

Libraries and Cloud Computing

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Abstract: Now a days Libraries are suffering from common problems like metadata, low level of efficiency, huge cost of knowledge & information, IT Infrastructure etc. Cloud Computing would help us in bridging the gap between Digital Libraries and Information Technological resources. Sharing the data among Libraries will reduce the overall cost and increase the efficiency in all aspect. It will also enhance the user’s knowledge and will help in making the Libraries a lot more scalable.

Keywords: Cloud Computing, Architecture, Types, Deployment

1. Introduction

The term “Cloud” is analogical to “Internet”. The term “Cloud Computing” is a phrase used to describe a variety of computing concepts that involve a large number of computers connected through a real-time communication network i.e. “Internet”.

Hence Cloud Computing is Internet based computing where virtual shared servers provided software, infrastructure, platform, devices and other resources and hosting to customers on a pay-as-you-use basis i.e. user(s) have to pay for all the services/resources which he/she wants to avail as per their need. Thus Cloud Computing user(s) does not own the physical infrastructure but they have to rent the usage from a third-party provider(s) or through common centers and built on servers.

User(s) can access these services available on the “Internet Cloud” without having any previous known-how on managing the resources involved. Thus, user(s) can concentrate more on their core business processes rather than spending time and gaining knowledge on resources needed to manage their business processes.

Objectives : The objectives of Cloud Computing are :

- (1) To fulfill the need of Resource Sharing.
- (2) To cut down the cost of the IT infrastructure.
- (3) To improve the services of the Libraries.

Characteristics of Cloud Computing :

- (1) **Self Healing :** Any application or service running in Cloud Computing has the property of self healing i.e. in case of failure of an application or service, there is always a backup of the said application or service to take over it without disruption.
- (2) **Multi User(s) Support :** With Cloud Computing every application is having multi user(s) support feature. This is done by visualizing the servers on the available machine pool and then allotting the server to multi user(s).
- (3) **SLA Driven :** Cloud Computing services are SLA (Service Level Agreement) driven i.e. user(s) can terminate the contract any time either he is satisfied or his need is over.
- (4) **Flexibility :** Another feature of Cloud Computing services is that it is flexible. It can be used to serve

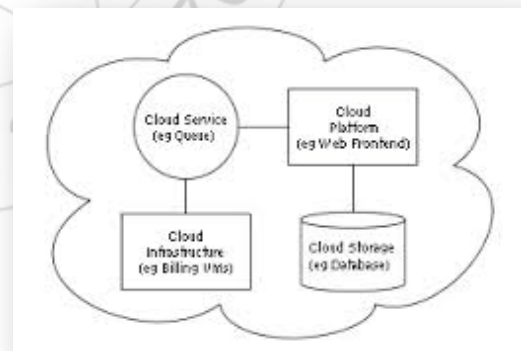
a large variety of workloads i.e. small user(s) application to commercial applications.

Cloud Computing Architecture

Cloud Computing Architecture consists of two components viz. “Front End” and “Back End”. The Front End of the Cloud Computing System comprises the client’s device and some applications are needed to access the system.

The Back End refers to the cloud itself which may encompass various computer machines, servers and data storage devices. Group of these clouds make a whole cloud computing system.

The whole system is administered via a central server that is also used for monitoring clients demand and traffic ensuring smooth functioning of the system. A special type of software called “MIDDLEWARE” is used to allow computers to connect on the network and to communicate with each other as well. Making copy of data is called redundancy and Cloud Computing service providers provide data redundancy.



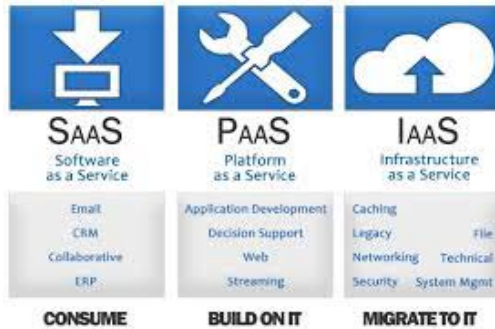
Cloud Computing Architecture

Types of Cloud Computing

Cloud Computing can be divided into three categories :-

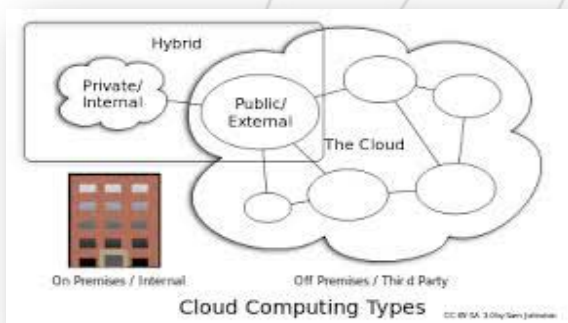
- (1) **Software as a Service (SaaS) :** In this model, a complete application is offered to the user(s), as a service on demand. User(s) is allowed to use software accessible through net and can use it as per his requirement. There is no need to acquire software license or to purchase it.

