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Cloud Computing for E-Learning

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ABSTRACT

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Introduction

E-learning is defined as an Internet-enabled learning. It is the use of networked information and communications technology (ICT) in teaching and learning. With the growing trend of information technologies, e-learning is the IT new research and exploited platform. There are several universities who are running their e-learning programs like Khan Academy (www.khanacademy.org), "free online course "of the Stanford University, online courses offered by Harvard University and many more.

The courses that are offered by the e-learning approach usually have many enrollments worldwide (because there are no physical boundary limitations in e-learning approach) as compared to the physical class room attendance group. For example, the "Machine Learning" course of Stanford has got more than 160,000 worldwide students registered. Therefore, elearning systems have high infrastructure requirement that are necessary to provide concurrent service to that amount of students which actually succeeds the capabilities of a conventional web server. E-learning systems require quiet superior infrastructure than that required for the regular working of the institutions. So, the alternative is to provide the services of an e-learning system on demand and pay only for the resources that are actually used. So the new direction is to use Cloud Computing.

Cloud Computing is a new paradigm in which the resources of an IT system are offered as services to the user and the users can avail these services through the Internet. Cloud Computing provides a pool of computing resources with its dynamic scalability and usage of virtualized resources as a service through the Internet. The resources can be network servers, applications, platforms, infrastructure segments and services. Cloud computing deliver services based on demand and provides sufficient network access, data resource environment and effectual flexibility. This technology is used for more efficient and cost effective computing by centralizing storage, memory, computing capacity of PC's and servers. With the tremendous advantages of cloud computing, expect this technology to revolutionize the field of e-learning education. There are several cloud computing services providers that offer

E-Learning stands for electronic learning, which means delivering a course through computer. The growth of e-learning is related to the growth of ICT and is favorable because of the decreasing hardware and software costs. But there are other costs as well which have to be kept in account like the cost of infrastructure, its maintenance, training of staff and many others. Cloud Computing provides a platform to support e-learning. This paper reviews how cloud computing can be used as an effective platform to support E-Learning.

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support for educational systems. Among them are Amazon, Google, Yahoo, Microsoft etc.

Thus cloud computing provides two distinct features: first is the on demand service and the other is scalability in such a way that the computational resources are assigned in a dynamic and accurate way when they are strictly required without the need to understand the infrastructure from user's view point.

This paper focuses on cloud computing concepts and the benefits of cloud computing for e-learning solutions. Also, the impact on e-learning solutions based on cloud computing project management is analyzed. This is very important for the development of e-learning solutions based on cloud computing. **Cloud Computing**

Cloud Computing, commonly referred as "the cloud" is the delivery of on demand computing resources-everything from applications to data centers-over the Internet on a pay-for-use basis. Cloud computing allows consumers and businesses to use applications without installation and access their personal files at any computer with internet access. This technology allows for much more efficient computing by centralizing data storage, processing and bandwidth.

The NIST (National Institute of Standards and Technology) definition lists five essential characteristics of cloud computing: on-demand self-service, broad network access, resource pooling, rapid elasticity or expansion, and measured service. It also lists three "service models" (software, platform and infrastructure), and four "deployment models" (private, community, public and hybrid) that together categorize ways to deliver cloud services. Cloud computing employs a service driven business model. Cloud offers services that are grouped into folloeing categories: Infrastructure as a service (IAAS)

IaaS provides companies with hardware as a service which includes servers, data centers, net technology, storage, computing power on a pay-per-use basis. This helps businesses to rent these resources instead of spending money to buy dedicated servers and networking equipment. Examples of infrastructure as a service includes Amazon1 which offers S3 for storage, EC2 which offers computing power, and SQS offers network communication for small businesses and individual consumers.

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Platform as a service (PAAS)

This refers to providing not just the infrastructure, but an integrated set of software which a developer needs to build applications. PaaS provides the entire support for building an application including design, implementation, debugging, testing, deployment, operation and support of rich Web applications and services on the Internet. Thus PaaS does not provide access to infrastructure directly but to use the services of IaaS, it presents the tools that a developer needs. Thus PaaS indirectly access IaaS services and ultimately the infrastructure. **Software as a Service (SAAS)**

In this, software's or we can say software applications are provided as service on the Internet to the user. The companies or businesses need not to buy expensive software packages from the market. SaaS was one of the first implementation of Cloud services. Example is the Customer Relationship Management

application provided as a service Salesforce.com.

Challenges in Cloud Computing

Although cloud computing comes out to be a very effective paradigm because of its key characteristics like on demand self service because the customers are able to make use of computing resources without any human intervention; scalability and elasticity via on-demand service; network access from heterogeneous client platforms; resource sharing across a large pool of users and pay-per-use business model. Despite of all these benefits, there are some issues in the Cloud computing Model. They are:

• Security Issues: While the cloud may be flexible and cost efficient, but since the data is distributed on different servers and it is "out of control" of the customer, lack of data safeguards and compliance standards makes security the largest hurdle. There will always be issues of data privacy and confidentiality in cloud environment. Critical business data might be at risk

• Lack of internet access leaves data out of reach.

