International Scientific Journal of Engineering and Management (ISJEM) ISSN: 2583-6129
Special Edition: Volume: 04 PKDAL – 2025 DOI: 10.55041/ISJEM.PKDAL030
An International Scholarly || Multidisciplinary || Open Access || Indexing in all major Database & Metadata

Cloud Computing: An Innovative Tool for Library Services

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Abstract

Cloud computing is a new technique of Information Communication Technology because of its potential benefits such as reduced cost, accessible anywhere anytime as well as its elasticity and flexibility. In this Paper defines cloud Computing, Definition, Essential Characteristics, model of Cloud Computing, Components of Cloud, Advantages & Drawbacks of Cloud Computing and also describe cloud computing in libraries.

➢ **Keywords:** Cloud Computing, SaaS, PaaS, IaaS, Components of the Cloud, Models of Cloud Computing, Benefits of Cloud Computing in Library Servicesand Disadvantages, Libraries And Cloud.

Introduction

We are living in the age of web technology which shows its effect on the each and aspects of the human life. Technology plays a vital role in the field of library science also. Library functions like acquisition, archiving, processing and organization facing many new challenges due the application of information technology in the field of library. Each day bring new challenges as well as new technology applications in library field as it is necessary to satisfy the changing need of the information driven society. Nowadays cloud computing is the buzz word in the field of the library. As the cloud computing is still a quite new technology is the field of library, library professionals should be aware about this technology and due this needed focus this paper provides a brief overview about this technology.

Libraries Integrated Library Management Software (ILMS)

Computers are used to run services such as websites or portals , digital libraries or institutional collections. These are maintained either by the parent institution's computer staff or by library staff. Investments are required in hardware , software and staff to maintain these services and to back up and upgrade them when new versions of the software are released. In most cases, library professionals who are not trained to maintain servers find it difficult to perform some of these activities without the support of IT staff within or outside the organization. Now cloud computing A new forum has emerged in the field of libraries , which is giving blessings to run various ICT services. Without much trouble because third-party services will manage and upgrade the servers and back up the data .

Definition of cloud computing

According to the National Institute of Standards and Technology (NIST) “ Cloud computing is the ubiquitous , convenient , and scalable use of a shared pool of configurable computing resources (e.g., networks , servers ,

storage , applications, and services) It is a model for enabling on-demand network access that can be rapidly provisioned and released with minimal management effort or service provider interaction .”

According to Gartner Group Cloud computing is "a style of computing in which highly scalable and flexible IT-enabled capabilities are delivered as a service to external customers using Internet technologies."

According to Forrester cloud computing is defined as "a pool of abstract, highly scalable, and managed computing infrastructure capable of hosting end-customer applications and billed by usage."

Cloud computing is a type of computing that relies on sharing computing resources rather than having local servers or individual devices to handle applications.

- **Essential features of cloud computing**

NIST has identified five essential characteristics of cloud computing: on-demand services broad network access Resource aggregation, rapid elasticity, and measured service. Cloud services demonstrate their relationship and differences with traditional computing approaches. The following are five essential features On demand

Self-service: Without human interaction with a customer service provider Server time and as needed Can unilaterally provision computing capabilities such as network storage.

Broad network access: Capabilities are available over the network and accessed through standard mechanisms Which encourage use by heterogeneous thin or thick client platforms (e.g. mobile phones, laptops, and PDAs) as well as other traditional or cloud based software services.

Resource Aggregation: A provider's computing resources are pooled to serve multiple customers using a multi-tenant model in which they are dynamically assigned and reassigned based on customer demand. A certain level of location independence is such that the exact location of the resources provided to customers is There is usually no control or knowledge of the location , but they may be able to specify the location at a higher level of abstraction (e.g. country , state, or data center) Examples of resources include storage, processing, memory, network bandwidth, and virtual machines. Private clouds can also be shared by a single organization. Combines resources in different parts.

Rapid flexibility: In some cases capacity can be quickly and flexibly automated Can be released to scale out and scale rapidly. Available capacity for provisioning to customers Often appear unlimited and can be purchased in any quantity at any time.

Measured Service: For the type of cloud system service (e.g. storage , processing, bandwidth or active user accounts) metering at some level of abstraction that is appropriate Automatically controls and optimizes resource usage by leveraging capacity. Resource usage can be monitored , controlled, and reported providing transparency for both the service provider and the customer.

Multi-tenancy: This is the sixth feature of cloud computing supported by the Cloud Security Alliance. It Policy-driven implementation , segmentation , isolation , governance, service levels and Indicates the need for

chargeback/billing models. It is important to recognize that cloud services are often but not always, enabled in conjunction with virtualization technologies. are not used by However the abstraction of resources There is no requirement to connect to virtualization technology, and many offerings include virtualization via a hypervisor or operating system container Not used.

- **Cloud computing models**

Cloud providers offer services that can be divided into three categories.

Software as a Service (SaaS):

In this model a complete application is offered to customers as an on-demand service. A single piece of the service runs on the cloud and is served to multiple end users. On the customer side there is no need to make an upfront investment in servers or software licenses while for the provider costs are reduced as only a single application needs to be hosted and maintained. Today SaaS It is offered by companies like Google , Salesforce , Microsoft , Zoho, etc.

Platform as a Service (PaaS):

A layer of software or development environment is included as a service and PaaS is offered on top of which other higher-level services can be built. The customer has the freedom to build their own applications that run on the provider's infrastructure. To meet the manageability and scalability requirements of the applications PaaS Providers offer a predefined combination of OS and application servers Such as the LAMP platform (Linux, Apache, MySql and PHP), restricted J2EE, Ruby, etc. Some popular PaaS like Google's App Engine, Force.com etc. There are examples.

