

Distance Education Technologies: Using E-learning System and Cloud Computing

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Abstract - Learning, teaching and training are intensely affected by the challenges of this epoch of digital time. They give prospects for the professionals in their higher and further education for training and developing their practical skills as the today smart user must need in this fast-moving and opulently diverse field. The gaining popularity of erudition on the internet, the edifice of perfect web-based learning environment has become one of the hottest points on researching remote education. Now a day, cloud computing and e-learning is rising speedily and plays a vital and powerful role in the field of education and learning. It supports the smart phone mobile users to perform their tasks effectively with paying less cost by utilizing the cloud-based applications offered by the cloud service providers. These technologies are aimed at running applications such as word processing, spreadsheets, access database and many more provided by the internet service provider in the virtual environment while on the move by a flexible infrastructure as all the data and information is stowed in the cloud ambiance. This paper focuses on how e-learning benefits the e-learners by using cloud computing services and presents e-learning approaches by using cloud computing.

Keywords: E-learning, Cloud Computing, SaaS, PaaS, IaaS, Internet Enabled Learning.

1. INTRODUCTION

By the turn of the century, the fast development of digital technologies is creating not only new opportunities for our society but challenges to it as well. Our society is now being reshaped by rapid advances by technologies in the field of education, telecommunications, sciences and many more. Today, e-learning and cloud computing is emerging as the new-fangled paradigm of modern education with reduced upfront investment for teachers and the apprentices. E-learning is an Internet based learning process, using Internet technology to design, implement, select, manage, support and extend learning, which will not replace traditional educational methods, but will greatly improve the efficiency of higher education [1]. The E-Learning system motivates the e-learner user in their learning process anytime and anywhere at his/her own pace while on the move with the help of electronic gadgets like smart phones, PDA, tablets etc. and with powerful strategy of cloud computing. The cloud computing is a collection of server delivering resources that can be accessed remotely via the Internet in real-time. It is also a place for the users to create, store and access personal information by much

more efficient way of computing technology [2]. The development of these technologies is directly related to the increasing access to the communication technology, as well as its decreasing cost provided by the mobile service providers. The learners choose to learn over distance or in person at a traditional campus, the power of e-learning and virtual collaboration is growing fast in education and in the worldwide economy. This power is best realized with a well-planned cloud computing and e-learning strategy. Learners can use the enormous interactivity of innovative media and develop their skills, knowledge, and awareness of the future domain. The benefits of these computing can support education institutions to resolve common challenges such as cost reduction, rapid and effective communication, security, privacy, flexibility and accessibility. The Educational institutes, businesses and many other industries are adopting the services of cloud computing because of the following reasons:

- 1. Cost Saving:** One of the most appealing reasons to switch to the cloud is the cost savings feature. With the cloud, the user will pay for applications only when needed and many applications are included free of charge.
- 2. Scalability:** One of the major reasons for using cloud computing is its scalability. Cloud computing allows universities, colleges and IT industries to easily upscale or downscale IT requirements as and when required.
- 3. Ease of Use:** Quite simply, cloud computing is easy to get up and running. Instead of having to download and/or install software yourself, in the cloud it is all done for you.
- 4. Time Shifting:** This allows for on-demand analysis of study material instantly.
- 5. Courseware Resource and wiki pages:** It includes web pages design and methods for courseware like video examples of study material, review of academic papers, text book extended resources and the use of wiki pages for teaching assistant and student interactive sharing and collaboration.
- 6. Adore More Fault Tolerance:** Cloud providers can afford to have multiple data centers and multiple Internet connections at each data center to adore fault tolerance. As they offer levels of data protection for

the e- learner users simple nightly backups, such as continuous data protection, generators to handle power outages, and high-end servers that can keep running even one component fails.

Apart from the above mentioned reasons, the Learners, Consumers and businesses utilize the cloud on a daily basis even if they're not aware of it. For instance, when we are using e-mail, or go to a social network and post photos, access online document software, or use company's hardware/software we probably use the cloud services.

2. E-LEARNING

A new Paradigm Out-of-classroom and in-classroom educational experiences

E-learning is the computer and with the aid of network-enabled transfer of skills and knowledge. E-learning applications and processes offer Web-based learning, computer-based learning, virtual education prospects and digital collaboration to their e-users. Popular e-learning technologies include:

- ✓ Content is delivered via the Internet, audio, satellite TV.
- ✓ Voice-centered technology, such as CD/DVD or Webcasts.
- ✓ Video technology, such as instructional videos, DVDs, and interactive videoconferencing.
- ✓ Computer-centered technology delivered over the Internet or corporate intranet [3].

3. CLOUD COMPUTING

An Outsourcing Frame to the cloud The term cloud is related to internet. Cloud computing is an internet based computing where virtual shared servers deliver software, infrastructure, platform, devices and additional resources that are hosting to clients with comparable quality of service on demand but at a much lower cost. Essential Characteristics that cloud computing should have:

- ✓ On-demand self-service.
- ✓ Broad network access.
- ✓ Virtualization.
- ✓ Resource pooling.
- ✓ Security and Maintenance.

