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Opportunities and Challenges in Cloud-Based E-Learning

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ABSTRACT

Education and learning continue to be expanded a step-by-step, and each section of education has improved gradually. The popularity of education using the web and the development of the immaculate online learning condition has turned out to be one of the hot concentrates on exploring remote education. Cloud computing is rapidly developing, having nearly any discipline application. By offering benefits to education, it is very important to enhance the quality of education in order to fulfil the essential performance, such as offering negligible effort, flexibility, diversity, cooperation and convenience. The cloud services and programs enable clients to store and get to their nearby info on the remote server farm by utilizing their PCs or smart phones by means of the web. Cloud-based E-learning is the technique to cut down expenses and intricacy of data dealing with, which controlled by third party services. Conventional E-Learning strategies joined with cloud computing advancement to offer huge favourable circumstances to the academic users but it compromises in security perspectives. This study explains advantages of E-learning in education and describes different types of attacks in service delivery models of E-Learning proposed by different researchers.

Keywords : E-learning, Cloud Computing, SaaS, PaaS, IaaS

I. INTRODUCTION

Education or learning is an important part of life and any person cannot live properly without education. At present, there are various models for getting knowledge or learn something. One of the most encouraging paradigms for education is E learning. E learning is typically alluding to the deliberate use of networked information and communications technology (ICT) in teaching as well as learning. Also, another term used to illustrate this mode of teaching and learning, including web-based education, virtual education or delivered education. The spreading out of learning is especially known for the reach of ICT expansion, and in addition, its' diminishing costs. The capability of ICT to aid multi-media resource-based learning and teaching can also highly relevant to the developing enthusiasm for E-Learning. Cloud computing is one of the innovation inclines liable to significantly affect the educating and learning conditions. [1] Cloud computing is definitely a new paradigm that provides a proper pool of processing assets with its dynamic adaptability and use of virtualized assets as a service through the Internet. The resources can be programmed, network servers, platforms, infrastructure segments, and services. It provides demand based on autonomy and provides an adequate system, data resource environment, and effective adaptability. This particular innovation is utilized to get more effective and economically perceptive registering by centralizing storage space, memory, processing limit of PCs and servers. With the enormous preferences of cloud computing, we anticipate that this innovation will reform the field of E-learning training. Cloud computing applications offer flexibility to all academic institutions or

universities, schools, and organizations. The cloud system in institutions' campuses offers effective infrastructure and deployment model for their energetic demands. Some great benefits of cloud computing support, education institutions to ascertain a portion of the ordinary difficulties, such as cost diminishment, brisk and persuasive correspondence, security, versatility, and accessibility. In addition, it makes it possible for users store their important data and access it on-demand from anywhere anytime via the internet. [2] The cloud e-learning innovation is recognized as an effective alternative technology over conventional e learning. The security is the major concern in this technology. In September 2009, reviewed by 263 IT executives manage by the IDC, security has been separated from 87.5% as shown in Figure 1. [3]

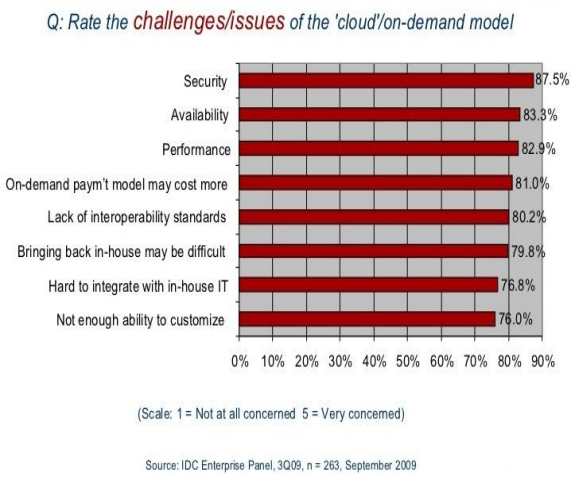

Figure 1: IDC's Survey Report

II. E-LEARNING FUNDAMENTALS

E Learning is one of the ways that is bridging the gap between traditional and smart education. [4] The Internet has a significant influence on education, today's education is reshaping because of Internet. The adoption of the Internet in education has entirely re-structured the learning and training model. A new concept of ubiquitous type learning exists that supported by several technologies, especially Information and Communication Technology (ICT) and Web Technology. The fundamental concept behind e learning is to promote learning through up-to-date, studying materials, without worrying about the bounding of time, space, gender, nationality cast and origin. Just using Internet availability, higher education might be achieved. Actually, the internet supported technologies that provide essential knowledge and increase learning efficiency is called e learning. The e learning offers students decent services of speedy, anywhere and anytime learning, particularly for those who have a very hectic schedule, do not have enough time to attend classroom and learn. Some popular e-learning aspects are textual content, image, picture, animation; audio and video, which have an excellent effect on learning, but if these aspects misuses, the e-learning may possibly, lose its usability. Many professionals commenced believing that e learning may be one of the most effective growing industries in the future and that is reason different massive educational institutions are applying their educational system from traditional to e-learning system. It is noticed that complete e learning setup usually required enormous resources in the form of big servers, highly furnished infrastructure, big data storage equipment, skilled manpower, hi-tech strategies regarding security and fault tolerance. The shifting from traditional to e-learning technique is the most significant concern specifically for those institutions or university that have limited resources; less technical personnel, inappropriate network infrastructure, and poor economic status. The cloud computing innovation could be one of the most effective alternatives for these challenges. [5][6]

