CLOUD COMPUTING: ITS NEED, PROBLEM, AND BEST PRACTICES IN THE LIBRARIES SECTOR

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Abstract: This paper discusses the fundamentals of cloud computing along with its characteristics, types, advantages, needs, and best practices in the academic. Here, we present the problems faced by libraries and the developmental efforts to overcome those problems. Cloud computing is being used in every domain like a business, industries, corporate sectors. One can access hardware and software promptly using the internet. Therefore, libraries all over the world try to implement cloud computing to take advantage of its features and services and try to improve the infrastructure and services. However, cloud computing is not a magic solution for all. There are also some disadvantages with its aspects of cloud computing; it also prescribes the best practices to implement it in a library environment to gain the maximum advantage from it. The intention of this paper is to tackle this type of decision. Indeed, different types of CC deployment are available; selecting a suitable one is extremely important, for it can alter the requirements of various stakeholders: students, teachers, administrative staff (especially the IT department members), etc., apart from affecting the overall performance of the existing facility, such as a laboratory. Naturally, proper decision-making will have to carry out an analysis from different perspectives while addressing such strategic interventions by any educational institute.

Keyword: Cloud computing, Cloud Architecture, Cloud Architecture, IaaS, PaaS, SaaS

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1.0 Introduction

Cloud computing provides resources, from servers and storage to enterprise applications such as email, security, backup/DR, voice, internet. Cloud has an immediate, flexible, scalable, secure, and available hosting environment while providing savings to corporations in cost, time, and resources.

Cloud Computing is a totally new IT technology, which is poised to be the third big revolution after the PC and the Internet in IT. To elaborate, Cloud Computing is an offshoot of Distributed Computing, Parallel Computing, Grid Computing, and Distributed Databases. A fundamental difference from the traditional way of implementing compute services that Cloud Computing brings along is the focus on making all distributed tasks be executed on a huge number of distributed computers rather than one local computer or remote server. This means the enormous amounts of data and resources of these personal computers, mobile devices, etc., can be joined and offered public access for use via Cloud Computing. Thus, cloud computing provides users with shared resources across internet resources. Cloud computing is an amalgamation of several efforts in large computing with seamless access to virtually limitless resources.

Introduction: A Golden Era in Computing

- General purpose graphic processors
- Virtualization leveraging the powerful hardware
- Superior software methodologies
- Wider bandwidth for communication
- Powerful multi-core processors
- The explosion of domain applications

What is Cloud Computing?

Cloud computing is a combination of software and hardware computing delivered as a network service. The term cloud refers to internet and networks, in other words, we can say that cloud is something

which is present at the remote location.
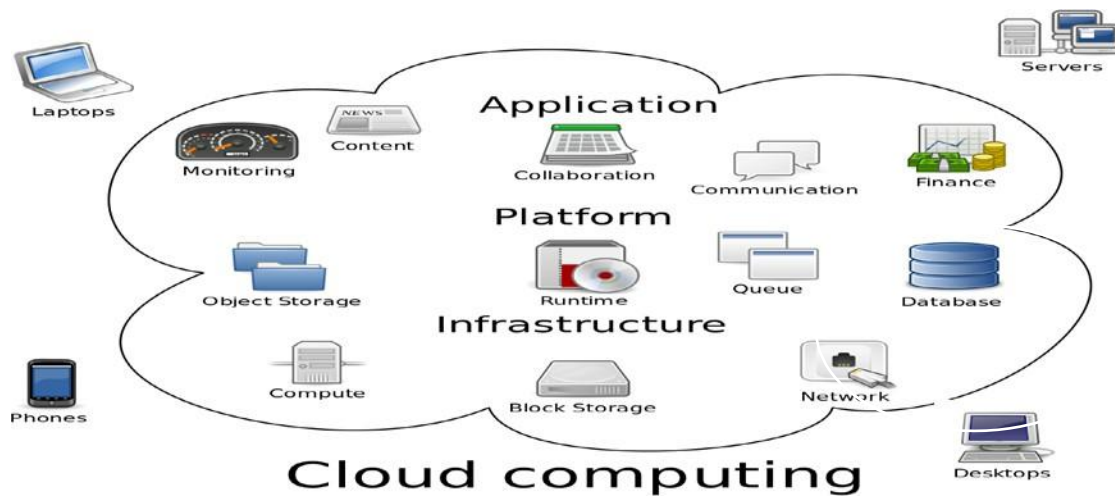
Cloud can provide services over the network: WAN, LAN, and VPN. An application such as e-mail, web conferencing, CRM, all runs in the cloud Cloud computing refers to manipulating, configuring and accessing the online .it offers online data storage, infrastructure, and application.