4. APPROACHES TO E-LEARNING FACILITIES

E-learning is broadly used nowadays in different educational stages i.e. continuous education, academic courses, development in higher education, education via satellite and on line problem solving and discussion through video conferencing. There are various e-learning facilities from open source to commercial for the educators and apprentices that are discussed below:

- ✓ **Multimedia:** A combination of text, graphics, animation, audio and video to enhance the online learning process that helps the e-learner users to grasp

the pedagogy and concept maps associated with technical concepts of the educational materials.

- ✓ **Interactivity Skills:** An instructional strategy that helps a learner practice what they have learned and implement them in their behavioral interaction.
- ✓ **Bookmarking:** With the advancement of technology, e-learning can be beneficial to the users in the comfort of their home and the willingness to start and commence the course according to their timeline with preference to the job at their disposal.
- ✓ **Search:** The technology helps the e- learner user to search the particular information required to complete a task while on the move.
- ✓ **Notes and Highlights:** The smart users mark and save their own interesting topics of a course that contain the most important information on the web for the longer use. This facility is available on all the gadgets like tablets, smart phones PDA'S and many more.
- ✓ **Online Experts:** While accessing the internet, the e-learner user can easily access to subject experts through chat or online discussion on a particular topic of their interest.
- ✓ **Computer-based training:** Computer- based training provides delivery of training or education through electronic media such as internet, CD/DVD and many more. It also provides learning management system through software such as web courses that helps educators and smart users in their knowledge base.

5. CLOUD COMPUTING PLATFORM: ARCHITECTURE AND ITS LAYERS

Cloud computing is everywhere. It reduces the time from sketching out application architecture to actual deployment and incorporates virtualization, on-demand deployment, Internet delivery of services, and open source software for its users. Cloud computing architecture consist of two components, the front end-that comprises the client device i.e. Cloud Software, Virtualization Software or may be Management Software. The back end- that is the cloud itself that includes techniques of data storage system, managing of high end servers and the computer apparatuses. Cluster of these clouds make a whole cloud computing system [4]. Cloud service providers tend to offer amenities that can be assembled into three clusters: software as a service, platform as a service, and infrastructure as a service. These categories group together the various layers.

Software as a service (SaaS): Software as a service provides business solutions available on pay-per-use basis i.e. a complete application offered as a service on demand. By removing complexity of the IT environment and provide smart business solutions to their smart users.

Platform as a Service (PaaS): Platform as a Service offers base environment ready for organizing applications on cloud without hassles of managing the cloud infrastructure. Commercial examples of PaaS include the Google Apps Engine.

Infrastructure as a Service (IaaS): Infrastructure as a Service delivers basic components such as Servers, Network and Storage on-demand, Self-service, and Pay per use basis that are pooled and made available to handle workloads that range from application components to high-performance computing applications [5].

6. CLOUD COMPUTING BASED E-LEARNING SOLUTIONS

The e-learning cannot entirely replace educators; it is merely an updating for technology, concepts, tools and ideas that gives new content in the field of education. The educators and students are playing prominent roles and contribute in developing and making use of e-learning cloud. This unified learning approach is improving the educational act. E-learning cloud is a new journey of cloud computing technology in the field of e-learning, which is a future e-learning infrastructure that includes all the needed hardware and software computing resources engaging in e-learning [6]. In cloud based e-learning systems, the organizations are responsible for content creation, management and delivery while the cloud service provider is responsible for system building, advancement, management and maintenance. The organizations are charged according to the usage that directly depends on the number of students. There are numerous e-learning solutions from open source to commercial and at least two entities involved in an e-learning system: the students and the instructors.

The students:

- ✓ Pay by subscription based on usage.
- ✓ Take online course.
- ✓ On Line Discussion of courses.
- ✓ Allow students to work from multiple places i.e. from home, work, library etc.
- ✓ No need for backing up everything to a thumb drive and transferring it from one device to another.

The instructors:

- ✓ Provide e-content material to the e-learner users.
- ✓ Prepare on-line tests for the students.
- ✓ Assess projects taken by students.
- ✓ (24x7) availability of Teachers.
- ✓ Communicate with students with the help of video conferencing.

7. BENEFITS AND CHALLENGES OF USING CLOUD COMPUTING IN E-LEARNING

Corporations are progressively conscious of the business value that cloud computing carries and are taking steps in the direction of evolution to the cloud. This smooth evolution involves a systematic understanding of the benefits as well as challenges involved. Like any new technology, the implementation of cloud computing is not free from issues. Some of the most important benefits and challenges are discussed below.

