

Cloud Computing: A Tool for Library and Information Services and Activities

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Abstract: *Cloud computing is a fast emerging technology of Information Communication Technology because of its own benefits such as low cost, remote accessibility anywhere anytime, flexibility. This paper deals with definition of cloud Computing, Characteristics, model of Cloud Computing, and also Library and Information centres activates and services with cloud computing.*

Keywords: *Cloud Computing, SaaS, PaaS, IaaS, Characteristics of Cloud, Types of Cloud Computing, Libraries and Cloud.*

I. INTRODUCTION

In this era of digital revolution most of the information in digital form. Size of the information and other digital material is very huge one single PC or organization is not able to handle or maintain it. The maintenance of storing information and other digital material or applications and programme is very difficult and very costly. And here we come towards cloud computing. Cloud computing is bridge between computing resources and end user

Cloud computing is system for end users to provide services through infrastructure which is a not really owned by end user. It is an infrastructure of service provider not an end users or organization or person. Cloud computing made easy to create separate an infrastructure for services provisioning from the library of providing end user services. Cloud computing provides library users the way to share scattered resources, information and services that related to different organizations, institutes or website. It shares scattered resources through network to the library users. Cloud computing is a virtual bridge of computing resources throughout internet. Many companies, such as IBM, Joyent cloud, Amazon, HP, Google, and Microsoft and so on, are using their R&D departments in developing Cloud Computing systems and enhancing their services and system. To provide for a larger amount of users Libraries are using computers for providing services such as Library Management Software, website or portal, digital library or institutional repository, virtual library etc. This services are either maintained by library and information centre's computer staff or library staff. It needs investment on

hardware, software, and staff to maintain these services and keep backup and upgrade as and when new version or upgrades of the software introduced. Most of the time it is found that library staff is not able to manage it or he gets difficulties in maintaining services without help or support from IT professionals. Today cloud computing is increasing its importance in the field of Libraries and Information Centres for the services. Because it provides services to Libraries and Information Centres without much problems as a third party. Cloud computing manages server, upgrades and data backup of Library Information software or Systems.

II. OBJECTIVES

- To Define Cloud computing.
- To understand the characteristics of cloud computing
- To understand the models of Cloud computing.
- To understand the types of cloud computing
- To identify Library and Information Centres activities and services with cloud computing .

Definition of Cloud Computing:

- 1) Forrester defines cloud computing as: "A pool of abstracted, highly scalable, and managed compute infrastructure capable of hosting end customer applications and billed by consumption."(<https://www.forrester.com>)
- 2) Another good and authentic definition of cloud computing is the definition issued by the U.S. National Institute of Standards and Technology (NIST) September, 2011.

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. This cloud model promotes availability and is composed of five essential characteristics, three service models, and four deployment models.

Characteristics of Cloud Computing

According to NIST definition of cloud computing we can elaborate following five characteristics i.e on-demand service, broad network access, resource pooling, rapid elasticity, and measured service.

- D) **On-demand self-service-** A consumer can unilaterally provision computing capabilities, such as server time and network storage, as needed automatically without requiring human interaction with each service provider.
- II) **Broad network access-** Capabilities are available over the network and accessed through standard mechanisms that promote use by heterogeneous thin or thick client platforms (e.g., mobile phones, tablets, laptops, and workstations).
- III) **Resource pooling-** The provider's computing resources are pooled to serve multiple consumers using a multi-tenant model, with different physical and virtual resources dynamically assigned and reassigned according to consumer demand. There is a sense of location independence in that the customer generally has no control or knowledge over the exact location of the provided resources but may be able to specify location at a higher level of abstraction (e.g., country, state, or datacenter). Examples of resources include storage, processing, memory, and network bandwidth.
- IV) **Rapid elasticity-** Capabilities can be elastically provisioned and released, in some cases automatically, to scale rapidly outward and inward commensurate with demand. To the consumer, the capabilities available for provisioning often appear to be unlimited and can be appropriated in any quantity at any time.
- V) **Measured service-** Cloud systems automatically control and optimize resource use by leveraging a metering capability at some level of abstraction appropriate to the type of service (e.g., storage, processing, bandwidth, and active user accounts). Resource usage can be monitored, controlled, and reported, providing transparency for both the provider and consumer of the utilized service.