Cloud computing is a computing technology that uses the internet and remote servers to maintain data and application. Cloud computing provides a variety of computing resources, from servers and storage to enterprise applications such as email, security, backup/DR, voice, etc. It provides the immediate, secure, flexible, and a hosting environment and useful for saving corporations money, time and resources.

A Brief History of Origins and Influences- The idea of Computing in a 'Cloud' traces back to the origins of utility Computing, a concept that computer scientist John Macarthy Publicly in 1961.

In 1969, Leonard Kleinrock, a chief scientist of the Advanced Research Projects Agency Network or ARPANET Project that seeded the Internet, Stated. As of no computer networks are still in their infancy, but as they grow up and we will Probably see the spread of computer utilities.

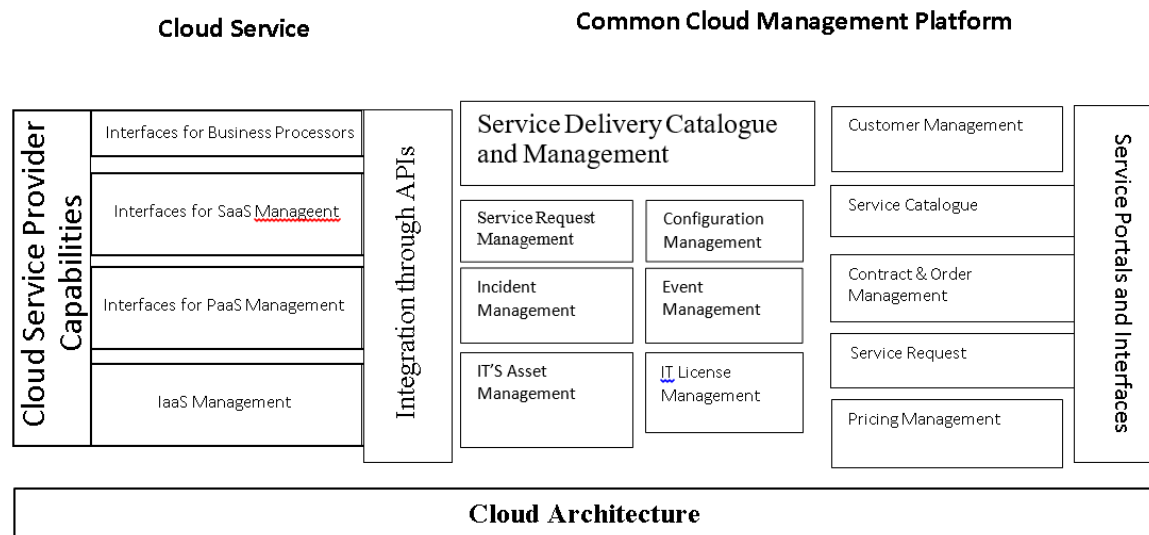**Cloud Computing Characteristics**

An IT environment required a specific set of characteristics to enable the remote Provisioning of Scalable and efficiently measured its resources. These Characteristics need to exist to a meaningful extent for the IT environment to be considered a useful Cloud. The following six specific characteristics are common to the majority of cloud environments.
- Massive Scale
- Resilient Computing
- Homogeneity
- Geographic Distribution
- Service Orientation
- Virtualization
- Low-Cost Software
- Advanced Security
- On-Demand Self-Service
- Broad Network Access
- Rapid Elasticity
- Resource Pooling
- Measured Service

Cloud Computing Architecture

Facilitates seamless integration into existing customers environments based on industry- leading expertise with SOA for building services and service-oriented architectures. Cloud computing Combines Powerful

automation and services management with prosperous business management with rich business management functions for fully integrated top-to- bottom management of cloud infrastructure and cloud services. Cloud Service models including infrastructure as a service platform as a service software and business process as a service. It is Enables the flexible scaling and resiliency required for successful cloud economic and ROI.

