

Cloud Based Teaching and Learning Environment for Smart Education

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Abstract: Education is nowadays going beyond classrooms. The advent of cloud computing has set new platforms for innovative teaching and learning practices. The education is now more technology oriented and here the cloud is the latest technology which has established. Following various research areas in cloud computing we propose to introduce an innovative teaching practice for teachers using the sharp features of cloud computing. This paper introduces an educational purpose built platform using IaaS as a service provider and private cloud to experience a smart teaching and learning system which is an innovative concept in the field of education.

Keywords: *Cloud computing, Smart Learning, IaaS, Private cloud.*

I. INTRODUCTION

Now a days, higher education environment is emphasizing on the innovative teaching and learning tools/techniques that are used. The evolution of the educational process is getting faster every day as new technologies puts more and more tools at its disposal. These technological systems do not use education as a key element instead they are based on the advantages that the teachers and the students can find in management models through online and distance education.

Earlier, education system was considered to be the means for the privileged only but now education is compulsory for all at least till a specific age. Various limitations of attaining regular education has opened door for the alternative system is distance education/e-learning system.

The need for the education is increasing constantly and the development and the improvement of the solution is necessary as we are using different tools in teaching and learning method but the need is to give new direction or make some innovations to the existing.

In the proposed paper we have studied how cloud computing uses innovative ways in education system so that education gets smarter. There are several cloud computing service providers that offer support to educational system.

A. CLOUD COMPUTING

The National Institute of Standards and Technology (NIST) defines 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.

The term **cloud computing** is a new phenomenon that appears to be **linked to Web 2.0**. The user has access to a number of

files and programs stored in different, undefined, or virtual places (this is the reason why the term cloud is used), which are permanently available to us wherever we are (Gens, 2008). Our documents are not physically hosted on our computer and we can have them from anywhere with just an Internet connection. Working in the cloud means that users don't have the need to depend on a particular program or even an operating system any more. The only need to start working in the cloud is a device with Internet connection. The three service models are Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS).

Cloud computing is Internet-based computing in which shared resources, software and information are delivered as a service that computers or mobile devices can access on demand.

The cloud computing is a culmination of numerous attempts at large scale computing with seamless access to virtually limitless resources. Cloud computing is already used extensively in education. Free or low-cost cloud-based services are used daily by learners and educators to support learning, social interaction, content creation, publishing and collaboration. Examples of cloud-based services include Google Apps, YouTube, Twitter and Drop box.

II. BACKGROUND

Cloud computing by no means is different from grid computing, in grid the concept of parallelism is used whereas in clouds the collaboration is used by creating a virtual processor by joining the cluster of computers. By sharing its services in the cloud an education institution can more focus on offering different services to the students, faculty and the staff to help them to achieve success in their field.

To fill a significant gap in the distance learning many of the institutions/organisation adopt the concept of the cloud computing.

Over the years education is striving for constant innovation, ease of use and access for everyone, and in turn social development and progress. Till now pedagogical teaching and

learning practices were being followed. Then was introduced the concept of e-learning. The tools of information and communication technology were being used the advancement of education. Students could watch instructional video; download learning materials or online communication with teachers and other operations, which was the innovativeness in the traditional teaching environment. In the network teaching process, students can learn anytime, anywhere to break through the traditional teaching of the simple way to acquire knowledge, to better train students in the initiative, highlighting the individual student learning.

Why we use cloud in education environment?

The following are some advantages of using cloud in education

- Significant cost reduction
- Access to application from anywhere.
- Support for teaching and learning.
- Increase openness to students to new technologies.
- Offline usage.
- Opening to advance research.

We are using different service models like IaaS, PaaS and SaaS of cloud with different deployment model like public, private, hybrid and community clouds in our teaching and learning process, among the different model in our research paper we are mainly focus on IaaS (Infrastructure as a service) with Private deployment models.

As we have proposed to use **IaaS** of cloud in our education environment it offers the infrastructure that is required for teaching and learning “**use as you pay on**” basis or sometimes with free of cost. The private cloud models are normally designed for a single organization or university. Different departments of a university can share its services. It is more secured than all the other models and the main advantage of using private cloud is that that is authenticated to specific users only means it is very useful to the security purpose of the data.

III. PREVIOUS WORK DONE

In research literature, to improve standard of the education there is an immense need to introduce some innovative techniques so that the quality of education will improve. In an educational environment teachers and students can take the advantage of new trends in ubiquitous computing, employing ubiquitous devices (desktop, mobile phone, PDA, tablet etc) and technologies in the classroom. By introducing new computing like cloud computing students can access their data from cloud with the help of either smart phone or desktop. The students can learn the lesson from network teaching and design the applications for the students with cloud computing. Students were motivated to learn independently they can use the concept of collaboration which can prove to be the main advantage of cloud computing in their studies to share the data from the cloud.

Cloud computing provides a good solution which should address some of the IT challenges and the new opportunities to the distance learning. Due to significant decrease of expenses

with the use of cloud computing in institution/organization, many of the institutions have started adopting this technology for their organization.

