

# Cloud computing: Moving towards for Teaching and Learning Methods

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**Abstract** - E-Learning is virtualized distance learning by means of electronic communication mechanism. E-learning is an emerging aspect of distance education that makes available any-time, anywhere educational approach. E-Learning systems usually require many hardware and software resources. There are many educational institutions that cannot afford such investments, and cloud computing is the best answer. Cloud Computing environment rises as a natural platform to provide support to e-Learning systems and also for the implementation of data mining techniques that allow exploring the enormous data bases generated from the former process to extract the inherent knowledge, since it can be dynamically adapted by providing a scalable system for changing necessities along time. This paper presents the positive impact of using cloud computing architectures upon e-learning solutions development.

## Keywords

E-Learning, cloud computing, SaaS, PaaS, IaaS

## 1. INTRODUCTION

Education or Learning is an important factor of life. Now a days, there are lots of paradigms for getting knowledge or learn something. One of the most promising paradigms for education is e-learning. Web based E-learning is new trend in education which overcomes disadvantages of conventional education system. E-Learning can be describes as learning facilitated and supported through the use of information and communications technology. E-learning is like that, in that it reduces costs traditionally associated with education (such as for classrooms and educational material), to the point that it becomes affordable to a developing nation. Components of e-Learning can include content of multiple formats, management of the learning experience, and an online community of learners, content developers and experts. The study summarized the main advantages, which contain flexibility, convenience, easy accessibility, consistency and its repeatability [5]. The most vital of these include the costs of infrastructure support and its maintenance and the appropriate training of staff

to enable them to make the most of the technology. Cloud Computing is a new paradigm that offers an appropriate pool of computing resources with its dynamic scalability and usage of virtualized resources as a service through the Internet [4]. 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.

Cloud computing is becoming an adoptable technology for many of the organizations with its dynamic scalability and usage of virtualized resources as a service through the Internet [3]. This paper aims to explore the educational potential of "cloud computing", and how it could be exploited in enhancing engagement among educational researchers and educators to better understand and improve their practice, in increasing the quality of their students' learning outcomes.

## 2. LITERATURE REVIEW

Md. Anwar Hossain Masud and Xiaodi Huang have identified an architecture which will be using Cloud Computing within higher education. They have considered the benefits of cloud architecture. They also described that Cloud computing has recently emerged as a compelling paradigm for managing and delivering services over the internet. The rise of cloud computing is rapidly changing landscape of Information technology and ultimately turning to the long-held promise of utility computing into a reality. Cloud computing can help communities and nations, can transform education. An entire world of knowledge can now be made available to teachers and students through cloud based services that can be accessed anytime, anywhere, from any device. By helping countries worldwide, lowering the cost and simplifying the delivery of educational services, cloud computing enables students across the globe to acquire the 21st-century skills and training they need to compete and succeed in the global information society. Present economic situation will force different educational institutions and organizations to consider adopting a cloud solution. Universities have

begun to adhere to this initiative and there are proofs that indicate significant decreasing of expenses due to the implementation of cloud solutions. The aim of their work was to identify an architecture which will be using Cloud Computing within higher education.

From the point view of Aruna.R and S.Prakasam Cloud computing has recently emerged as a compelling paradigm for managing and delivering services over the internet. It is rapidly changing landscape of information technology and ultimately turning to the long-held promise of utility computing into a reality. This practice is aimed to provide an online knowledge-sharing platform for faculty & students. This online forum provides an opportunity for faculty and students to meet online and share knowledge. This practiced is expected to create knowledge explosion. The college administration also uses this forum as a tool to provide details information on policy rules & regulations of the institution.

Prof. Swati Vitkar has described that Cloud Computing adds value with small capital expenses, assuring at the same time the protection of the environment. By including the cloud services, academic institutions achieve a substantially decreasing of expenses with software licensing and at the same time to reduce the campus IT staff by 75% employees with full working schedule.

As Utpal Jyoti Bora, Majidul Ahmed stated cloud based E-Learning, Cloud based education will help the students, staff, Trainers, Institutions and also the learners to a very high extent and mainly students from rural parts of the world will get an opportunity to get the knowledge shared by the professor on other part of the world. Even governments can take initiatives to implement this system in schools and colleges in future and they believe that this will happen soon.