7.1 Benefits of using Cloud Computing

- **Convenience and continuous availability:** Public clouds offer services that are accessible wherever the end user might be positioned. This type of approach enables easy access to information and accommodates the requirements of users in different time zones and geographic locations.
- **Cost Efficiency:** This is one of the biggest benefits of cloud computing as the cloud is in general available at much cheaper rates. This is achieved by the elimination of the investment in stand-alone software or servers.
- **Resiliency and Redundancy:** A cloud deployment is typically built on a robust architecture thus providing resiliency and redundancy to its users.
- **Better Storage Capacity:** Cloud accommodates much more data on a server compared to a personal computer. It offers boundless storage capacity and eliminates worries of the e- user about running out of storage space and at the same time.
- **Easy to get the latest and greatest updates:** Software updates are also handled by the cloud vendor and occur several times a year at no price to the customer. This helps the user to remain up-to-date with ongoing business demands.
- **Improved information security:** Data confidentiality issues such as data location and segregation, and privileged access control, become greater in the cloud. Threats introduced by cloud computing infrastructures include new types of privilege escalation vulnerabilities from virtual machine to virtual machine. Organizations are much more concern about the safety of the user's data and discovers new security solutions day by day.

7.2 Challenges of Cloud Computing

- ✓ **Ensuring adequate performance:** The intrinsic restrictions of the Internet apply to cloud computing. These enactment limitations can take in the form of interruptions caused by traffic spikes, strikes caused by malicious traffic/attacks, haste in the server and many more.
- ✓ **Ensuring adequate security:** Several cloud-based applications contain private data and individual information. So, one of the crucial barriers cloud providers have had to overwhelm is the perception that cloud-based amenities are less secure than desktop-based or datacenter-based services.
- ✓ **Performance and Bandwidth Cost:** Companies can save money on hardware but they have to spend more for the bandwidth. This can be a low cost for smaller applications but can be significantly high for the data-intensive applications. Delivering intensive and complex data over the network requires sufficient bandwidth. Because of this, many businesses are waiting for a reduced cost before switching to the cloud.

- ✓ **Harmful competition:** Too many companies are entering in the cloud environment and crowd the stage. This result is a virtual scrap where some are not afraid of using erroneous procedures to gain the upper hand. This can include false claims or trying to damage the reputation of a competitor.
- ✓ **Major failures:** The major challenge to cloud computing is how it addresses the security and privacy concerns of businesses thinking of accepting it. Issues related to data security need to be taken more seriously by the vendors, particularly the big players that fully trust on the cloud data storage.
- ✓ **Political and Legal Issues:** Cloud computing legal issues result from where a cloud provider retains important data of the consumer. The data centers of the cloud service providers (csp) may be located beyond the boundaries of the client's nation. This arise the political and legal issues as we have to ensure that CPS complies with that country's business policies and regulations.

8. FUTURE SCOPE OF RESEARCH

Though the concept of internet education is gaining momentum with time, however, lot of work is required to be done to make it more popular and adoptable by the masses. Collaborative efforts are needed to make e-Learning as a main stream mode of education. The future research includes the following prospects:

- i. The rich source of multilingual e-Contents are required to be designed and developed to accommodate all the streams of education.
- ii. Government should take more initiatives and create awareness among the people to remove the barriers of digital divide.
- iii. More universities and colleges must support e-Learning and cloud based infrastructure.
- iv. Development of online education based policies and regulations.

9. CONCLUSION

Distance education has always been around the Orb and has gone forward with time to time. E-learning is an emerging aspect of distance education that provides any-time, anywhere educational approach. Advance apprentices always looking for up-gradation of their knowledge and higher education and those who want extra skills are thronging towards it. Even rural students are adopting this technology. With progression of e-Infrastructures, increased budget and governmental initiatives the future of distance learning is gaining impetus day by day. The advent of cloud environment makes online and distance education more popular and convenient to access. People of all age-groups are connected through the Internet and mobile devices, thus increasing awareness. In short, we can conclude that online education is best feasible solution for the students of internet generation.

REFERENCES

- [1]. Madan Deepanshu, Pant Ashish, Kumar Suneet, Arora Arjun (Feb, 2012): E-learning based on Cloud Computing, IJARCSSE, Volume 2, Issue 2.
- [2]. Manro Sunita, Singh Jagmohan Singh, Joshi.A.S.(June 2012): International Journal of Computers & Distributed Systems, Volume 1, No.1.
- [3]. Bora Utpal Jyoti, Ahmed Majidul (January 2013): International Journal of Science and Modern Engineering (IJISME), Volume-1, Issue-2.
- [4]. Introduction to Cloud Computing architecture (June 2009): White Paper 1st Edition.
- [5]. Fern'andez. A, Peralta.D, Herrera.F, Ben'itez.J.M, An Overview of E-Learning in Cloud Computing.
- [6]. Masud Md. Anwar Hossain, Huang Xiaodi, An E-learning System Architecture based on Cloud Computing, World Academy of Science, Engineering and Technology 62 2012.