IV. EXISTING METHODOLOGIES

We can imagine our future in which the majority of educational services will be hosted in the cloud and institutions no longer have their own data centres with expensive hardware, power bills, and computing resources which are rarely fully utilized. Here we have analyzed some of the emerging benefits and challenges of cloud computing for the educational sector. In most of the government schools and colleges in India IT plays very limited role. Most of the work is done manually from attendance to classroom teaching to examination system.

Cloud computing technology provides solution to various problems being faced by everyone in the education system. Cloud computing facilitate users to control and access data through the Internet. The main users of a typical higher education cloud include students, Faculty, administrative staff, Examination Branch and Admission Branch. All the main users of the institution are connected to the cloud. Separate login is provided for all the users for their respective work.

Cloud collaboration is a newly emerging way of sharing and co-authoring computer files through the use of cloud computing, whereby documents are uploaded to a central "cloud" for storage, where they can then be accessed by others. New cloud collaboration technologies have allowed users to upload, comment and collaborate on documents and even amend the document itself, evolving the document within the cloud.

Collaboration, in this case, refers to the ability of people in an organization to work together simultaneously on a particular task. In the past, most document collaboration would have to be completed face to face. However, collaboration has become more complex, with the need to work with people all over the world in real time on a variety of different types of documents, using different devices. While growth in the collaboration sector is still growing rapidly, it has been noted that the uptake of cloud collaboration services has reached a point where it is less to do with the ability of current technology, and more to do with the reluctance of workers to collaborate in this way.

Teachers can upload their class Tutorials, assignments, and tests on the cloud server which students will be able to access all the teaching material provided by the teachers via Internet using computers and other electronic devices both at home and college and 24x7. The education system will make it possible for teachers to identify problem areas in which students tend to make mistakes, by analyzing students' study records. In doing so, it will also allow teachers to improve teaching materials and methods. This will not only make it possible for students to use online teaching materials during class but they will also be able to access these materials at home, using them to prepare for and review lessons. Utilization of cloud computing systems

will reduce the cost of operation because servers and learning materials are shared with other colleges.

In our research paper we used network teaching structure platform along with IaaS. Cloud Computing is able to provide new software resources development model. We can take advantage of this feature to implement the communication between students and teachers through Cloud service. XML can be used to exchange data in data layer and achieve the following features: IM Q&A service, E-mail service, Online Q & A Service. Before adapting the concept of the cloud computing and different services that are offered by cloud service providers many of the university or organization must be considered many issues to use these services. Despite some commonality to use the applications and services many of the organizations wants to use different systems for them, while some argue that organizations should considered redesigning their processes in collaboration with others to reap benefits and in this case the degree of collaboration is hard to achieve and hence the concept of the virtualization using IaaS is used to enable a single computer to run several different independent application.

Virtualization can be used at any scale between the institutions to share different applications on the same computer or within a university or organization to run the applications from different departments on a central facility.

A more difficult issue when considering a cloud solution is confidence that the data and applications will be secure and that the service will continue to be available over many years. Using the private cloud presents a possible solution in situations while security is still remains a concern. For example if a researcher wants to store their data on cloud then using private cloud and IAAS will give the possible solution for security.

An important area where the higher education can construct on the successful track record of collaboration using cloud computing concept to reduce cost, improve the flexibility of provision and scalability.

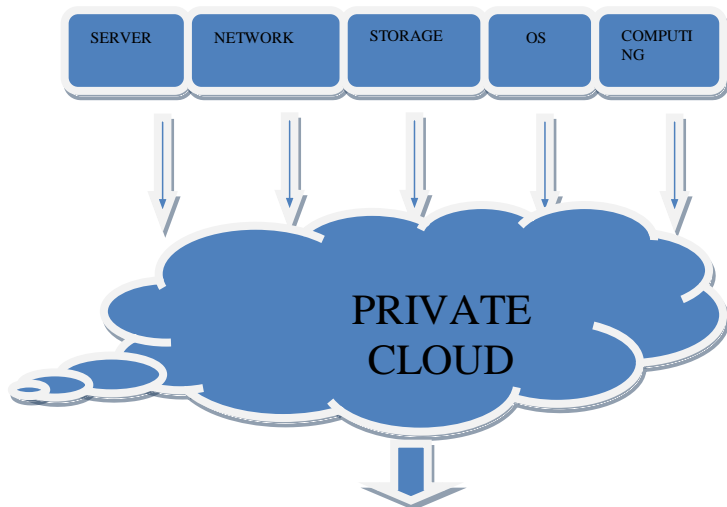


Figure1. IAAS MANAGEMENT (SERVICE MODEL)

The initiation of cloud computing in education is still at a budding stage. The research now particularly spotlights on the analytical aspects of the cloud computing applications, describing some current and accomplished educational and research products. The successful applications of cloud computing models at educational institutions have been estimated only to a partial extent. With this point of view our paper takes a baby step by bringing together the various definitions of cloud computing in the education with a innovative way to implement cloud computing. To stress upon this paper emphasizes the innovative technique of using educational cloud computing for providing smarter education. This paper studies various aspects like characteristics of the educational platform and flexibility for all universities, and educational institutions. In addition, this paper presents different educational applications for education infrastructures implement for using in academic section. The cloud computing in education will resolve not only from an academic point of view but also on following important attributes like:-

- 1) Reduction of cost.
- 2) Effective communication.
- 3) Security and privacy.
- 4) Providing flexibility and accessibility

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