Fernández, D. Peralta, F. Herrera and J.M. Benítez have exposed the main components of e-Learning, focusing on the flexibility, convenience, easy accessibility, consistency and repeatability of this kind of systems. In this manner, an E-learning system is facing challenges of optimizing large-scale resource management and provisioning, according to the huge growth of users, services, education contents and media resources. The features of the Cloud Computing platform are quite appropriate for the migration of this learning system, so that they can fully exploit the possibilities offered by the creation of an efficient learning environment that offers personalized contents and easy adaptation to the

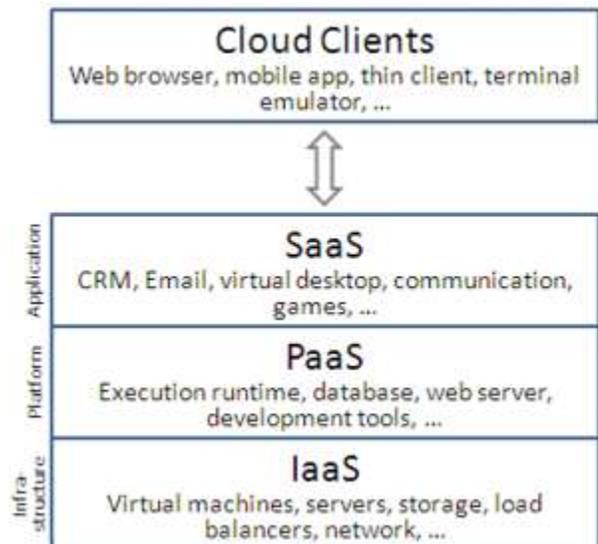
current education model. Finally, they have enumerated several approaches that have been already proposed for addressing e-Learning on Cloud Computing, describing these models and how they take advantage of this environment to enhance the features of the educational system.

## CLLOUD COMPUTING

Cloud Computing is a technology that makes use of the internet and central remote servers to maintain data and applications. Cloud computing let consumers and businesses to utilize 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 National Institute of Standards and Technology (NIST) defined cloud computing as “ a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.”

Cloud computing consists of three layers:

1. Infrastructure as a service (IaaS)
2. Platform as a service (PaaS)
3. Software as a service (SaaS)



**Fig. 1: Three Layers of Cloud Computing**

Depending on the requirements, the customers can prefer one or more services provided. Cloud computing employs a service driven business model. Cloud offers services that can be grouped into the following categories:

**A. Infrastructure as a service (IaaS):** Hardware resources (such as storage) and computing power (CPU and memory) are offered as services to customers. This facilitates businesses to rent these resources rather than spending money to buy dedicated servers and networking equipment. As examples in this category, Amazon1 offers S3 for storage, EC2 for computing power, and SQS for network communication for small businesses and individual consumers.

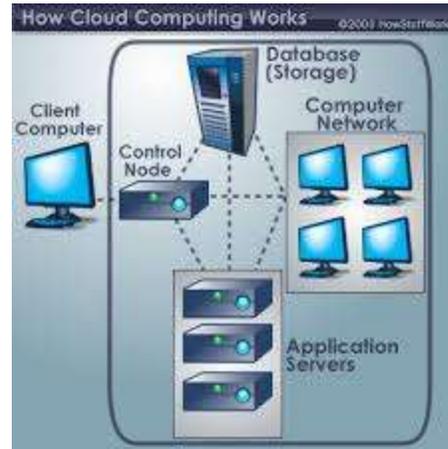
**B. Software as a service (SaaS):** In this model, software applications are offered as services on the Internet rather than as software packages to be purchased by individual customers. One of the pioneering providers in this category is Salesforce.com offering its CRM application as a service. Other examples include Google web-based office applications (word processors, spreadsheets, etc.),

**C. Platform as a service (PaaS):** This refers to provide facilities to support the entire application development lifecycle including design, implementation, debugging, testing, deployment, operation and support of rich Web applications and services on the Internet. Most often Internet browsers are used as the development environment. Examples of platforms in this category are Microsoft Azure Services platform6, Google App Engine, Salesforce.com Internet Application Development platform and Bungee Connect platform. PaaS enables SaaS users to develop add-ons, and also develop standalone Web based applications, reuse other services and develop collaboratively in a team.

#### HOW CLOUD COMPUTING WORKS?

In a cloud computing system, the local computer only constitutes part of the resources to complete the task, and usually the cloud provides most of the resources and data. The hardware and software requirements of the user's computer are much less significant. In many cases all the user requirements is a device that is capable to run a Web browser and connect to the cloud, and the cloud network possesses all the resources and data that are required by the user. As shown in Figure, people use their own PC or portable devices, over the Internet to connect to the cloud. The cloud is seen by these users as a single application,

device, or document. The hardware and the operating system used in the cloud are not visible to the users.