Cloud Computing Service Models

There are three cloud computing models as follows:

- i) **Software as a Service (SaaS):** This model is provide application to the customer, as a service on demand. Only one gateway of the service runs on the cloud & multiple end users are serviced. Other hand customer's side, there is no need for 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 G-Mail, Youtube, Google Scholar Salesforce, Microsoft, Yahoo, Twitter, Facebook, Salesforce, Workday, Concur, Citrix GoToMeeting, Cisco WebEx. Common SaaS Use-Case etc.
- ii) **Platform as a Service (PaaS):** These service is a choice based service according to your requirement you have to develop software or choose a software. The customer or Libraries and information Centres has the freedom to build his own applications, 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 Linux, Red Hat Open Shift J2EE, Ruby etc. Google's App Engine, Force.com, AWS Elastic Beanstalk, Windows Azure, Heroku, Apache Stratos etc are some of the popular PaaS examples.

- iii) **Infrastructure as a Service (IaaS):** In an IaaS model, a third-party provider hosts hardware, software, servers, storage and other infrastructure components on behalf of its users. IaaS providers also host users' applications and handle tasks including system maintenance, backup and resiliency planning. IaaS platforms offer highly scalable resources that can be adjusted on-demand. The customer would typically deploy his own software on the infrastructure. Some common examples are Amazon, GoGrid, 3 Tera, etc. (<http://nvlpubs.nist.gov/nistpubs/Legacy/SP/nistspecialpublication800-145.pdf>)

Types of Cloud Computing

Cloud computing is defined to have several deployment models, each of which provides distinct trade-offs for agencies which are migrating applications to a cloud environment. NIST defines the cloud deployment models as follows

- i) **Private cloud:** The cloud computing infrastructure is operated only for an organization. It may be owned by the organization or a third party and may be on premise or off premise. For example any Library and information centre creates Virtual library this can we said private cloud computing.
- ii) **Community cloud:** One or more organizations when used same cloud infrastructure it can we said Community cloud. It is shared by several organizations and supports a specific community that has shared concerns (e.g., mission, security requirements, policy, and compliance considerations). It may be managed or own by the organizations or a third party and may exist on premise or off premise.
- iii) **Public cloud:** The cloud infrastructure is made available for open use by the general public. It may be owned, managed, and operated by a business, academic, or government organization, or some combination of them. The word public itself explain that it is for general public It exists on the premises of the cloud provider. For examples of public clouds include Amazon Elastic Compute Cloud (EC2), IBM's Blue Cloud, Sun Cloud, Google App Engine and Windows Azure Services Platform.
- iv) **Hybrid cloud:** Combination of two or more cloud infrastructure is called Hybrid cloud (private, community, or public). This clouds remain unique entities but are bound together by standardized or proprietary technology that enables data and application portability (e.g., cloud bursting for load-balancing between clouds).

III. LIBRARY AND INFORMATION CENTRES ACTIVITIES AND SERVICES WITH CLOUD COMPUTING

Today we are living in the age of information. Information technology plays a very vital role in handling library resources ranges from collection, storage, organization, processing, and analysis of information dissemination. Library and Information Centres are facing many challenges in the profession . Cloud Computing concept added to ease the practices in the libraries and satisfy the needs of the knowledge society. With the advent of Cloud Computing, libraries have become automated which is the basic need towards advancement followed by networks and more effort are towards virtual libraries. The emergence of digital library, internet usage, web tools application for libraries, consortium practices leads to the advancement in library profession. Cloud computing is a revolution in the IT. This revolution changed the boundaries of Library and Information Centres. The trend in Library and Information Centres is use of cloud computing for various purposes and services to meet economy in library functions and services. Since cloud computing is a new and core area the professionals should be aware of it and also the application of cloud computing in library science. In Library and Information Centres cloud computing can be used following activities and services.

- **Virtual Library**
- **Digital Library**
- **Institutional Repository**
- **Library Automation**
- **OPAC**
- **Web Hosting**
- **Ferreted Search**
- **Integrated Library System**
- **Book Acquisition**

IV. CONCLUSION

Hence cloud computing is new technology in the field of IT but it is emerging as magic. We need not to worry about our data and infrastructure, because someone else is taking care of it. As a Library and Information professionals we have to take benefits this advantage. As a mediator between information and its user we have to manage the information, actually we are the managers of this information. We have to manage lot of things in this digital and virtual era. Cloud computing is playing vital role in provide Library and Information services.

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