

A Survey on E-Learning Using Cloud Computing Technology

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ABSTRACT

Gaining and developing the knowledge is the key success for any student. In earlier days, it was very difficult for sharing the knowledge as there were no sources of Internet. Later Internet arose and it became a great boon for the society. From Internet many technologies came into existence. E-learning an electronic way of learning for all the learners and from that the latest which gave rise is the way of E-learning using cloud computing technology. Here this paper discusses about the method of E-learning using cloud computing and various aspects related to cloud. The word Cloud has made a loud importance in the society with its latest features.

1. INTRODUCTION

Education plays an important role in one's life. It has become a stage where no education no life. One such form of learning E-learning – a comfortable learning sitting at a place. E-learning is a way of learning with the help of internet it is an online form of learning. By e-learning it is possible to share an idea globally among many people, which is limited in a classroom teaching Teachers can add the syllabus, lessons online and students can study, take assignments, exams everything through online mode. Thus it saves time for both the students and teachers. Some students have quick grasping power and some have somewhat slowly comparatively. Thus by this way of learning a student can learn the concepts any number of times till he is fully familiar with the concepts.

E-learning can be accessed at anytime from anywhere across the globe. The below figure of e-learning system developed as a distributed application includes a client application, an application server and database server and hardware to support it (client computer, communication infrastructure, servers)

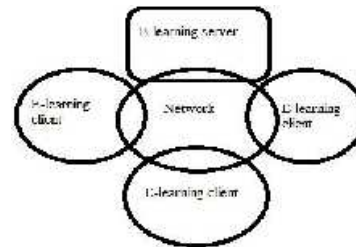


Fig. 1. E-learning System

2. CLOUD COMPUTING

The main aim of education system is achieving Anytime, Anyone, Anyplace and Anything. This four A's are possible through cloud computing[1]. Cloud Computing is a technology where information are retrieved from the Internet through web-based tools and applications, instead of keeping the required information in local storage device or any sort of hard drive.

Cloud based storage is based upon storing it in a remote database. Many companies provide cloud services in recent years some of them are IBM, cloud sify, Amazon etc. The companies which are providing cloud services allows the users to store their files and information on a remote server and which in turn can be accessed via the gateway of internet. E-learning using cloud is the latest one which is in wide use.

The previous E-learning systems usually suffer from the problem of scalability and availability. In order to find a solution for this problem E-learning using cloud was made available. Traditional E-learning system which has to be owned by the individual institutions, it was very costly that it was not affordable for everyone. But cloud based e-learning system is cost-effective.

Cloud computing is mainly based on the concept of pay-as-per use. It is like how the bill is generated from electricity board, telephone department to the people based upon their usage.

A cloud computing system can automatically handle heavy load tasks easily and more efficiently. In usual a local machine does not want to perform heavy load operations while running the applications. Thus the software and the hardware demand get reduced.

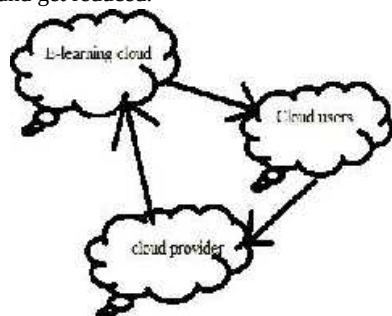


Fig. 2. E-learning Cloud Model

Cloud based e-learning architecture is divided into five layers. They are hardware resource layer, software resource layer, resource management layer, server layer and business application layer.

- **Hardware resource layer:** This layer is the bottom most layer in the cloud service middleware. In this layer physical memory and CPU for the system is handled. Hence this layer is considered as the most important for the entire infrastructure of the system.
- **Software resource layer:** It is created with the combination of both operating system and middleware. Software developers create many applications for e-learning system and then embed them in cloud.
- **Resource management layer:** It gets us the uninterrupted on-demand software distribution for various hardware resources.
- **Service layer:** Infrastructure As A Service (IAAS), Platform As A Service (PAAS), Software As A Service (SAAS) are the service layers of the cloud.

