Cloud Computing: A Backbone for Educational Platform in E-learning

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Abstract

E-learning (Electronic learning) systems provides the contents to learners, who belong to different backgrounds and have different interest and locations and they are away from the classroom. The main motive of the E-learning is to accelerate the values of the learning. The previous E-learning systems are based on the client and server architecture, which lack the scalability and flexibility and that's why learning resources are not easily share and improvement of system is not easy. The main motive of this paper is to proposes E- learning system with the cloud computing. Cloud Computing is a new emerging technique of computing which is mostly used in IT industries and societies. Revolutionary changes are occurs in the world of ICT with the Cloud Computing, because of its benefits which are like reduced cost, flexibility, accessible anywhere anytime. Cloud computing has brought new changes in the field of education. In the future, levels of education are increased with the usage of this technology for improving and enhanced learning.

Keywords: E-learning, ICT, PDA, Cloud Computing

1 Introduction

E-learning is an internet based learning known as Electronic learning can be defines as the usage of electronic media and ICT in the field of education by using combination of audio, text videos, animation and images. E-learning components can include the content from multiple sources, management with learning experience, online learners and developers of educational content and professional.

Cloud computing is internet based service which maintain the data on cloud by using applications and central remote servers. By using cloud computing, users can access their data without any installation on their internet base devices.

This technology is more efficient by centralizing storage and processing. Cloud computing provides a linked network of systems to provide file and data storage. By using the services of cloud computing user get benefits in cost of computation, hosting of application, delivery and storage of content.

Nowadays Gmail, Yahoo mail or hotmail are the best examples of cloud computing. User don't need any software to access the emails. They just need the internet connection for exchanging emails. The server and E-mail management software to provide the services like Yahoo and Google is available on the cloud (internet).

2 Review of Literature

According to Mayank Aggarwal, Rinkey, Piyush Gupta (2017), integration of cloud computing with the E-learning is a good combination and used by the various institutes. But still a more efforts are needed to implement cloud based online learning. Mansi Bosamia and Atul Patel (2016), they stated that combination of E-learning and cloud computing , allows the integration of different E-learning standards to increase the learning objectives. Combination also provides a cost effective solutions to the academic institutions.

It was further highlighted that E-learning lack face-to-face interaction with the tutor and the learners and reduced social and cultural interaction. According to Prabha Sharma (2014), combination of an E-learning system with the cloud computing can be highlighted as good flexibility and scalability for the resources and reduce the cost in new hardware and software and license of software for educational programs. Faten Karim, Dr. Robert Goodwin (2013) advocated the cloud based learning systems are attractive method for providing E-learning services. This method also deploys the multiple locations of the content as they are centrally administrated. It also stated that institute faces the number of challenges in implementing these systems such as costs, a lack of technical resources, and resistance by key

stakeholders. It also offers many benefits to users like accessibility, security, and compatibility.

It was further highlighted that Internet connection is compulsory, low speed internet connections reduce the efficiency of the provision of E-learning services, and issues surrounding the security of a cloud remain unclear. According to Romero, (2012) Cloud computing is a highly scalable platform that provide quick access of hardware and software over the internet, in addition to easy management and access by non-expert users.

Studies by Thomas, (2011) resulted that the cloud as an everywhere computing tool and a influential platform that can enable educators to practice the ideals of SoTL.

3 Working of Cloud Computing

Cloud computing system can be dividing into two sections: firstly, the front end and the second one, the back ends which are connected with internet over a network. Cloud computing front end is related to GUI part of the software, where user can interact with the software or application. The back end is the cloud part of the system. In the back end there are number of servers, computers and data storage systems create the cloud of computing services and users are unaware of the server running database services and user can not able to see or edit the database.

The main motives of the central server administer system is to monitoring traffic and users demands and also ensure that everything runs smoothly.
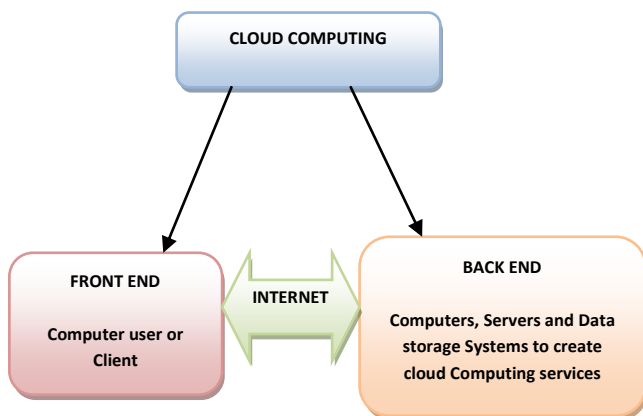

