

# Implementing Virtualization Using Cloud Computing in Digital Library

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**Abstract**— During the last few years, there is innovative development in the field of multimedia communication and wireless technology. Cloud computing is fundamentally altering the expectations for how and when computing, storage and networking resources should be allocated and managed. Cloud computing technology came up as a boon for libraries and is offering various opportunities for libraries to connect their services with cloud. The emergence and development of cloud computing have a great effect on the development and application of digital library. Libraries may soon be building and managing their own data centers. This model would let libraries maintain more control over the applications and data stores that contain sensitive, private information about patrons. In the recent years growth of computer technology contribute to the progress towards the application of the cloud computing. The paper describes architecture, use of cloud computing in libraries and how cloud computing works which helps understanding the need of implementing virtualization using cloud computing in digital library.

**Keywords**-Cloud Services; Cloud Platforms; Educational Cloud computing; digital library; Virtualization;

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## I. INTRODUCTION

Rapid development of information technology (IT) industry for the last several decades has introduced us with many new terms. Nowadays, we are doing the same tasks but in a flexible, much cheaper, and are in a portable manner, either by using desktop computer or mobile devices to several types of servers tied together to create a so called Cloud Computing System (CCS). Cloud Computing has emerged as a phenomenon that represents the way by which IT services and functionality are charged for and delivered. Cloud computing can be defined as the aggregation of computing as a utility and software as a service [1] where the applications are delivered as services over the Internet and the hardware and systems software in data centers provide those services [2]. The new concept of cloud and libraries has generated a new model called cloud libraries. Though the usages of cloud computing may vary with the libraries nature, services and information needs but most common usages of cloud computing with in libraries can be development of digital libraries, corporate cataloging, acquisition, storages and sharing the resources on virtual environment. This Cloud computing technology provides almost everything as service using Internet, and every resource is highly scalable. Resources in cloud computing are provided as service based on data centers. Educational institution is moving towards adopting new developing technology for providing the student new and faster means of resources through which they can adopt the higher level knowledge. Cloud computing might be an area for the educational institution to provide faster and much chipper resources for student with globalization. Cloud computing offers some advantages by allowing user to use infrastructure, platforms and software's provided by the cloud providers at very low cost. Cloud computing brings new types of services and facilities for users to take full advantages of cloud computing. This paper proposed an idea to develop various clouds for educational

sectors which help different students and faculty to research on the various subjects globally.

## II. OVERVIEW OF EDUCATION, CLOUD COMPUTING AND DIGITAL LIBRARY

Educational institution consist a large I.T. infrastructure and for managing it requires many services. Student required software for simulation, experimental performance and manipulation of statically data. These software's are high end software and required skilled people to work with, thus rather this software can be installed in the virtualized environment on the clouds data centre. Internet can be medium to provide access to this software with high reliability. Virtualization technology helps creating multiple client nodes for student, these nodes can be easy access through Internet [3]. The basic 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 large quantities of information and resources stored in personal computers, mobile phones and other equipment. There is a serial of problem in digital library, such as resource independent of each other. Low level of information technology, non-uniform resource form and hardware limitation. In order to solve these problems, it proposes a new digital library platform based on cloud computing, which can provide personal service to different terminal users, such as computer, PC etc. The educational sectors are looking for options which are chipper and more convenient in terms to improve the performance and ranking of the students [4].

## III. CLOUD COMPUTING

Cloud computing is emerging as one of the most important branch for providing seamless application on mobile devices.. Cloud computing is not a new technology that suddenly appeared on the web but it is a new form of computing. It is a web-based processing, whereby shared resources, software

and information are provided on demand to computers and other similar devices. Cloud computing can be defined as , “It refers to both the applications delivered as services over the Internet and the hardware and systems software in the datacenters that provide those services” [5]. Cloud computing data centers can be sliced into various servers and virtual machines can be a solution to their problems, and these are easy to access to the computing services on demand. Cloud computing can also be used for research work for various platform [6].Cloud computing has become a significant technology emerging trend, and many experts, researchers and academicians expect that cloud computing will reshape information technology (IT) sector and the IT marketplace in world. With the cloud computing technology, users use a wide variety of devices, including PCs, Laptops, Smart Phones, and PDAs to access different kinds of utility programs, storage, and application development platforms over the Internet, via services offered by cloud computing providers.

This section provides an overview of Cloud computing including definition and service oriented cloud architecture. In overall cloud computing revolves around two things one is Cloud platforms and other is Cloud services.

#### A. Cloud computing Platforms

Cloud platforms are basically the hosts that provide the required resources to the clients. It is an arrangement for executing software applications in a logically abstract environment comprising of various utility cloud services [7]. Cloud computing is being driven by cloud providers including Amazon, Google, Salesforce and Yahoo as well as traditional vendors including IBM Microsoft and are adopted by different users. Few well-known cloud platforms are,

- Amazon Elastic Cloud Computing (EC2)[8]
- Microsoft Azure[9]
- Hyrax[10]
- Google App Engine[11]
- Force.com[12]

#### B. Cloud Services

Cloud services are hosted services. Cloud service [13] is a software system which is responsible providing interoperable machine-to-machine interaction over a network or internet which is further accessed by other cloud computing components ,clients, software or end users directly like,

- Integration (Amazon simple Queue Service)
- Mapping (Google maps, Yahoo! Maps)
- Payments (, Google Checkout)
- Search ( Google Custom search)

### IV. SERVICE ORIENTED CLOUD ARCHITECTURE

Here, we focus on a layered architecture of cloud computing. In cloud computing there are different categories of cloud services. The cloud services are generally classified based on layer concept (fig.1) .This architecture is commonly used to demonstrate the effectiveness of the cloud computing model in terms of meeting the users’ requirements[14]. In the upper layer of this paradigm, Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS) are stacked. These services delivered to the users in real time via internet. The service model has been explained in below fig.1.

