AN IMPLEMENTATION OF E-LEARNING SYSTEM IN PRIVATE CLOUD

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ABSTRACT -   E-learning system is the key technology development trend which provides delivery and distribution of the learning contents to the end users who are from diverse environment, and having different interest, and destined away from a classroom. It also facilitates maximization of the flexibility and effectiveness of the learning system. The recent advancement in the information and communication technology offers the better IT solution in E-learning which has the potential to provide the adequate information required by the end users where education field throughout the world becomes unexceptional case. Penetration of the contemporary tools and techniques of an E-learning system using cloud is an emerging trend. There is an increasing interest in E-learning systems based on cloud computing architecture for providing the resources on the demand basis. In this paper we developed and deployed an E-learning application in private cloud (Cluster based Environment) using open source technologies like Eucalyptus, VMware and euca2ools. This paper presents the cloud computing architecture for the E-learning system that helps to achieve scalability, persistent storage, distributed access, efficient resource usage and interoperability of the E-learning system objects.

Keywords: E-learning, Cloud computing, Eucalyptus, Ubuntu Enterprise Cloud, VMware.

I.   INTRODUCTION

Cloud computing is a virtualized image based Internet technology that becomes a great solution to provide a flexible, scalable, on-demand and dynamic computing infrastructure for many applications. It is a significant technology trend set which has a potential to reshape information technology processes and IT marketplace as cost effective. Cloud computing offers the sharing of resources that includes software, storage, data, applications, infrastructure and business processes to the IT marketplace to contest elastic demand and supply.

The emergence of new-fangled generation E-learning systems brings diverse teaching and learning environments for the facilitator and the students. The emerging and elastic cloud computing technology is a special kind of Web service which improves the performance of educational management system in terms of resource sharing and also provides efficient teaching learning mechanism for different range of students from different environment. Cloud computing provides a platform to share resources in terms of scalable and flexible infrastructures, application development platforms, middleware and business enterprises. It depicts a new enrichment, consumption and delivery model of IT services using various internet protocols at remote computing sites.

With the Rapid growth of contemporary knowledge society, there is an enriched demand for the E-learning object models, when the educational information and resource availability is growing drastically. Most of the educational institution recognizes the requirement of adopting new technologies such as E-learning techniques to satisfy the stipulation of the age. Using an amalgamate approach based on the Cloud computing gives the solution to attain the agility and ease access to technology in an affordable manner at institution level.

In the Traditional E-learning systems, network and their applications are built, developed and maintained by the institutions or enterprises. The cost of equipment investment, development and maintenance take a

lot of expenditure. The shift of E-learning system to cloud reduces the cost, where the service provider takes responsibility to build and maintain E-learning Cloud model.

This paper primarily addresses the benefits of cloud based E-learning system which provides the learning platforms for the students to enjoy all the benefits of cloud that encompasses active, collaborative and discovery learning in an efficient and scalable manner.

II. E-LEARNING BASED CLOUD COMPUTING

Most of the educational institutions do not have the ability to maintain the resources and infrastructures required to run top e-learning systems (Figure-1). E-learning system is widely used in various educational levels for example Academic courses, Continuous education and company trainings etc.
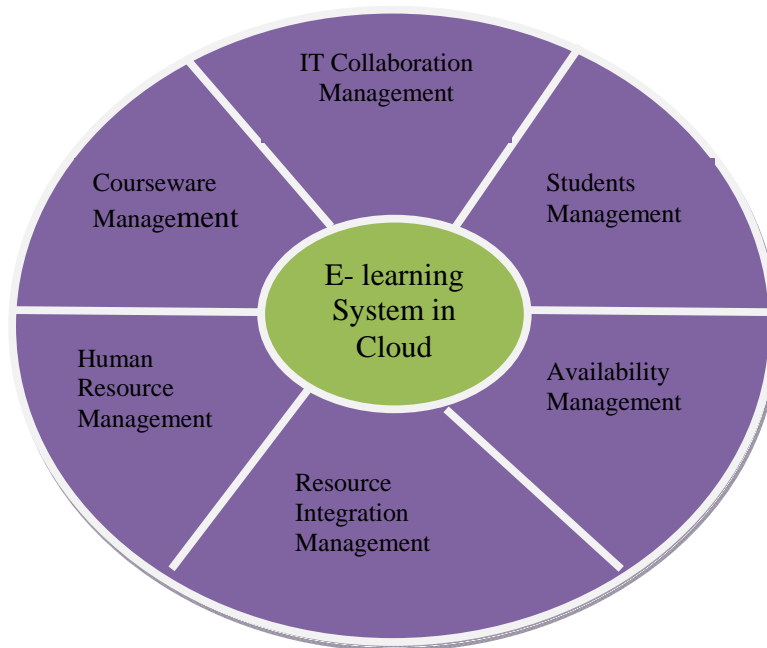
Figure -1 Drivers for cloud adaptation in E-learning System

The E-learning system architecture is developed as a distributed application which includes the three possible entities: a client application, application server and the database server (Figure – 2). The client hardware could be a simple web browser, mobile device, desktop computer or simply a dedicated application.