Cloud Service   **Common Cloud Management Platform**

Cloud Service Provider Capabilities		Integration through APIs	Service Delivery Catalogue and Management			
	Interfaces for Business Processors				Customer Management	Service Portals and Interfaces
	Interfaces for SaaS Manageent		Service Request Management	Configuration Management	Service Catalogue	
	Interfaces for PaaS Management		Incident Management	Event Management	Contract & Order Management	
	IaaS Management		IT'S Asset Management	IT License Management	Service Request	
					Pricing Management	

Cloud Architecture

Cloud Deployment Models

A cloud deployment model represents a Specific type of cloud environment, primarily distinguished by ownership, size, and access. There are four common cloud deployment models:

Private Cloud: The service provider opens up the cloud infrastructure to open use. The infrastructure will be on the premises of the service provider; it is a government organizationand all educations institute. The user does not have any control over the location of the infrastructure.

The features of the private cloud are:
- Maximum levels of reliability and scalability
- Designed for enterprises and businesses
- Greater control over cloud infrastructure
- Users get both network access and computational resources

Community Cloud: Community clouds were stipulated for exclusive use by a particular community of consumers from organizations that have shared concerns.

Public Cloud: An academic, government, or business organization, or a combination of them can own and operate a Public cloud. It existed on the premises of the cloud provider and opened for the use of general public.

The features of the public cloud are:
- Reasonable levels of security
- Easy to implement
- Cost-effective
- Low operational cost

Hybrid Cloud: As the name suggests, hybrid contains the best of private, public and community (another type of cloud service). Hybrid solutions ensure safety, scalability, and performance, but you need a reputed hybrid cloud vendor to ensure reliability, especially because diverse environments are involved.

But it can leverage the cost benefits to a great extent and even manage the vulnerabilities found in mission-

critical data applications.

Cloud Service model

Three Service models SAAS, PAAS AND IAAS are called SPI Models.the cloud service models are below:

1.   (SaaS) Software as a Service: SaaS is a software deployment model where an application is hosted as a service provided to customers across the Internet. It allows activities to be managed from central locations in a one-to-many model, including architecture, pricing, partnering, and management characteristics.

Examples of SaaS cloud service: Google Apps, SalesForce.com, SQL Azure, Twitter, Microsoft 365 and Oracle On Demand. Unauthorized access to data is a drawback of

SaaS as user's Data & information is stored on the Cloud provider's server.

2.   (PaaS) Platform as a Service: PaaS provides virtual machines, operating systems, applications, services, development frameworks transactions and control structures. The client can deploy its applications on the cloud infrastructure or use applications that were programmed using languages and tools that are supported by the PaaS, service provider.

Example of PaaS Cloud is Google App Engine, Windows Azure cloud services, Open shift, Force.com.

3.   (IaaS) Infrastructure as a Service: IaaS is a Model of offering virtualized resources (computation, storage, and communication) on demand is known as Infrastructure as a Service (IaaS).

Examples of some IaaS service provider are Amazon elastic compute cloud (EC2), GoGrid, FlexiScale, Linode, RackSpace, Verizon Terremark, NaviSite, Google Compute Engine and HP cloud.

A comparison of cloud delivery models in common cloud consumer activities & provider activity.

| Cloud Delivery Model	Common Cloud Consumer Activities	Common Cloud Provider Activities
SaaS	Uses and configures cloud service	Implements, manages, and maintains cloud service Monitors usage by cloud consumers.
PaaS	Develops, tests deploys and manages cloud services and cloud-based solutions	Pre-configures platform and provisions underlying infrastructure, middleware, and other needed IT resources, as necessary Monitors usage by cloud consumers
IaaS	Sets up and configures bare infrastructure, and installs, manages, and monitors any needed software	Provisions and controls the physical processing, storage, networking, and hosting required Monitors usage by cloud consumers

