

Cloud Computing: An Application In Higher Education.

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Abstract :

We are already aware the term Distance learning. Many students in long time ago used to take benefit of distance learning. But the concept of learning was different as there was no internet at that time. Institutes used to send the learning material to student and take the examination using postal service or in physical mode at the institute itself. Student is supposed to learn on his/her own.

Distance learning was just one of the phenomena to prove the value of the cloud to enterprises. The cloud, in a sense, second-generation distance learning engine– Rev. 2.0, essentially. The cloud computing solve many problems and open many opportunities to the education institutions. Multimedia interactive lessons offered by cloud providers holds great promise for improving the quality of education by the ability to illustrate ideas with visual, audio, text, or any combination of media and in that way to improve the level of acquired knowledge. Now in the pandemic situation everyone has understood the importance of e-learning.

Key words: cloud computing, higher education, distance education, e-learning

I. Introduction:

Cloud is the most powerful term in the IT industry right now. Cloud computing(CC) – a relatively recent term, builds on decades of research in virtualization, distributed computing, utility computing, and more recently networking, web and software services (Vouk, 2008). One of definitions for a Cloud OS is simply a simplified operating system that runs just a web browser, providing access to a variety of web-based applications that allow the user to perform many simple tasks without booting a full-scale operating system (Betonio, 2011). A study by McKinsey (the global management consulting firm) found that there are 22 possible separate definitions of cloud computing. A more commonly used definition describes it as clusters of distributed computers which provide on-demand resources and services over a networked medium (usually the Internet) (Sultan, 2010).

In the past few years the concept of “Cloud Computing (CC)” has emerged as a viable and promising solution to the challenges associated with distance education. It provides IT budgeted solutions also escalates IT needs. CC is a model for enabling convenient, ondemand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services). These devices are rapidly provisioned and released with minimal management effort or service provider interaction. Users can access these resources from any computer with a high speed Internet connection while having no other connection to the hardware that holds the source software [4]. Because computation takes place on a remote server, the need of user’s hardware and software are much lowered down than they would be otherwise It reduces both cost and maintenance requirements [5]. For this reason, CC has a lot of importance for HE institutions seeking to reduce IT budgets.

The role of Higher education (HE) for overall development of society is very important. The collaboration between universities, government and industry, researchers and students has proven their contribution to the transformation of society and the entire world economy [1]. During the last few years, the universities offering higher education are making transition to research universities [2,3]. Universities/institutes use IT infrastructure as foundation for their educational activities and Science research. With the evolution of

technology and due to pandemic situation all around the world all educational services migrates from traditional form to the online form. These educational services, requires an adequate IT infrastructure using the proper technologies, guaranteeing the access of large number of users, fast and secure service access.

Cloud computing do offers economies of scale through aggregating computing resources and virtualization. Cloud computing ensures a global reach of information and services. It uses computing environment that offers on-demand scalability, performance guarantees, minimal initial investment and ongoing cost containment. In short, the cloud provides educators an architecture to offer pre-built educational services and solutions together with the required skills for running and maintaining them.

In this paper we will discuss about how cloud computing supports higher education? In section 1 we will see how cloud computing works. Section 2 will brief about how CC relates to higher education. Section 3 will talk about one of a case study of using CC in academic.

II. Working of Cloud Computing

A. SERVICE MODELS

Cloud computing generally refers to an Internet-based computing model that various PCs and servers are associated with internet, operating systems, software and database. These resources can be shared by multiple clients based upon their demands (Chi and Gao, 2011). Cloud computing do offer the computing resources *as a service*, meaning that the resources are owned and managed by the cloud provider rather than the end user. Those resources may include anything from browser-based software applications, third party data bases, or third-party servers used to support the computing infrastructure of a business, research, or personal project.

CC has three main service models which are based on the type of resource being offered. These are Software as a Service (SaaS), Infrastructure as a Service (IaaS) and Platform as a Service (PaaS).

i. SaaS

SaaS provides users access to various applications over a widerange of devices through a APIs or a thin clientsuch as web browser over the internet [1]. Users are able toaccess these applications at any time in any place and are ableto continue from where ever they stopped the previous time[7]. Because of the possibility of accessing course contentanytime and anywhere, knowledge sharing can be improvedamong users in HEIs [14].In SaaS applications are delivered through the medium of the Internet as a service. It helps organizations with limited IT resources to deploy and maintain needed software in a timely manner while, at the same time, reducing energy consumption and expense. Instead of installing and maintaining software, you simply access it via the Internet, freeing yourself from complex software and hardware management.

ii. IaaS

IaaS provides users with access to computing resources , infrastructure such as storage, processing and networks over the internet [7].IaaS allows users to be able to run applications on remote devices. Also users can savetheir data on the provided resources without having to worryabout the management and maintenance [1].

iii. PaaS

PaaS allows users to deploy their own applications onto thecloud platforms and gives them control over their applications [7]. Theservice provider is left with the responsibility of managing andcontrolling the underlying infrastructure such as servers,networks, storage and operating systems [1].PaaS is the operating environment in which applications run. PaaS is a way to rent hardware, operating systems, storage and network capacity over the Internet. It is an outgrowth of Software as a Service (SaaS), a software distribution model in which hosted software applications are made available to customers over the Internet (Rouse, 2010).