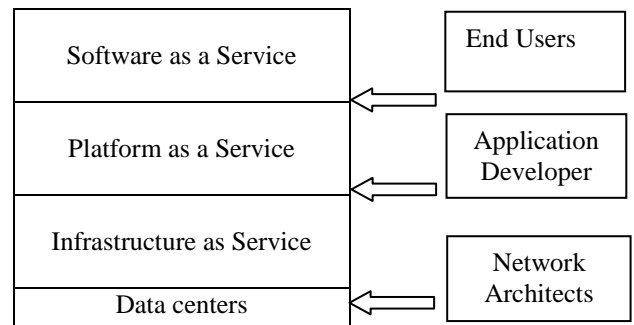


Fig.1. Service cloud computing architecture

- Software as a Service (SaaS)

It is a model of software deployment whereby the provider licenses an application to the consumers for use as a service on demand. The capability provided to the consumer is to use the provider applications running on a cloud infrastructure. In this service, users can avail the facilities to access and use any software available with cloud vendors.

- Platform as a Service (PaaS)

Platform as service helps in generating the computing platforms to run the software and other tools over the internet without managing the software and hardware at the end of user side. The capability provided to the consumer is to deploy onto the cloud infrastructure consumer created or acquired applications created using programming languages and tools supported by the provider. It is the delivery of computing platform and solutions stack as a service.

- Infrastructure as a Service (IaaS)

This service comprises a wide range of features, services and resources which support to build a virtual infrastructure for computing. Organizations can be developed entire infrastructure on demand. The capability provided to the consumer is to provision processing, storage, networks and other fundamentals computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications IaaS enables the provision of storage, hardware, servers and networking components. Amazon Web Services, HP,IBM, Google Base are the examples of IaaS.

- Data Centers layer

This layer provides the hardware facility and infrastructure for clouds. In data layer, a number of servers are linked with high speed networks to provide services for customers.

The Cloud computing architecture can be divided these layers as in fig.1. Given this architectural model, the users can use the services flexibility and efficiently.

### V. CLOUD COMPUTING REALIZATION

The Cloud in cloud computing are categorized in three types

they can be used in various services as educational public cloud, educational private cloud and educational hybrid cloud.

- Public clouds  
It provides services like application, storage and makes resources available to public through the Internet.
- Private clouds  
Private cloud is special infrastructure dedicated to a single educational organization for services, resources and data storage.
- Hybrid clouds  
It is the combination of one or more public and private educational cloud.

The educational sector can be implemented using public cloud, as they are cheaper compare to private and hybrid, for some of the institution and university, which carry out the research work in depth, they can use the private and hybrid cloud after undergoing through the various terms. The components used in the architecture as in fig.2.

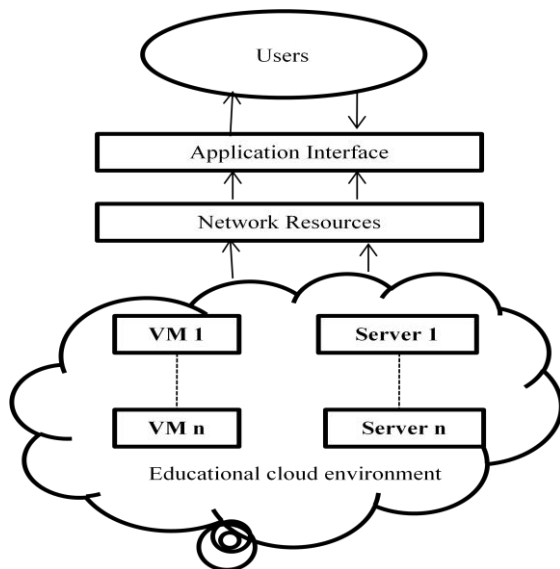


Fig. 2 Architecture for Cloud Computing Educational Environment

## VI. IMPLEMENTATION

The implementation work consists of a thin client which acts as node for the client to access and work with the services provided by the cloud computing model. A thin client is a low configuration computer system which consist hardware only to access information online. Secondly an application interface is required for working which act as GUI interface through which user can interact with cloud. The user interface will give a dashboard panel and a configuration window which help user to communicate and configure the services. Operating system and network management software are also required, this software are powerful enough to handle the connectivity and to provide a standard bandwidth through which the thin client can communicate with the cloud. The services are provided through Internet, this Internet

connectivity and network device layer. Cloud environment is made up of shared resources, these shared resources are none other than the same computing resources which are used for computing, but with a slight change that the shared resources can be located at remote location and accessed using an Internet connection. Better resources management will lead to maximize the usability of cloud resources.

## VII. CONCLUSION

Cloud computing represents an exciting opportunity to bring on-demand applications to digital library. This technology provides a better used in educational system much more reliable platform for handling computing resources, it appears to the users of high-quality service and high security.. This paper has discussed about introducing cloud computing and virtualization in educational sector in digital libraries.. This provides a platform independent of infrastructure with much more flexible model. Thus considering the educational cloud environment proposed model in terms educational sector in digital library will help in making a better model for student with powerful functional capabilities which can be further implemented in the real world cloud computing environment.

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