Application of Cloud Computing Technologies in Libraries

Libraries have been using the cloud computing services such as online databases and large union catalogs for over a decade. While planning to use third-party services one needs to have a precise idea of the whole system and should search and find out the standard company who has experience in handling such services. There are many cloud service providers are Ex Libris, Duracloud and Polaris Library System in the market which can provide these types of services. Cloud computing can manage many common challenges of the library such as scarce resources, increased user demand, ever more complex collections, systems, and workflows to a great extent. Cloud-based library management services are offering workflows that save the time of users and discovery solutions that meet users' expectations because of the integration in the cloud

between libraries, applications, partners, and data. Libraries are experimenting with all types of cloud computing services including that of infrastructure services, i.e., IaaS. Libraries can utilize cloud computing services such as SaaS, PaaS, and IaaS in some areas such as library automation, website hosting, digital library services, search services, Storage, Integrated Library System (ILS), Inter-Library Loan system,etc.
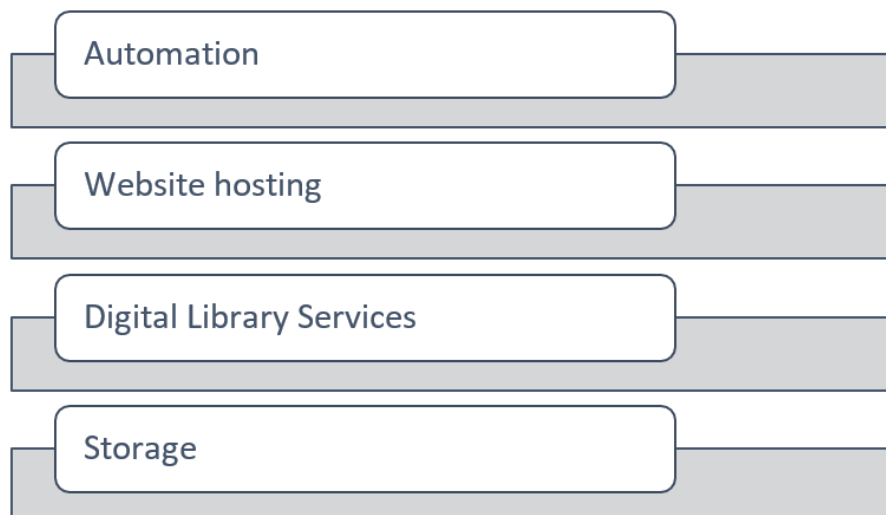
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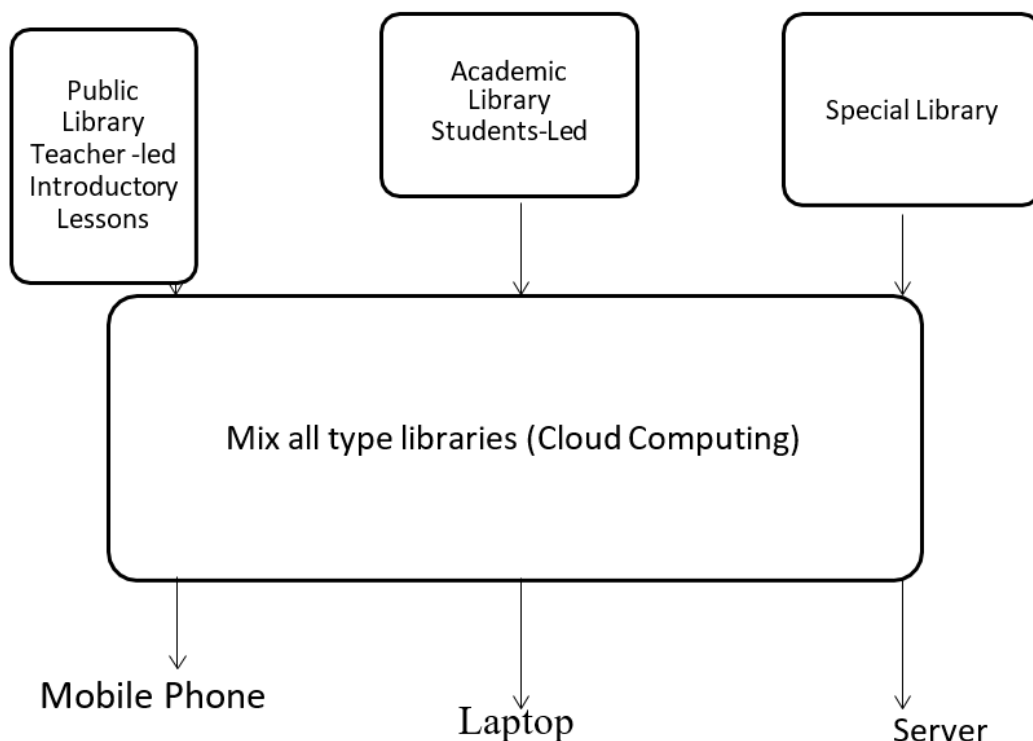
Libraries and shares in the Cloud