III. CLOUD SYSTEM

In an October 2009 presentation titled "Effectively and Securely Using the Cloud Computing Paradigm,"[7] by Peter Mell and Tim Grance of the National Institute of Standards and Technology (NIST) Information Technology Laboratory, Cloud computing is defined as follows. "Cloud Computing is

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." "This cloud model promotes the availability and is composed of five essential characteristics, three service models, and four deployment models."[8], which is shown in figure 2.

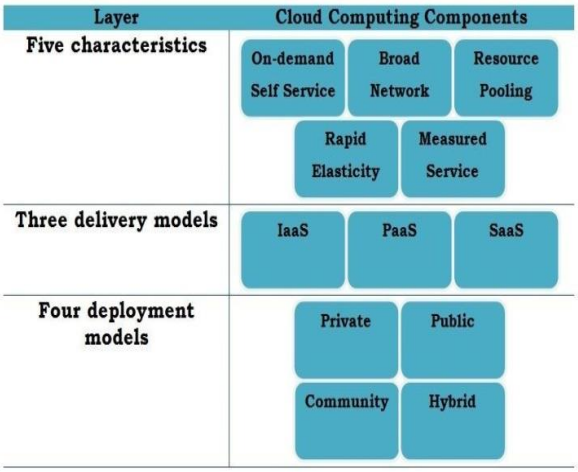

Figure 2: Cloud Computing Characteristics, Service Models and Deployment Models

In the modern education system, the main partners of cloud computing are shown in figure 3. In advanced educational institutions, the partner term refers to those who have had access to educational services, such as students, faculties, researchers, employees, etc.

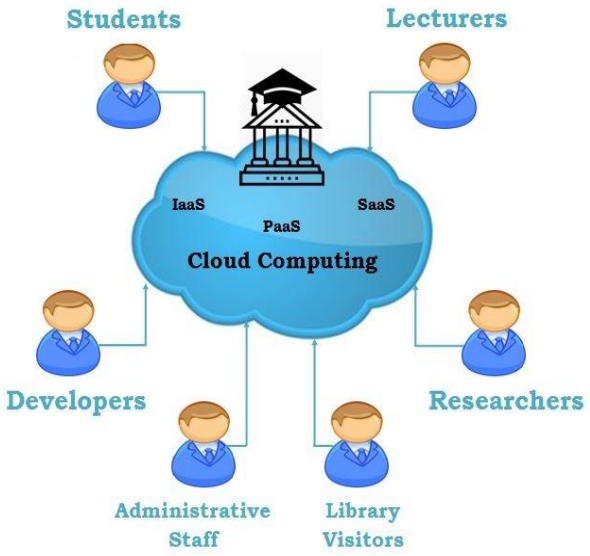

Figure 3 : Partners of cloud in an educational institution

IV. WHY CLOUD COMPUTING FOR E-LEARNING?

Partners who use cloud property and services in advanced education institutions can certainly sort the important benefits of cloud computing in the education system.

4.1 Benefits for Educational Institutions:

There are numerous positive aspects may be granted when implementing cloud computing technology in advanced education institutions. There are different focal points might be conceded while receiving cloud computing innovations in advanced education institutions. Generally, there are different points of interest might be admitted while achieving cloud computing innovations in advanced education institutions. Some universities have accepted cloud computing in their programs for economic purposes, while some other institutions use the cloud to provide scalable and acceptable IT administrations. [9]

4.2 Benefits for students:

The key recipient of cloud advancement in the educational institutions must be students. Cloud computing emits services for students along with new capabilities that cannot be found well in traditional computing. Nowadays, the students can easily store anything in electronic formats, such as their daily activities, class notes, reports and almost every record. Apart from, they are able to move their files to the cloud and retrieve them when needed. Students can get emails of quality learning material and approaches to learning quality of their courses. This particular take care the problem of the student's reluctance to gain textbooks due to their high-cost prices. In addition, cloud-based reading material focuses on the issue of using obsolete materials in many organizations and allows students to use the most updated educational resources. The Lab's programs and auxiliary resources, which may be executed on

the Internet, enable students to execute lab assignments from anywhere and by a minimal effort by individual gadgets. Therefore, students are no longer required to purchase expensive equipment or install special software. Students have the opportunity to get the platform easily whenever for getting programs on the net, go to the online assessment and upload their assignments and project through the cloud to the instructors. A student can collaborate themselves with other students as a group or with their instructors. Students can collaborate themselves with other students.