**Fig. 2: A typical Cloud Computing System [6]**

**Cloud Storage:** Data storage is one of the main applications for cloud computing. In the past data was usually stored on a single dedicated server, while with cloud storage, the data is stored on multiple third-party servers.

**Cloud Services:** A cloud service can be considered as any web based application or service offered via cloud computing. Cloud services can include anything from spreadsheets to calendars and appointment books. The application of cloud service is hosted in the cloud and then a user runs the application over the Internet using a web browser.

### 3. CLOUD BASED E-LEARNING

E-Learning in the Cloud can be viewed as Education Software-as-a-Service. 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 education methods, but will greatly improve the efficiency of education.

E-learning is widely used today on different educational levels: continuous education, company trainings, academic courses, etc. There are various e-learning solutions from open source to commercial. There are at least two entities involved in an e-learning system: the students and the trainers [3].

The students can:

- Take online course
- Take exams
- Send feedback

- Send homework, projects

The teachers can:

- Deal with content management
- Prepare tests
- Assess tests, homework, projects taken by students
- Send feedback
- Communicate with students (forums)

Usually, e-learning systems are developed as distributed applications, but this is not necessary so. The architecture of a distributed e-learning system includes software components, like the client application, an application server and a database server and the necessary hardware components (client computer, communication infrastructure and servers).

### Cloud based Architecture for E-learning System

In this work, architecture of Cloud based E-learning using Knowledge sharing System is used. Knowledge sharing system includes such as resources from learning objects, open educational resources, mobile education, Curriculum development, etc. The e-learning cannot completely replace teachers; it is only updating for technology, concepts and tools, giving new content, concepts and methods for education, so the roles of teachers cannot be replaced. The teachers will still play leading roles and participate the developing and making use of e-learning cloud. The blended learning strategy should improve the educational act. On the other hand, E-learning cloud is a 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 engaging in E-learning. After these computing resources are virtualized, they can be afforded in the form of services for educational institutions, students and businesses to rent computing resources [2].

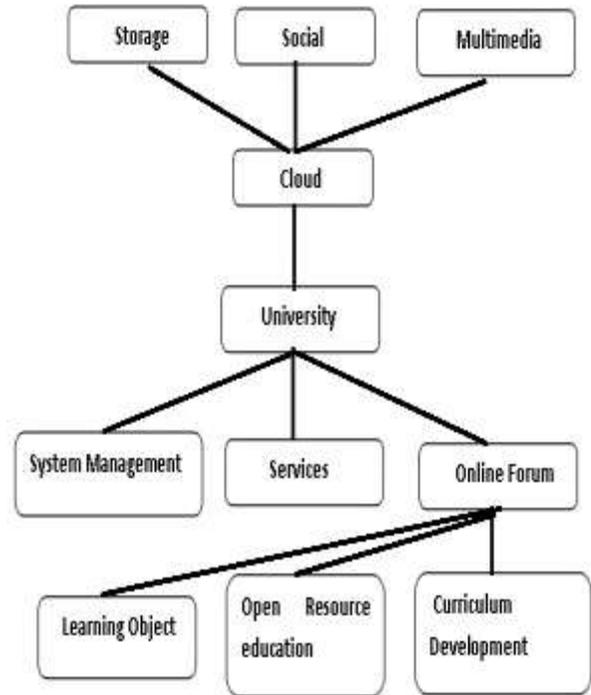


Fig 3: Cloud based E-Learning architecture [2]

### CONCLUSION

E-learning system is facing challenges of optimizing large-scale resource management and provisioning, according to the huge growth of users, services, education contents and media resources Cloud-based learning systems are emerging as an attractive method for providing e-learning services. They can reduce costs due to lower requirements of hardware and software, and less need for onsite maintenance. They are also easier to deploy across multiple locations as they are centrally administered. They also offer benefits to end users in terms of accessibility, security, and compatibility. However, the limitations of cloud-based learning systems are that an Internet connection is compulsory, low speed connections reduce the efficiency of the provision of e-learning services, and issues surrounding the security of a cloud remain unclear. As the speed and stability of the Internet are continuing to improve, it gives the impression like that the popularity of cloud computing for e-learning will increase.

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