services to the users, library users are always in a centric position.

VI. DISADVANTAGES OF CLOUD COMPUTING

- **Security & Privacy:** This is the main drawback of cloud computing. Because there is no safety & privacy in storing data and information, especially when it comes to sensitive information and data stored on the cloud is at risk because of viruses, theft etc. and also data loss due to improper backup and system failure.
- **Network connectivity & bandwidth:** (Maitra & Mudholkar, 2011) The cloud computing . These are the major disadvantages of the internet. Due to network issues or any problem with the server, if the internet connection goes down, organizations can endure loss of data connectivity till the time it is set up and also cloud computing services stand to be closed. In the low speed internet bandwidth connectivity will not work properly.
- **Dependency:** In the cloud platform, hidden dependency is the main drawback and another drawback of cloud computing is vendor - lock - in
- **Limited Control & flexibility:** There is restriction to control and convenience by service seekers in the form of cloud computing, cloud computing model shall create a monopoly service supplier by third party.
- **Segregated:** segregated is one of the drawbacks of cloud computing. In this model, the data is not segregated. It is distributed through the cloud network and cause a problem when specific data needs to be segregate.

VII. CLOUD COMPUTING APPLICATIONS IN LIBRARY AND INFORMATION CENTRE (Kaushik et al., 2013)

- **Building digital library or Repositories:** Nowadays Each and every library will have a library to implement that digital library using some of (Mate, 2016) library software such as Dspace and Fedora with these software building digital libraries & repositories. Dura cloud also gives an entire solution for developing digital library and repositories, and also provides open source code and a standard interface for both software.
- **Searching library data:** A very important service is searching library data. In the cloud computing platform, through web share management is offering a variety of services like (Mate, 2016) circulation, cataloguing, acquisition and other library related services. For example: OCLC World Cat Service.
- **File Storage:** In the cloud library, important files can be store, and also these files can be shared and provide access through the internet, time - time to individual software & hardware. Cloud computing provides various services those are; Google Doc, Drop box, Flickr, Jungle disk and Sky drive etc. (Mate, 2016) LOCKSS - Lots of Copies Keeps Stuff Safe and CLOCKSS - Controlled LOCKSS these tools are used for the purpose of digital preservation.
- **Hosting website:** In the present scenario, many libraries, including organization or Institutes desired to host their own website, hosting and maintaining their own server on cloud computing through third party service providers. Google site server is an example of service, from various locations (Mate, 2016) hosting websites outside of the library's server and allowing for multiple editors to access the site.
- **Searching for scholarly content:** In the current scenario, INFLIBNET- Information and library Network centre has been integrated Knimbus, It has decided (Mate, 2016) to Knowledge innovation and collaborative space for researchers and scholars and also the UGC INFONET DIGITAL Library consortium is arranging search and retrieve scholarly contents attached in that.
- **Library Automation :** Library automation cloud computing is very supportive and there is no need to buy any applications, software and servers. Polaris gives different cloud services such as cataloguing, acquisition, digital contents & the latest technologies for library automation in the library field. MARC 21 XML, Z39.50 and UNICODE various standers to supporting library automation.
- **Building community Power:** Facebook and Twitter are well- known social networking sites. By using these tools to build community power.

VIII. CLOUD COMPUTING SERVICES IN LIBRARY AND INFORMATION CENTRE

- **Serial Solutions:** (Rakesh, 2017) Serial solutions can be managed easily with the help of the cloud computing platform.
- **Delivery Customized services:** Delivery customized services which focus on the cloud platform.
- **Open Infrastructure** (Ex. Amazon, EC2): Open infrastructure is the major advantage in cloud computing platform.
- **Publishing** (Ex. Wordpress.com, twitter, Youtube): In a consequence of the cloud computing platform, publishing has become very easy.
- **Integrated library Systems:** Integrated Library Systems are possible because of the cloud computing environment.
- **Digital asset management:** Due to the cloud computing platform, digital asset management can be achievable.
- **Electronic resource Management Systems:** With the help of cloud computing Electronic resource management systems can be executed very easily.
- **Web based management Systems:** Because of the cloud computing platform, Web-based management systems can be formulated.
- **OCLC based ILS services:** Through the cloud computing environment, OCLC based ILS services can be provide.
- **Circulation, acquisition, cataloguing, and search:** In cloud computing, the Maximum Library functions can be achieved very easily.
- **Cloud based services and data collaboration:** (Ex. LOCKSS): Without any problems, cloud services & data collaboration can be complete with the help of cloud - based environment.

IX. CONCLUSION

In this study, cloud computing models and concepts provide an overview of cloud computing applications and their services in a well-organized library and information centre for the purpose of improvement and development. No-Doubt, Library and information centre are moving towards cloud computing tools in the scenario. Because of cloud computing, building digital library & repositories, social networking with a variety of innovations and some problems interrelated to safety, privacy and legal issues are still not fully resolved. Hence, a library and information centre has to think seriously before integration the library applications and services. (Maitra & Mudholkar, 2011) The cloud based technologies provide reliable and rapid services to end users and also cloud computing tools & techniques are applied to libraries and information centre, not only to develop the quality of services and utilization of resources, but also to create broad use of cloud computing for professional work. Moreover, all the library and information centre applications and services have become very easy to perform through cloud computing. In addition to this, lack

of nominal expertise & Financial Crunch cloud computing is developing into more relevant in the modern era.

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