4.3 Benefits for faculty:

The faculty also can get numerous benefits through cloud-based applications. [10] Cloud technology provides an easy and adaptable stage to set up their materials, presentations, meetings, articles and so on for educators. To overcome the lack of expertise in some faculty members, they can exchange experiences by creating a remote seminar. If offers an opportunity for instructors to work from home and complete assignments, prepare online tests, assessing and planning with their own devices. Cloud accommodates experts a discussion area along with ease of access to global computing resources and satisfactory stockpiling limit.

V. LIMITATIONS IN CLOUD SERVICE MODELS

Even, the enormous features of utilizing cloud computing in educational institutions, there are a few complications that prevent the wide scale reception of this development in different areas of the university. This section focuses about several restrictions discovered with cloud service models, which deserve adopting cloud computing in advanced educational institutions. [11][12][13][14] This research intends to deal with the key security challenges of implementing cloud computing in advanced educational institutions.

5.1 Limitations in SaaS:

Two main important constraints may affect conveying applications under SaaS model are information locality and reliability. Normally, the user fails to be aware of the geographical location where the cloud service provider stores user's data and how can be assured that cloud service provider follows a Service Level Agreement or not. Lack of trust between users and cloud service providers is a serious concern that ought to be snapped while using the SaaS. Therefore, to prevent data spillage in the academic institutions the computer department in the organizations may host the SaaS software programs on its own private server or deploy it on infrastructure services supplied by reliable and trusted service provider, such as Google, Amazon, Sales force etc. Therefore, almost all the academic institutions associated with this evaluation are utilizing a private cloud rather than the public or hybrid cloud.

5.2 Limitations in PaaS:

The actuality is that platform as a service offer versatility to the programmer to accelerate the development of new SaaS programs and move them to the cloud. Nevertheless, the programmers may deal with a few troubles when utilizing PaaS platforms. First, the actual expense is expanded due to including some new components enable programmers to incorporate and handle own cloud-based applications. Another challenging problem that confronts PaaS users is secure programming models and high-level services to the merchant who provides a benefit. These kinds of models and services depend on the particular situation and when shifting to a different PaaS environment, they need to work entirely again. This specific less comfort decreases user's mobility to move to the different platform. Then, the reality is that even though programmers are capable of developing and managing their programs at the top of the platform, they do not think of any kind of safety taking into consideration the security of the platform, which is covered by the cloud service provider.

5.3 Limitations in IaaS:

When compared with first two service models, IaaS accommodates cloud user more effective handle on security related challenges. Security and safety compulsions of the IaaS model can be shared among service providers and their customers. The provider's responsibility consists of primary security controls such as physical as well as virtual environment protection. Therefore, the cloud user is responsible for implementing the suit security controls associated with software programs such as operating system, developed applications and data. Virtualization technique is often a crucial IaaS model. In the virtualization domain, when cloud users are employing contributed infrastructure resources, they can lead to cross-based attacks. In these cases, the attacker gains root-level access and then penetrates most of the tenant's accounts in the cloud.

VI. SECURITY CHALLENGES AND RISKS:

Organizers in the education section are desperate to utilize cloud services, which have been profoundly less than just as if that service that totally monitoring inside their own focuses. Nonetheless, they are actually facing the scope of numerous new problems. This section seems towards the basic security and privacy-related issues and hazards in cloud computing.

VII. CLOUD INFRASTRUCTURE:

This section consists of problems recognized with the physical devices used as a backbone for cloud infrastructure and additionally the virtual program employed to operate cloud resources. The cloud infrastructure consists of key elements of cloud service models and is especially associated with virtualization environment. Virtualization is the key innovation used by cloud vendors to complete multi-tenant architecture, where it splits the cloud server's computing resources into various execution environments. The virtualization-based cloud is not secure because of multi-user distributed environment, where every virtual instance is on a single physical machine. Among the list of virtualization security issues encounters cloud system is a lack of VM safety, because several VMs located on a similar PC, we cannot place a hardware protection device such as a firewall between them. A dynamic environment causes one more problem where VMs are carried out, ended or moved to elsewhere for that reason, which marks difficult to screen activity and decide whether the attack is accumulating. Primary attacks that may debilitate cloud infrastructure are Theft-of-Service, DoS, Cross-VM Side Channel, Phishing, Malware Injection, Botnets and VM rollback attack.

VIII. CONCLUSION

Be sure that IT manager able to manage and deal with cloud's products and services while finishing the contract concurrently with the service provider. A concurrence by having an outsider to accomplish evaluations constantly to screen the execution and compliance from the service provider to contract terms. Keep track of regularly the efficiency of available cloud services and resources, which have been poured and roll out a noticeable difference as required. This tactic may minimize security risks and threats. This research paper primarily focuses on the investigation of the use of cloud computing and advantages of E-learning in the E-learning environment. In this environment, the emphasis is especially on the invention of the use of cloud computing and benefits of eLearning. It can also be inferred that we can establish an E-learning application model depending on cloud computing because of mass data storage, high-speed processing abilities, as well as it's ideal and the sharing mode of resources. E-learning application model dependent on

cloud computing will not end its pace to continue. As the cloud computing technologies turn out to be more refined and the uses of cloud computing, turn out to be progressive across the board, E-Learning will surely introduce another period of cloud computing.

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