• Reliance on third parties to run your IT: Firms can, of course, make savings by cutting job in their IT departments, but this will also mean that they don't have easy and quick access to people on the ground if things go wrong. It's great having access to an online helpdesk, but what if the Wi-Fi has gone down?

E-Learning

E-learning is an Internet-based learning process, using Internet technology to impart learning, which will not replace traditional education methods, but will greatly improve the efficiency of education. [2]

E-learning is electronic learning which means usage of electronic media and information and communication technology (ICT) in education. E-learning can occur in and out of the classroom. E-learning includes and is also synonymous with computer-based training (CBT), internet based training (IBT), web based training (WBT), Computer-aided instruction (CAI), online education, technology enhanced learning (TEL), virtual learning environments (VLE).

E-learning is the computer and network enabled transfer of skills and knowledge. The content is delivered using Internet, audio tape, video tape, CD ROM, satellite TV. The base requirement for e-learning is that everyone must be equipped with basic knowledge of technology and e-learning can be used for regular academic courses or continuous education, company trainings, online tests. E-learning has many benefits. First one is no physical boundaries- Students are not restricted to a physical location. All they need is the internet connection and they can attend online classes, take exams, send feedbacks, and download course materials. Second one is no time restrictions- student can take online course at any time as per his/her convenience. They

don't have to follow the conventional time table. The last benefit is that the student can easily collaborate and communicate with their classmates and their teachers.

Challenges of E-learning

E-learning or web-based learning offers several benefits over conventional classroom-based learning. Its biggest advantages are the reduced costs since a physical environment is no longer required and therefore it can be used at any time and place for the convenience of the student. Additionally, the learning material is easy to keep updated and the teacher may also incorporate multimedia content to provide a friendly framework and to ease the understanding of the concepts. Finally, it can be viewed as a learner-centered approach which can address the differences among teachers, so that all of them may check the confidence of their material to evaluate and reutilize common areas of knowledge [1]. However, there are some challenges of e-learning systems. Most prevailing among these is that currently, e-Learning systems are still weak on scalability at the infrastructure level. Several resources can be deployed and assigned just for specific tasks at the time of high workloads, making the cost and resource management very expensive. This is also related to the efficient utilization of these resources. For example, in a typical university scenario, PC labs and servers are under-utilized during the night and semester breaks. In addition, these resources are on high demands mainly towards the end of a semester, following a dynamic rule of use. The physical machines are hold even when they are idle, wasting its full potential. Finally, we must understand that there is a cost related to the computer (and building) maintenance, but that the educational center must pay for the site licensing, installation and technical support for the individual software packages [1].

Cloud computing for E-learning

The e-learning system cannot completely replace teachers; it is only a usage of technology to deliver lectures, giving new contents, concepts and method for education, so that the role of teachers cannot be replaced. As per Fernandez [1], E-learning in the Cloud can be understood as Education Software-as-a-Service. It can be implemented quickly because the hardware requirements of the user are low.

As specified by A. Fernandez in [1], following are the suitability of developing e-learning services within cloud computing:

• Accessed via Web: Students or teachers can access from anywhere, anytime the browser-based applications through various devices like mobile, laptop and desktop computers provided internet access is available.

No client side software needed: Since the system construction and maintenance are not located in interior of educational institutions or enterprises, it has reduced many costs like installation cost (as there is no installation), maintenance cost, deployment and server administration cost, total lower ownership cost, IT staff cost.

• Pay per usage: Because of this one can gain access to more sophisticated application as one has to pay according to usage.

• Scalability: Since the application is running on a server farm, the scalability is inherent to the system SaaS server may support many educational institutions. So, as the students' or teachers' need grows, the software performance will not degrade.

• Improved Improbability: It is almost impossible for an intruder to determine where the machine is located that stores some wanted data like tests, exam papers, results.

• Crash recovery is not needed at client side. If a client computer crashes there is no lost of data s nothing is there on client side, everything is on the cloud.

• No need for backup.

• Virtualization: it is not difficult to replace a damaged cloud located server without major costs.

• Centralized Data Storage: Since the main application and data is stored on the cloud, it is very easy to connect client to the cloud.

• Easy Monitoring of data: Monitoring of data is simple because all the data is stored at one place and not in thousands of geographically distributed computers. Security testing can also be easily done and any security change can be easily implemented.

• Instant software updates: Since the cloud based application for e-learning runs with the cloud power, the software's are automatically updated in cloud source. So, always e-learners get updates instantly.