- (2) **Platform as a Service (Paas)** : Here software or development environment is encapsulated & offered as a service, upon which other higher levels of service can be built. The user(s) has the freedom to build his own applications which can run on the provider’s infrastructures.
- (3) **Infrastructure as a Service (IaaS)** : The Cloud Computing vendors offer infrastructure as a service. User(s) can avail hardware services such as processors, memory, networks etc on agreed basis for specific duration and price.



Types of Cloud Computing

Deployment Models : There are four different deployment models of Cloud Computing



- (1) **Private Cloud** : Private Cloud describe offerings that deploy Cloud Computing on private networks. It consists of applications or virtual machines in a company’s own set of hosts. They provide the benefits of utility computing shared hardware costs.
- (2) **Public Cloud** : Public or external cloud is traditional Cloud Computing where resources are dynamically provisioned on self service basis over the internet. Technically there may be little or no difference between Public and Private Cloud architecture however security considerations may be different for services.
- (3) **Community Cloud** : Community Cloud is established when several organizations have similar requirements. This is quite more expensive option as compared to Public Cloud. However, this option may offer a high level of privacy, security and policy compliance.
- (4) **Hybrid Cloud** : Hybrid Cloud means either two separate clouds joined together i.e. Public, Private, Internal or external or a combination of virtualized Cloud server.

Benefits of Cloud Computing : Benefits of Cloud Computing are

- (1) Reduction of capital expenditure on hardware and software deployment.
- (2) Consumption is usually billed on a utility like phone bills, electricity bills etc.
- (3) User(s) can terminate the contract at any time and are often covered by Service Level Agreement (SLAs) with financial penalties. Which reduces risk and uncertainty and ensures return on investment (ROI).
- (4) Location independence is there so long as there is access to the internet.
- (5) Allows the user(s) to focus on their core requirement.
- (6) Increased competitive advantage.
- (7) Easy to maintain as they don’t have to be installed on each user(s) computer.
- (8) Increased security at a much lesser cost as compared to traditional standalone applications.

Risk Factors evolving in Cloud Computing

Although Cloud Computing has many advantages & benefits over risks but some of the risk factors evolving in Cloud Computing should also be considered :

- (1) Cloud Computing Providers or Vendors trustworthiness.
- (2) Privacy and confidentiality of personal, sensitive or regulated data and information.
- (3) Legal and regulatory compliance.
- (4) Cyber Security and support for incident forensics.
- (5) Records preservation, access and management.
- (6) Service availability and reliability.
- (7) Data and Intellectual Property Issues.
- (8) Operational Flexibility.

Scope of Cloud Computing in Libraries

Cloud Computing allows a library to respond more quickly to services needs by allowing a library to scale its technological resources, employ a pay on demand resource model. I will also helpful in providing IT infrastructure in the library which could be difficult to acquire and manage by every library. Some of these services offload technical management responsibilities and even proved a level of data management for libraries.

Cloud Computing has large potential for libraries. Libraries can upload more and more contents in to the Cloud which user(s) would be able to browse or download it resulting saving the money and time of the reader and library staff. All historical and rare documents would be scanned into a comprehensive, easily searchable databases of Cloud and would be accessible to any researcher.

But using Cloud Computing means more than purchasing access to a specified system. A number of companies offer dedicated virtual platforms that enable libraries to completely control their environment. Many libraries are having online catalogues and bibliographic databases with OCLC. More frequent online catalogues are linked to consortium that share resources.

By establishing a Public Cloud Computing in libraries, it not only can conserve library resources but also can improve its user(s) satisfaction which will be the ultimate goal of any library to offer appropriate comprehensive and multi-level services for its users.

Furthermore it is must for all libraries to make workflow simpler and improve end-user customer services up to the mark by using the means of Cloud Computing globally.

Some Live examples where Libraries are adopting Cloud Computing

- (1) **OCLC** : OCLC Online Computer Library Center is a nonprofit, membership, computer library service and research organization dedicated to public purpose of gaining knowledge. In a sense OCLC has been functioning as a Cloud Computing vendor, they provide cataloguing tools over the internet and allow member(s) to access the data from their centralized data store.
- (2) **Library Thing** : Library Thing is also one of the sites that combine aspects of social networking and Cloud Computing. Library Thing offers services which are just like social networking site which authorizes people to contribute information and suggestion about books and allow them to interconnect globally to share interests.
- (3) **Reed Elsevier** : Reed Elsevier is a service provider for scientific information working with hospitals to provide point in time information to medical technicians as they needed.
- (4) **Amazon and Google** : These are among the leading enterprises also providing solutions for libraries by having partnerships between library automation vendors. For many years they are working for the dissemination of information and also taking interest in library solutions using “AAP Search Engines”.
- (5) **Dura Space** : Dura Space provides a hosted service and open technology to help organizations and end users effectively utilize public cloud services. These services can work on Amazon, Atoms etc and other Cloud services.
- (6) **Terra Pod** : Terra Pod is a Digital Video Library. It allows the user to outsource upload and data creation to the creators of the contents.

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2. Conclusion

Cloud Computing offers to solve the major problems of libraries. This new technology holds the concept of cost cutting and adopting better IT capabilities in libraries to provide better user satisfaction and their need. Although study of Cloud Computing is still in the initial stage but in this paper I have tried to express how Cloud Computing is more beneficial and the need of libraries in this present era.

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