SAAS – As the name indicates here Software is provided as a service. This is widely in practice compared to other two layers. The customers need not purchase the entire hardware or software instead they can use the software which is needed for the required time by availing SAAS. By using this cost

for the purchase and upgrade of the software is minimised.

PAAS – Platform as a Service. Here platform is provided as a service to the customers.

IAAS – Infrastructure as a Service. Here the infrastructure such as database storage, backup, load balancing etc are provided as services to the customers. **Business application layer:** In e-learning content creation, delivery, teaching evaluation all takes place here.

The major five essential characteristics [2] of cloud include on-requirement self service, wide network access, resource pooling, rapid elasticity, measured service.

- **On-requirement self service:** A consumer can avail the service which is required by making a request and no human interaction is involved.
- **Wide network access:** We can have the access of Cloud using various client platforms such as mobile, laptop and tablet through Internet.
- **Resource pooling:** A software program that makes possible an instance of the program to serve different consumers whereby each one is isolated from the other is commonly known as multitenancy. Resource pooling is achieved through this multitenancy technology.
- **Rapid elasticity:** Usually elasticity is referred to as greater expandability. Here cloud solves the problem of scalability by scaling in and scaling out based on the requirement.
- **Measured service:** Cloud service providers automatically have control and based on metering process they measure the amount of service being used.

3. CLOUD BASED E-LEARNING

E-learning using cloud is a convenient and flexible way of teaching methods and sharing the knowledge all over the world. e-learning cloud is a migration of cloud technology which very well enhances in future including all the software and hardware computing resources needed in e-learning [5]. There are numerous benefits of cloud based e-learning.

They are lower costs, increased performance, instant software updates, beneficial for students and beneficial for teachers [4].

3.1 Cloud Deployment Models

The cloud deployment models are categorized into four types. They are private cloud, public cloud, hybrid cloud and community cloud.

- **Private Cloud:** The private cloud is the one which is owned privately (self-use). The private cloud is built for the access within the organization where the users and the customers can make use of the facility without any chargeable amount [3].
- **Public Cloud:** The required resources are made available from a third party provider. The resources are available free or the provider charges on a pay-per use model. Microsoft and Google are major cloud service providers which own and operate the infrastructure and offer access via Internet.
- **Hybrid Cloud:** It generally offers the benefits of multiple deployment model. It is a combination of both public and private cloud.
- **Community Cloud:** The security and privacy is achieved more in this sort of cloud. Few companies which are in need of similar requirements gather together and share the infrastructure to avail the usage of cloud.
- **Lower costs:** e-learning users can run their applications through their personal computer, mobile phones, Tablet having minimum configuration with internet connectivity and it is not required that high end configured computers are needed. Hence it is comparatively cheaper and the users pay only for what they use.
- **Increased Performances:** Everything is hosted as cloud and so client machines do not create problems on performance when they are working.
- **Instant software updates:** Software's are updated automatically in cloud source since the application runs with cloud environment. Therefore, e-learners get updates as soon as they are updated.

- **Beneficial for students:** Students can take tests, attend online courses, can learn courses any number of times till they attain the stage of confidence.
- **Beneficial for teachers:** Teachers can stay at their place and upload course materials, lesson plan, response to student's requests and can send feedback to students.

Cloud computing offers to share scalable resource infrastructures and development of application platforms [8]. Students and the staff attain the way for quick access of various platforms through the cloud internet on requirement access. This gives the organization reduced expenses comparatively which gives a way for a cost-effective application [6].

Resource scheduling in cloud is one of the challenging job and the scheduling of the resources for cloud workloads depends on the QoS requirements of cloud applications. In cloud environment, heterogeneity, uncertainty and dispersion of resources faces problems of allocation of resources, which cannot be solved with existing resource allocation policies [7]. For scheduling of resources efficiently, it is necessary to consider the QoS requirements.

Cloud Computing faces some challenges such as security, interoperability, availability, performance and data migration. While taking security it includes data privacy, confidentiality; interoperability is supporting customer choice and additional agility. A proper SLA (Service Level Agreement) should address regarding the performance, availability and QoS. Biggest Challenge is migrating data between public and private cloud [9]. In privacy attackers can analyze the critical task which depends on the computing task submitted by the user [13]. Some e-learning systems are mainly designed for providing a virtual environment to users in order to serve various purposes [10].