• Improved document format compatibility: Since some file formats and fonts do not open properly in some PCs/mobile phones, the cloud powered e-learning applications do not have to worry about those kinds of problems. As the cloud based e-learning applications open the file from cloud.

• Benefits for students: Students get more advantages through cloud based e-learning. They can take online courses, attend the online exams, get feedback about the courses from instructors, and send their projects and assignments through online to their teachers.

• Benefits for teachers: Teachers also get numerous benefits over cloud based e-learning. Teachers are able to prepare online tests for students, deal and create better content resources for students through content management, assess the tests, homework, projects taken by students, send the feedback and communicate with students through online forums.

Cloud Based E-Learning Architecture

Cloud based e-learning architecture [1] as shown in Figure 1 is divided into following layers:

A. Cloud Management Layer

This layer act as the interface with the cloud environment which consist of cloud management subsystems that determine the user necessities in terms of computational resources, capacity planners, load balancers which manages the distribution of the execution load among the various virtual machines.

B. Virtualization Layer

The second layer consists of the virtual machines implemented within the system. Physical servers, network and storage can be expanded dynamically through virtualization in order to provide fluent services for cloud based e-learning systems.

C. Physical Layer

This layer includes all the physical architecture of the system. It contains Internet/Intranet, system software, information management system and some common software and hardware. This layer is the lowest level of cloud service middleware and the basic computing power like physical memory, CPU, memory is provided by this layer.

We can also specify the e-learning features provided by IaaS and SaaS cloud as follows[1]:

By IaaS Cloud:

- Load Balancing Storage
- Management of all learning systems.
- Scale management for virtual machines
- Back up and restoring
- By SaaS Cloud

• Application Registry Management – to register the applications

• Application Server – management and deployment of the subscribed learning contents to the user

• Account Management System – for managing the account of authorized users

• Virtual Desktop Deployment – for providing personalized desktop including the subscribed learning contents.

• Session Management- for managing the virtual desktop used by the authorized users.

• Personalized Management – for managing subscription of the favorite learning contents.







Figure 2. The Architecture of Virtual Personalized Learning Environment [4]

Conclusion

Cloud computing is an effective paradigm from education perspective. Learners can have the opportunity to gain quick and economical access to various applications and resources. Cloud computing reduces the organizational expenses like software license cost, hardware costs and maintenance costs. In this paper cloud based e-learning has been discussed. The e-learning system cannot completely replace teachers; it is only a usage of technology to deliver lectures, giving new contents, concepts and method for education, so that the role of teachers cannot be replaced. E-learning in the Cloud is the migration of cloud computing technology in the field of e-learning, which is a future e-learning infrastructure, including all the necessary hardware and software computing resources engage in elearning. It can be implemented quickly because the hardware requirements of the user are low. In the end, a cloud based elearning architecture has been described from the perspective of two services of the cloud (IaaS and SaaS).

As the cloud computing technologies become more and more sophisticated and the applications of cloud computing become increasingly widespread, e-learning will certainly usher in a new era of cloud computing.

References

▲ A. Fern´andez, D. Peralta, F. Herrera, and J.M. Ben´ıtez, "An Overview of E-Learning in Cloud Computing", A. Fern´andez et al

^AMd. Anwar Hossain Masud, Xiaodi Huang "An E-learning System Architecture based on Cloud Computing", World Academy of Science, Engineering and Technology Vol:6 2012-02-21

▲Md. Anwar Hossain Masud, Xiaodi Huang," M-learning Architecture for Cloud-based Higher Education System of Bangladesh", Mobile Computing Vol. 2 Iss. 4, November 2013.

[4] Utpal Jyoti Bora, Majidul Ahmed, "E-Learning using Cloud Computing", International Journal of Science and Modern Engineering (IJISME) ISSN: 2319-6386, Volume-1, Issue-2, January2013 [5] Paul Pocatilu, Felician Alecu, Marius Vetrici, "Using Cloud Computing for e-learning Systems", recent advances on data networks, communications, computers.

[6] Seyyed Yasser Hashemi, Khalil monfaredi, "E-learning Based on Cloud Computing: Issues and Benefits", MAGNT Research Report (ISSN. 1444-8939) Vol.2 (4):PP.104-109.

[7] Deepanshu Madan, Ashish Pant, Suneet Kumar, Arjun Arora, "E-learning based on Cloud Computing", International Journal of Advanced Research in Computer Science and Software Engineering ISSN: 2277 128X Volume 2, Issue 2, February 2012.

[8] D.Kasi Viswanath, S.Kusuma and Saroj Kumar Gupta, "Cloud Computing Issues and Benefits Modern Education", Global Journal of Computer Science and Technology Cloud & Distributed., 2012; 12(10):15-19.