E-learning Solutions can use Cloud computing for the benefit which includes the cloud infrastructure to use an E-learning system based on the provider's infrastructure, cloud platform to develop and deploy an e-learning solution based on the cloud computing providers' environment, cloud services to use the e-learning application given by the cloud providers' to use.
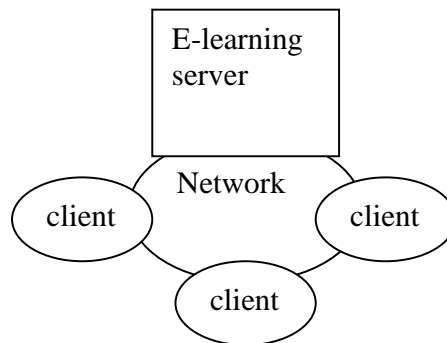
Fig – 2 E-learning system

A. Benefits of E-learning System in Cloud Computing

- A flexible and convenient tool used to engage teachers and learners.
- It is ubiquitous in environment.
- No need to store and backing up it from one device to the other.
- Allows students to avail the E-learning resources from different places and can also access through different resources such as mobile, laptop and desktop computers provided that internet access is available.
- Students can experience a richer and diverse learning environment.
- It provides affordable solutions to the academic institutions.
- Flexible and dynamically scalable infrastructure, which reduces the overall maintenance cost.
- A virtualized e-learning solution which increases the performance and reduces overall cost and burden for the academic institution.

B. Virtualization Role in E-learning Cloud Environment:

A teaching environment can be designed in such a way that the teaching resources are dynamically shared, smooth communication and cross platform operations which integrate of variety of media and new technology features that are executed in E-learning systems. The role of virtualization technology in E-learning got a lot of consideration recently to simplify the management cost. Virtualization technology can consolidate many existing computers onto fewer servers. By introducing a server virtualization we can reduce the maintenance cost and increase the performance.

III. RESULT AND DISCUSSION

A. Building a Private Cloud

Eucalyptus is one of the most popular and leading open source private cloud platform which is used to create and manage a private cloud setup. It affords an Elastic Compute Cloud (EC2) Compatible platform as well as Simple Storage Service (S3) compatible storage platform.

B. Ubuntu Enterprise Cloud

The UEC (Ubuntu Enterprise Cloud), which is powered by Eucalyptus (Fig – 3), is a very high Configurable and Customizable to a variety of environments. It is a private cloud set-up which is used to build up its own IT infrastructure. Using Ubuntu Enterprise Cloud, it is easy to bring the same self-service potential into the data center using the same APIs and tools used on Amazon Elastic Cloud. Using UEC, you can easily deploy workloads and run immediately. The architecture of Ubuntu enterprise cloud consist of a frontend running with one or more Cloud Controller, Walrus, Cluster Controller, Storage Controllers with one or more nodes.

The UEC cluster controller offers diverse virtual images (IaaS Services) in which the administrator want to create several OS images as a template. When a cloud user requests for a Virtual Machine, The virtual machine (VM) is allocate into the suitable node Controllers with a configured VM image as an instance. Then the cloud user can execute necessary service onto the virtual machine.
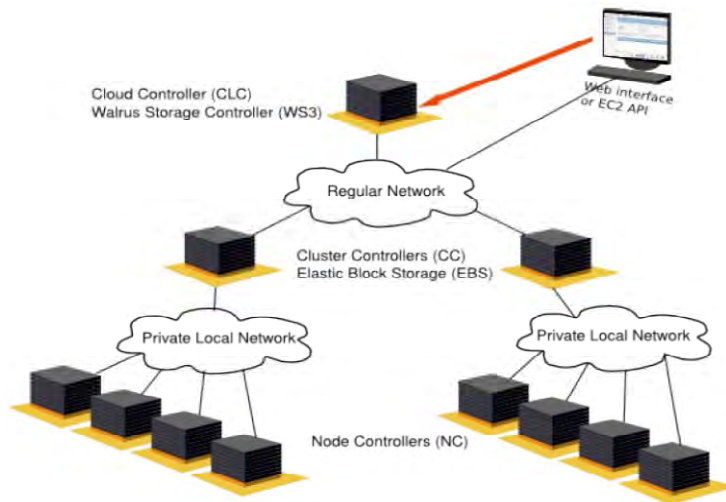
Fig -3 Ubuntu Enterprise Cloud setup

C. Private Cloud using Ubuntu 10.04 server Edition :

Hardware and software Requirements :

1. Two Dell Rack Servers having Configuration for both cloud and node controller.
2. Two 1.8GHz AMD processor : 8 cores per processor.
3. Internal Storage 200 GB
4. RAM – 8GB
5. Virtualization Support : VMware
6. Operating System – Ubuntu 10.04 server
7. Hypervisor – KVM

Private Cloud Setup :

- Server 1 : Install ubuntu enterprise cloud.

  Installation mode : Cloud controller, Walrus storage service, Cluster controller and Storage

  controller.

- Server 2 : Install ubuntu enterprise cloud

  Installation mode : Node controller

- Exchange of Public SSH keys : On node controller setup a temporary password.
- Get Credentials : On the Cloud controller , install credentials which consist of certificates and environment variables.
- Installation of images in Server1
- Finally Running Instances in cloud

D. Deployment of E-learning System in private cloud:

This paper focuses on all three deployment models such as platform as a service, software as a service and Infrastructure as a service using UEC. The E-learning application is developed using J2EE, a user can access E-learning application from any computer connected to the private cloud by using Apache web server. The database MySQL is used to store the details of the students, facilitators, and the content used for E-learning solutions.

IV CONCLUSION

Cloud computing is an IT based technology for managing and providing services over the internet. The growth of cloud computing is hastily changing landscape of Information Technology to the long held pledge of utility computing into a reality. In this paper we developed and deployed an E-learning application in private cloud using open source technologies like Eucalyptus and VMware. The virtual machine images are available in the cloud, based on the user request and its instances are created. This proposed system achieves interoperability, scalability and quality of E-learning solutions.

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