Figure 1: Working of Cloud Computing
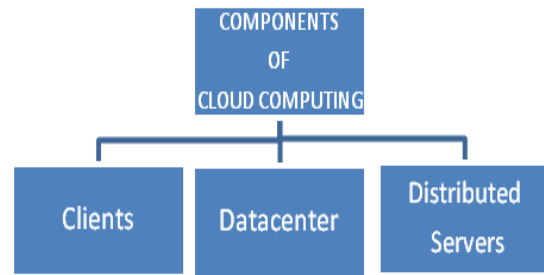
COMPONENTS OF CLOUD COMPUTING

Figure 2: Components of Cloud Computing

Cloud computing contains several elements such as:
- **Clients:** Clients are basically the devices that the end users use to interact with the cloud to manage their information. They are computers, laptops, tablet computers, mobile phones, or PDA.
- **Datacenter:** The datacenter is the collection of servers where the subscribed application will run.
- **Distributed Servers:** Each element has specific purpose and role in delivering a functional cloud based application.

All the servers cannot be placed in the same location; they are geographically placed in different locations, but for the clients which act as the cloud subscriber, these servers act as if they are placed right next to each other.
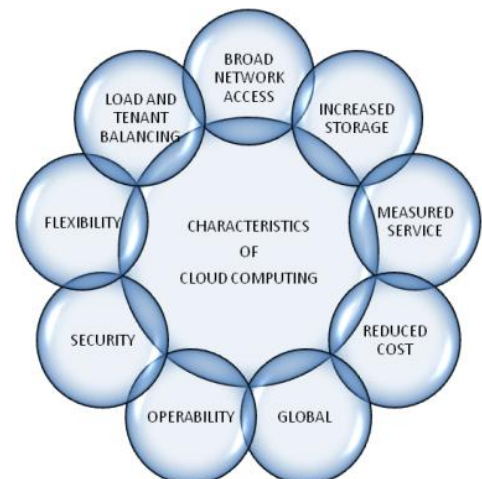
4 Quality Parameters of Cloud Computing

Figure 3: Quality Parameters of Cloud Computing

- **BROAD NETWORK ACCESS:** Cloud services are available over the network and it can be accessed with standard mechanisms that use by heterogeneous platforms such as cell phones, laptop and PDAs.
- **REDUCED COST:** Cost of the services will depend on the demand of resources and the size of enterprises.
- **INCREASED STORAGE:** Cloud computing provides massive infrastructure, storage capacity and maintenance of large volume of data which will be further increased in future.
- **MEASURED SERVICE:** Cloud computing provide transparency to both user and the service provider because reports of usage of resources can be accessed by both parties. High utilization of the services will increase the bill also just like electricity and water bills.
- **LOAD AND TENANT BALANCING:** In cloud computing divide the amount of work that a server has to do between two or more servers to avoid overloading.
- **SECURITY:** Provides maximum security for the uninterrupted operation of applications without any problem.
- **OPERABILITY:** Easy management of cloud computing.
- **GLOBAL:** Ability to use cloud services from anywhere.

5   Models of Cloud Computing

1. **SaaS (Software As A Service)**

Saas provides all the functions of applications and services on demand to many customers and often thousands of users with a Web browser.
SaaS provide the following application:
- Customer resource management
- Video Conferencing
- IT service management
- Accounting
- Web analytics
- Web content management

Eg. : Google's Gmail and applications, Yahoo mail, instant messaging from AOL (America online)

2. **PaaS (Platform as a Service)**

PaaS deliver scalable and elastic runtime environments on demand and host the execution of user's applications. It provides all the resources that required designing the applications and services through internet without having downloaded or installing software. PaaS will be responsible for designing & development of application, its testing then deployment and hosting.
Other services provided by PaaS are teamwork, database integration, security, web service integration, storage and state management. PaaS model has lack of portability among the providers. Means if user develop an application with one cloud provider and decide to move to another cloud, user may not be able to do this and if the provider goes out of the business, user application and user data will be lost.
Eg. : Google Maps, Microsoft's Azure, Sales force's Force.com, ADP Payroll processing, and US Postal Service offerings

3. **IaaS (Infrastructure as a Service)**

IaaS also called HaaS (Hardware as a service). HaaS simply offers the hardware to the customers. Rather than purchase servers, software, racks and having to pay for the datacenter space for them, the service provider rents those resources.
Haas allows rent such resources as:
- Server space
- Network equipment
- Memory
- CPU cycles
- Storage space

IaaS deliver infrastructure on demand in the form of virtual hardware, storage and networking. Servers, networking devices and data centre space etc. are shared and made available to handle workloads.
Eg. : Amazon, GoGrid, 3 Tera, etc.