A system based on multi instance learning is proposed by Amelia Zafra et al [11] to classify students in e-learning systems. It mainly focuses on quizzes, assignment and forum for the student classification.

Cloud Computing can provide greater advantage to educational and various learning organization with its budget restrictions and sustainability challenges, but one and only if the organization uses the cloud formation best matches for a particular activity[12].

4. CONCLUSION

Cloud computing keeps on developing further in future which is an advanced internet-based computing model. As discussed in this paper, E-learning using a cloud is a greater boon for the educational sector. An entire world can access and share the knowledge anytime, anywhere and from any device. In future privacy and security can be furthermore improved by using suitable methods.

5. REFERENCES

- [1] Qi Zhang, Lu Cheng, RaoufBoutaba, "Cloud computing: state-of-the-art and research challenges"J Internet ServAppl (2010) 1: 7–18.
The Brazilian Computer Society 2010.
- [2] P. Mell and T. Grance, "The NIST definition of cloud computing (Draft): Recommendations of the National Institute of Standards and Technology," NIST Special Publication 800-145 (Draft), January 2011, Computer Security Division, Information Technology Laboratory (ITL), National Institute of Standards and Technology (NIST), U.S. Department of Commerce, Gaithersburg, MD, USA. [Online]. Retrieved (Aug. 30, 2011).
- [3] R. Buyya, C.S. Yeo &S.Venugopal, "Market-oriented Cloud computing: Vision, hype, and reality of delivering IT services as computing utilities," 10th Ieee Int. Conf. High Performance Compute. Comm., p. 5–13, 2009.
- [4] D.KasiViswanath, S.Kusuma and Sarojkumar Gupta, "Cloud computing issues and benefits modern education", Global Journals Inc. ISSN:0975-4172 and print ISSN:0975 – 4350.
- [5] Md. Anwar HassainMasud, Xiaodi Huang, "An e-learning system architecture based on cloud computing" International Journal of Information and Communication Engineering, Vol:6, No:2, 2012.
- [6] UtpalJyoti Bora, Majidul Ahmed, "E-Learning using Cloud Computing", International Journal of Science and Modern Engineering (IJISME) ISSN: 2319-6386, Volume-1, Issue-2, January 2013.
- [7] Sukhpal Singh, Inderveer Chana, "A Survey on Resource Scheduling in Cloud Computing: Issues and Challenges. J Grid Computing (2016) 14:217–264DOI 10.1007/s10723-015-9359-2.
- [8] M. Lawanya Shri, Dr. S. Subha, "An implementation of E-Learning system in private Cloud", ISSN: 0975-4024 Vol 5 No 3 Jun-Jul 2013 3036 – 3040.
- [9] G. Lin, D. Fu, J. Zhu, and G. Dasmalchi, "Cloud computing: IT as a Service," IT Professional, Vol. 11, No. 2, March/April 2009, pp. 10-13, IEEE Inc., Piscataway, NJ, USA
- [10] OzgeYasar, TufanAdiguzel, "A working successor of learning management systems: SLOODLE, Procedia - Social and Behavioral Sciences", Volume 2, Issue 2, 2010, Pages 5682-5685, ISSN 1877-0428, 10.1016/j.sbspro.2010.03.928.
- [11] Amelia Zafra, Cristóbal Romero, Sebastián Ventura, "Multiple in-instance learning for classifying students in learning management systems, Expert Systems with Applications", Volume 38, Issue 12, Pages 15020-15031, ISSN 0957-4174, 10.1016.
- [12] Jericho Forum, "Cloud cube model: selecting cloud formations for secure collaboration," Version 1.0, April, 2009, San Francisco CA, USA: The Open Group. [Online].
- [13] Jianchun Jiang, Weiping Wen, "Information Security issues in Cloud Computing environment, Netinfo Security, issn.1671-1122.2010.02.026.