Library	Overview
Read-only library shares for private clouds	Administrators may store VM imag.es or application-framework resources to the read-only library share for a private cloud so that cloud users can deploy their own VMs or design their service applications.
Self- service for user role data paths	Used to offer members of a Self-Service user role a place to upload and share their resources. Only self- service users with the author or deploy action can use these resource.
Self- service user role assigned resource	If the user role has the Author action, these resources can be utilized templates for customized resources.
VM store and recover	This free share is assigned from a library to private cloud. Storing the resources release valuable capacity from the cloud, otherwise, be consumed, the resource is deployed but powered off.

Technology Challenges

There are two sides to a story and the same day-to-day experiences just mentioned can be viewed from the IT pro's point of view.

➢   Constant Time Pressure

➢   No clear Requirements

➢   IT Complexities

➢   Security and compliance

Advantages and Disadvantages of Cloud Computing in Libraries.

Cloud computing like any other technology; also have its strength and weaknesses, which needs to be taken into consideration before implementing this new technology.

Advantages	Disadvantage
Cost-effective	Complexity
Reduces storage space	Latency
Reduces hardware and maintenance cost	Need for Constant connectivity
More computing power	Security
The benefit of Cloud application is around the clock availability	Privacy
Infinitely scalable	
Automatic and secure data backup	
Increased collaboration, faster provisioning of systems and applications	

Conclusion

Libraries have to integrate and manage electronic, digital, and print resources; optimize workflows through shared data and collaborative services. It extends the range of library services to support rural masses regardless of location; as well as transmit resources within and outside their institutions in direct support of teaching, learning, and research goals of the nation. Cloud computing is a computing technology that uses the internet and remote servers to maintain data and application. Cloud Computing is the improvement of Distributed Computing, Parallel Computing, Grid Computing and Distributed Databases. And the fundamental principle of Cloud Computing is making tasks distributed in large numbers of distributed computers but not in local computers or remote servers. In other words, by collecting vast quantities of information and resources stored in personal computers, mobile phones, and other equipment, Cloud Computing is capable of integrating them and putting them on the public cloud for serving users. It provides the immediate, secure, flexible, and a hosting environment and useful for saving corporations money, time and resources. With cloud computing, library services will have a new leap in future; and it will become more efficient, user-centric, sophisticated and more professional. Libraries all over the world are moving towards cloud computing implementation to use the features and services of it to make their infrastructures and services better. Cloud computing is not the panacea for everything

Reference

1. Sanchati, Rupesh, and Kulkarni, Gaurav. (2011), Cloud Computing in Digital and University Libraries. Global Journal of Computer Science and Technology, vol. 11, no. 12.
2. Ramachandran, N., Sivaprakasam, P., Thangamani, G., & Anand, G. (2014). Selecting a suitable cloud computing technology deployment model for an academic institute: A case study. Campus-Wide Information Systems, 31(5), 319-345.
3. Mohapatra, Sanjay, and Lokhande, Laxmikant. (2014), Cloud computing and ROI: A new framework for its strategy. Springer International Publishing Switzerland. Pp-
4. Finn, Aidam; Vredevoort, Hans; Lownds, Patrick, and Flynn, Damian. (2012), Microsoft® private cloud computing, Wiley India Pvt. Ltd., New Delhi.
5. Erl, Thomas; Mahmood, Zaigham and Puttini, Ricardo. (2017), Cloud computing: concept, technology & architecture. Pearson Education Limited. U.K.
6. https://www.slideshare.net/himanshuawasthi2109/cloud-computing-ppt-16240131.
7. https://www.slideshare.net/Agarwaljay/cloud-computing-simple-ppt-41561620.
8. http://www.liscom.org/postContent/fullPaper/pdf/paper%20presented/S%2015%20Cloud%20Computing%20and%20its%20Application%20in%20Libraries.Adarsh%20&
9. %20Ambili.pdf.
10. https://hackernoon.com/how-to-select-the-perfect-cloud-deployment-model-for-your- business-b66f1e768f8f