Importance of Cloud Computing In E-Learning

With the increase usage of internet, most of the colleges and universities offer courses and graduate or post graduate programs through distance mode or in E-learning format. The increased use of technology for improving teaching and learning process at all levels to be the future of education. The different terminologies and technologies are used in the online learning and teaching area and as well as for broadcasting of knowledge. This new form of education is commonly known as E-learning. E-learning is basically the combination of computer and network enabled devices which are used for transfer of skills and knowledge. In the E-learning process of education, the content or knowledge can be delivered through the networked devices which are connected with the internet.
Microsoft office applications, such as MS word processing, excel spreadsheet, access database and many more can be accessed through the internet, even though the files and applications are placed in the cloud. With the help of Cloud computing, academic institutions can arrange all the resources for their researchers, faculty members and for students at a very low cost.

Cloud computing is also provide the supplementary benefit to all the institutions because all the educational applications can also be accessed through the smart phones with internet instead of variety of laptops or desk top computers.

Cloud computing has a momentous position in higher education in that the appropriate use of cloud computing tools can improve engagement among students, educators, and researchers in a cost effective manner.

Educational institutes can concentrate on training of students and research activities of the researchers and faculty members by using the cloud computing instead on complex IT configuration and software systems management of the systems. Complexity of the systems can be reduced with Cloud Computing by using the smart phones.

Cloud computing recommend many reimbursement to E-learning solutions by providing the infrastructure, platform and various educational services directly to the users through cloud providers and by using virtualization, centralized data base and facilities for data access monitoring. Educational institutions can collaborate with each other by using the cloud computing and create a common virtual environment by dropping the expenses and work force that required to install a well-equipped computing lab.

Cloud computing becomes an essential requirement for many educational institutions because low cost, increase institutional performance, sharing with other institutions etc.

6   Models of E- Learning

E -learning has two models: Synchronous and Asynchronous

- **Synchronous E- learning:** In Synchronous E-learning all the students and instructors are available online at the same time and they are communicating directly to each other. Synchronous E-learning includes live web cast, chat rooms and whiteboard sessions.
- **Asynchronous E-learning:** In asynchronous E-learning model communication between participants does not occurs at the same time. The learning content presents on the web server and makes available to the learner on their demand and at their own convenient. Courseware is normally available to learner for 24*7*365.

Synchronous learning is more attractive because of its lower cost of development and more convenient to the users or learners. But it is very hard to adopt the pure Synchronous E-learning because of the following reasons:

- Students really have well-matched schedules to participate in the real time sessions and

- Synchronous technologies are still expensive.
- The majority of the students don't have fast Internet service, most of the students use telephone dial up which cannot use the Synchronous tools effectively.

CLOUD ARCHITECTURE FOR E-LEARNING

E-learning architecture of cloud based is categorized into five layers:

1. **HARDWARE RESOURCE LAYER:**

   This is the bottom most layer in the cloud architecture of E Learning. It handles the essential computing things like physical memory and CPU . It offer the uninterruptable power to the cloud middleware services for the cloud based E-learning system.

2. **SOFTWARE RESOURCE LAYER:**

   this layer is created with the help of operating systems and middleware. With the help of middleware technology, software developer can create many applications for E-learning system and able to embedded these applications in cloud, which help the user to use these applications through cloud.

3. **RESOURCE MANAGEMENT LAYER:**

   This layer plays an important role on get loose coupling of software and hardware resources. With the help of virtualization and scheduling idea of cloud computing, it brings the uninterrupted on-demand software distribution for different hardware resources.

4. **SERVICE LAYER:**

   Service layer is divided into three levels:
   I.   IAAS
   II.   PAAS
   III. SAAS
   These service layers help to cloud customers to use the various forms of Cloud resources for their products like software resource, hardware resource, and infrastructure resource.