Infrastructure as a Service (IaaS):

IaaS Provides basic storage and computing capabilities as standardized services over a network. Servers, storage systems , networking equipment, data center space, etc. are integrated. and are made available to handle workloads. The customer will typically deploy their own software on the infrastructure. Some common examples are Amazon, GoGrid, 3 Tera, etc. Cloud computing is defined as a number of deployment models , each of which provides distinct trade-offs for agencies that are migrating applications to a cloud environment. NIST defines cloud deployment models as follows:

Private Cloud: Cloud infrastructure is operated exclusively for a single organization. It can be managed by the organization or by a third party and can be on-premise or off-premise.

Community Cloud: Cloud infrastructure is shared by multiple organizations and supports a specific community that has shared concerns (e.g. goals, security requirements, policy, and compliance). It can be managed by the organization or a third party and can be pre-based or outsourced.

Public Cloud: Cloud infrastructure is made available to the general public or a large industry group and is owned by the organization selling the cloud service.

Hybrid Cloud: Cloud infrastructure is a structure of two or more clouds (private, community, or public) that remain unique entities but are tied together by standardized or proprietary technologies that Enables data and application portability

Elements of the Cloud

A cloud system consists of three major components: client, data centers, and distributed servers. Each component has a specific purpose and plays a specific role.

Client: Clients Clients are in a cloud computing architecture similar to clients in an everyday local area network (LAN) These are computers that reside on the end-users desks. This is where the front-end Applications are installed. They can be laptops , tablet computers, mobile phones or PDAs . In short, the client is the one on the user side. Devices and clients are used to manage information. The physical specification brings clients into the following three categories.

• Mobile- Mobile devices include smart phones, tablets or PDAs.
• Thin- These are dump terminals that do not have hard disk space while it allows the servers to do all the processing activities. It only displays information.
• Thick- This type of client is a regular computer which uses a web browser like Firefox or Internet Explorer to connect to the cloud.

Data Center: A data center is a collection of servers where the applications to which a user subscribes are hosted. are hosted. The nature of data center servers can be virtualized where software can be installed on the main physical server but appear to the user as a separate server identity. Thus half a dozen virtual servers can be running on a single physical server.

Distributed Servers: You don't always need to have just one server in your location in a data center. Sometimes servers are placed in geographically different locations around the world. But from the end user's perspective it appears as if the data is coming from a central server. In this view if one server is down or If it is not available for a client request due to congestion etc. other services are activated to serve the clients. To provide seamless service to clients data in these servers is frequently synchronized.

➢ **Benefits of Cloud Computing in Library Services**

• Cost reduction – The ability to instantly and in some cases automatically in crease or decrease the use of hardware or software resources.

• Scalability - “Pay as you go” which allows for more efficient control of costs. Low investment, low risk - instant access to proposed resource improvements (Hardware and Software) and Debugging.

• Support included - Enjoy the most advanced security procedures, availability and performance from providers with experience and knowledge in this type of service. Greater security and ease - access to resources from any geographical point and the ability to test and evaluate resources for free.

Portability - Since the service is available on the web the service can be accessed through a browser from any part of the world.

• Adjustable storage - In a traditional system, if the server is less than what you have. The server must be replaced with a new one. In this computing the storage capacity can be adjusted according to the needs of the library as the storage is controlled by the service provider.

• Cloud OPAC- Most libraries in the world have catalogs available on the web. These catalogs are available in their libraries through local servers making them available on the web. If the libraries catalogs are made available through the cloud it will be more beneficial for users to find the availability of materials.

➢ **Disadvantages of cloud computing**

The disadvantages are actually similar to those faced by organizations that host information off-premises. While , in the case of hard-copy document files and at the enterprise level , this fear disappeared a few years ago , given the benefits of reducing costs in infrastructure management and security , in the case of digital data there is still a great fear of putting our information in the hands of third parties. This fear arises from issues of privacy, theft, loss, etc. Yet the use of Web 2.0 and social networks has become so widespread that people are now increasing the likelihood of doing so. Nothing is more sensitive than banking or personal data yet this data is stored on servers over which we have no domain or ownership. An organization may decide to move progressively towards cloud computing By uploading applications that are not very sensitive such as messaging, room booking, meeting management, Expense liquidation and vacation management. After this learning process more valuable information, i.e. "business intelligence" can be uploaded to the cloud along with the organization's corpus. In the case of libraries and information centers , this information will include management funds and network transactions.

Libraries and Clouds

Today we are living in the information age. Information technology plays a very important role in transferring the library Resources include the collection, storage, organization, processing, and analysis of information dissemination. The use of information technology has brought many challenges to the library sector. New concepts and technologies are being added to simplify the practices in libraries and meet the needs of the knowledge society. With the advent of information technology libraries have become automated which is a basic need for progress followed by more efforts towards networks and virtual libraries.

The rise of digital libraries the use of the Internet , the application of web tools for libraries consortium methods have led to progress in the library profession. Cloud computing is a completely new IT technology and is considered the third revolution in IT after the PC and the Internet. The latest technological trend in library science is the use of cloud computing for various purposes and to achieve economies in library operations. Since cloud computing is a new and key area, professionals should be aware of it and the use of cloud computing in library science.

Conclusion

Use of cloud computing is very new phenomena in the field of library and information science thus not many libraries are using this technology. However cloud based services offer many benefits to the libraries and helpful to the libraries for automating their library services and function. Hence library professionals should think positively about using the cloud computing services in their libraries and offer the more reliable and speedy information services to the library patrons.

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