Here are some examples of cloud Computing Operating Systems are:

1. Glide OS - Glide is a free suite of rights-based productivity and collaboration applications with 30GBs of storage.
2. Amoeba OS - is an advanced Online Operating System. Log in to your free account and join a cloud computing revolution that begins with great apps like Shutterborg, Exstream and Surf.
3. MyGOYA - is a free online operating system. Your own personal desktop can be accessed from any Internet PC in the world and includes e-mail, chat, filesharing, calendar and an instant messenger. Manage your contacts from anywhere in the world.
4. Kohive - is an online desktop where you can easily collaborate with others

5. ZimdeskOS - is your computer on the web – the entire functionality of a PC – online. There is nothing to install. A web browser and internet connection are all you need to access your desktop, files and favourite applications. You can access your data anytime from anywhere, from any PC.

B. DEPLOYMENT MODELS of CC

Just as there are service models, CC also have deployment models. These are private cloud, community cloud, public cloud and hybrid cloud.

i. *Private cloud*

In a private cloud, the infrastructure is owned by some organization. Organization uses the cloud as good as they have physical system in their organization. In this case cloud infrastructure is dedicated for use by a single organization with different divisions such as a university with different faculties and departments. The university, institute or a service provider owns the infrastructure. The university can manage it themselves or let the service provider manage it for them. The infrastructure can be either on premises or off premises. This deployment model gives the university more control of the infrastructure and data because it is owned and used exclusively by the university. In this case the data security is very high as all the servers are private to the university or institute.

ii. *Community cloud*

If there are two or more organizations with similar goals then they can share the cloud infrastructure is called as community cloud. [7]. For example, one or more universities or a service provider can own, manage and use the cloud infrastructure. The infrastructure can be in shared one or more of the universities that makes up the community. The infrastructure could also be at a service provider's premises or some part of the infrastructure could be in one or more of the universities while the remaining part could be at the service provider's premises [1].

iii. *Public cloud*

In a public cloud, the cloud infrastructure is dedicated for use by the general public. It could be used by individuals, businesses, government organizations and any one from the general public. It is owned by the service provider who controls the infrastructure [1].

iv. *Hybrid cloud.*

Hybrid cloud is a combination of two or more deployment models. For example, a university could use private cloud for their sensitive data for a sake of security and use public cloud for their less sensitive data which can be handled by all users [1].

III. Cloud benefits for Higher Education.

Cloud computing has a prominent role to play in the classrooms of tomorrow. Cloud computing can democratize education. For example, many schools suffer from low graduation rates directly attributable to insufficient infrastructure – shorthanded staff, tiny classrooms, lack of teachers [3]. Cloud computing solutions can solve many of these problems. Typically, the cloud computing infrastructure resides in a large data centre and is managed by a third party, who provides computing resources as if it were a utility such as electricity, accessible by anyone, anywhere with an Internet connection [4]. Some countries are already moving in this direction.

Out of the three services provided by CC, Software As A Service (SaaS) is used highly in Higher Education. SaaS offers many benefits for higher education institutions and it has the capability to improve the learning process in HEIs. Some of the benefits SaaS offer HEIs include:

1. *Access from any place at any time*

Due to CC as a SaaS, students, lecturers, administrative staff and other cloud users in the institution can access the cloud from any place at any time and continue their work without losing any data. This will help them in completing their tasks on time [2]. For example, students can now continue with their assignments at home or wherever they are provided they have internet access. As a result, everyone will be able to meet their deadlines.

2. *No installation is required by the institution*

As service provider provides all installation, the time needed for installation and upgrades of software and applications could be used for other important tasks. [5].

3. Cost reduction

HEI can save the money needed for purchasing and licensing of software and applications. The money needed for maintenance could also be saved and used for other important tasks [2].

4. Ease of use

The software provided by cloud service providers has very easy GUI that anyone can use it easily. This makes it easy for users to be able to understand and use cloud applications and software with little or no training [3].

5. Increases collaboration and knowledge sharing among institutions

Students, lecturers and other cloud users in institutions can share knowledge and ideas easily in a community cloud. This will assist them in keeping up to date with other institutions [3].

6. Scalability

The number of cloud users in an institution can be increased or reduced at any time depending on the institutions requirements. This helps the institutions to maximize the use of resources and only use and pay for resources that are utilized [7].

The potential of cloud computing for improving efficiency, cost and convenience for the educational sector is being recognized by a many institutions. Cloud benefits for education are obtained through Flexible services - Drive innovation with data services in the cloud that students, teachers, faculty, and staff can reuse. Offer your own data mashups on a portal.

Infrastructure - Get all the IT resources you need, only when you need them, managed securely and predictably. And pay for only what you use.

Applications and content - Rather than waiting in the software procurement line, get hosted software, datasets, and services so fast you'll have plenty of time to work on your mission.

Policies and regulations - Proceed carefully, but note how cloud computing can help you meet your institution's compliance requirements.

Creative IT - Free your IT department from a keep-the-lights-on approach to foster some creative problem solving that can help teachers better engage their students.

IV Conclusion

We expect further development and utilization of cloud services in the future. Hopefully that will increase the level of education quality offered by the faculty as well as the research work of students and academic staff. In future as more and more cloud services are adopted by HEIs, there should be standard SLA's that will help reduce the issues with SaaS adoption such as security and legal issues.

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