5. **BUSINESS APPLICATION LAYER:**

   Business application layer differs from all other layers in cloud based E-learning architecture, because this layer acts as important business logic of E-learning. It mainly consists of content creation, content delivery, education platform, teaching
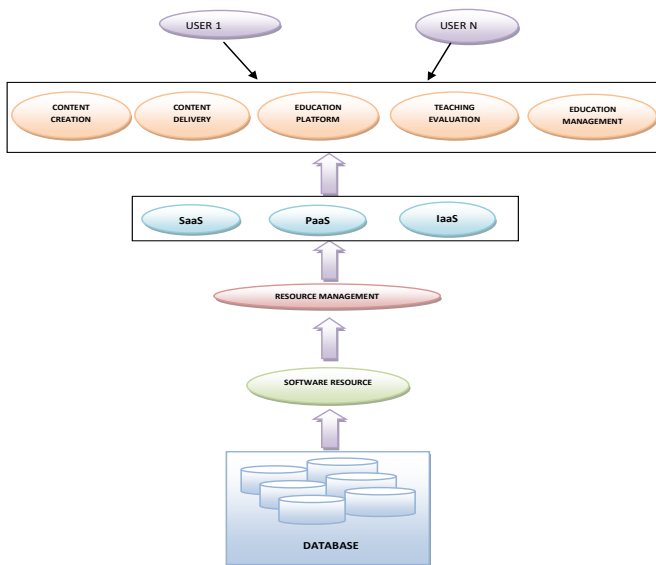
evaluation and education management.

Figure 5: Cloud Architecture for E-learning

7 Benefits Of Using Cloud Computing In E-Learning

Cloud-computer essentially allows all members of an academic community to store information in a central cloud location; basically, they don't keep separate files on their hard drives. Instead, the online program keeps them on a server to which all members have access. Users upload versions of the files to the shared server, and that server keeps the information secured based on what specific sharing settings each person uses. Because the information is located on a central computer, it actually creates many more opportunities for others to use that information. Other benefits of using cloud computing in E-learning are:
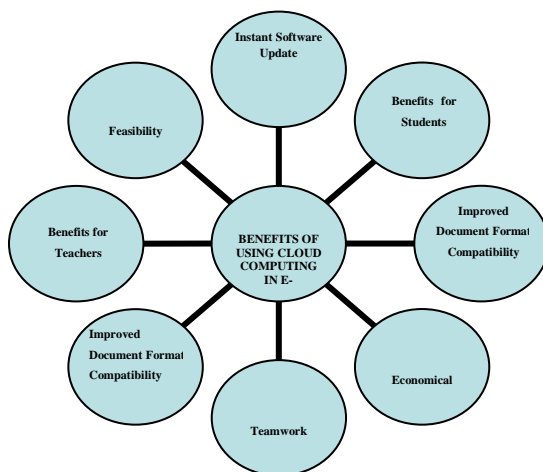

Figure 6: Benefits of Cloud Computing in E-learning

- **TEAMWORK:** Cloud-computing significantly encourages teamwork among learners and teachers and others in academic communities, because it's easy to access files. No more paper materials to carry around and no more back and forth emails; everything is combined into one system for easy access.
- **ECONOMICAL:** The students and educators spend less on materials because whole courseware store in education cloud. Educator could upload all reading material to cloud, which would thus cancel out the need for an expensive textbook or for excessive printing costs. Students would have to worry about the cost of computer. The long term return on a computer is much better than on a set of textbooks or course packets that they'll only use once. Users do not need high configured computers to run the E-learning applications. They can run the applications from cloud through their PC, mobile phones, tablet PC having minimum configuration with internet connectivity.
- **INSTANT SOFTWARE UPDATES:** E-learners always get the updated software because software's are automatically updated in cloud source.
- **IMPROVED DOCUMENT FORMAT COMPATIBILITY:** Some file formats do not open properly in some PC's or mobile phones, but cloud based E-learning applications do not worry about that, because cloud based E-learning applications open the file from cloud
- **BENEFITS FOR STUDENTS:** Students can take online courses, attend the online exams and get feedback from the instructor about the courses and send their assignments and projects through the online to their teachers.
- **BENEFITS FOR TEACHERS:** Teachers also get numerous benefits from 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.
- **FEASIBILITY:** Cloud-computing simply offers students and educators alike a much more convenient and efficient learning experience. The cloud keeps everything in one place: class records, attendance, assignments, syllabus, and readings. Everyone simply logs in to work with the materials; no longer do they have to carry heavy books around. This is great opportunity for the students, who need flexibility in order to be successful in their online programs.

8 Conclusion

Cloud computing is an advanced Internet -based computing model. With the combination cloud computing and E-learning, developed cloud based E-learning system. This cloud based E-learning system opens up new ideas for the future development of E-learning. This paper discusses a cloud based E-learning and describe its definition, benefits and some issues. Cloud based E-learning process enhance the traditional E-learning infrastructure. Once the study materials for E-learning systems are virtualized in cloud servers, these materials are available to students and educational business for use in the form of rent bases from the cloud vendors. By implementing the cloud services, academics institutions achieve a substantially decreasing of expenses with software licensing and at the same time to reduce the campus IT staff with full working schedule.

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