

E-Learning system by using cloud computing

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ABSTRACT: The increasing research in the areas of information technology has a positive impact in the world of education. The implementation of e-learning is one of contribution from information technology to the world of education. The implementation of e-learning has been implemented by several educational institutions. E-learning provides many benefits such as flexibility, diversity, measurement, and so on. The current e-learning applications required large investments in infrastructure systems regardless of commercial or open source e-learning application. It can be challenging to implement e-learning in educational institutions. Another problem that can arise in the use of e-learning trend today is more likely to institution building their own e-learning system itself. If two or more institutions are willing to build and use an e-learning so they can minimize the expenditure to develop the system and share learning materials more likely happened. This paper presents the benefits of using cloud computing for e-learning. There are many educational institutions that cannot afford such investments, and cloud computing is the best solution, especially in the universities where the use of computers are more intensive and what can be done to increase the benefits of common applications for students and teachers. In addition to this paper we also illustrated the shift paradigm from conventional e-learning to cloud-based e-learning and described the expected benefits by using cloud-based e-learning.

KEYWORDS: Models of cloud, E-learning using cloud computing, Security in cloud computing E- learning.

1 INTRODUCTION

The cloud computing is a collection of server delivering resources that can be accessed remotely via the Internet in real-time. It is also a place for the users to create, store and access personal information by much more efficient way of computing technology [2]. The development of these technologies is directly related to the increasing access to the communication technology, as well as its decreasing cost provided by the mobile service providers. The learners choose to learn over distance or in person at a traditional campus; the power of e-learning and virtual collaboration is growing fast in education and in the worldwide economy. This power is best realized with a well-planned cloud computing and e-learning strategy. Learners can use the enormous interactivity of innovative media and develop their skills, knowledge, and awareness of the future domain. The benefits of these computing can support education institutions to resolve common challenges such as cost reduction, rapid and effective communication, security, privacy, flexibility and accessibility. The Educational institutes, businesses and many other industries are adopting the services of cloud computing because of the following reasons:

Cloud computing refers to applications and services that run on a distributed network using virtualized resources and accessed by common Internet protocols and networking standards. It is distinguished by the notion that resources are virtual and limitless and that details of the physical systems on which software runs are abstracted from the user.[1][2][3] Cloud computing takes the technology, services, and applications that are similar to those on the Internet and turns them into a self-service utility. The use of the word "cloud" makes reference to the two essential concepts.

- **Abstraction:** Cloud computing abstracts the details of system implementation from users and developers. Applications run on physical systems that aren't specified, data is stored in locations that are unknown, administration of systems is outsourced to others, and access by users is ubiquitous.
- **Virtualization:** Cloud computing virtualizes systems by pooling and sharing resources. Systems and storage can be provisioned as needed from a centralized infrastructure, costs are assessed on a metered basis, multi-tenancy is enabled, and resources are scalable with agility.[1]

The Educational institutes, businesses and many other industries are adopting the services of cloud computing because of the following reasons:

1. **Cost Saving:** One of the most appealing reasons to switch to the cloud is the cost savings feature. With the cloud, the user will pay for applications only when needed and many applications are included free of charge.
2. **Scalability:** One of the major reasons for using cloud computing is its scalability. Cloud computing allows universities, colleges and IT industries to easily upscale or downscale IT requirements as and when required.
3. **Ease of Use:** Quite simply, cloud computing is easy to get up and running. Instead of having to download and/or install software yourself, in the cloud it is all done for you.
4. **Time Shifting:** This allows for on-demand analysis of study material instantly.
5. **Adore More Fault Tolerance:** Cloud providers can afford to have multiple data centers and multiple Internet connections at each data center to adore fault tolerance. As they offer levels of data protection for the e- learner users simple nightly backups, such as continuous data protection, generators to handle power outages, and high-end servers that can keep running even one component fails.

Apart from the above mentioned reasons, 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.

2 MODELS OF CLOUD COMPUTING

Deploying cloud computing can differ depending on requirements, and the following four deployment models have been identified, each with specific characteristics that support the needs of the services and users of the clouds in particular ways (see Figure 1).

- **Private Cloud** — The cloud infrastructure has been deployed, and is maintained and operated for a specific organization. The operation may be in-house or with a third party on the premises.
- **Public Cloud** — The cloud infrastructure is available to the public on a commercial basis by a cloud service provider. This enables a consumer to develop and deploy a service in the cloud with very little financial outlay compared to the capital expenditure requirements normally associated with other deployment options.
- **Hybrid Cloud** — The cloud infrastructure consists of a number of clouds of any type, but the clouds have the ability through their interfaces to allow data and/or applications to be moved from one cloud to another. This can be a combination of private and public clouds that support the requirement to retain some data in an organization, and also the need to offer services in the cloud.

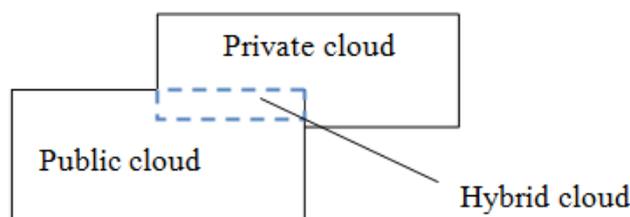


Fig-1 Service models of cloud

3 E-LEARNING USING CLOUD COMPUTING

A new Paradigm Out-of-classroom and in-classroom educational experiences E-learning is the computer and with the aid of network enabled transfer of skills and knowledge. E-learning applications and processes offer Web-based learning, computer-based learning, virtual education prospects and digital collaboration to their e-users. Popular e-learning technologies include: Content is delivered via the Internet, audio, satellite TV .Voice-centered technology, such as CD/DVD or Webcasts .Video technology, such as instructional videos, DVDs and interactive videoconferencing. Computer-centered technology delivered over the Internet or corporate intranet [3].

One of the most interesting applications of cloud computing is educational cloud. The educational cloud computing can focus the power of thousands of computers on one problem, allowing researchers search and find models and make discoveries faster than ever. The universities can also open their technology infrastructures to private, public sectors for research advancements. The efficiencies of cloud computing can help universities keep pace with ever-growing resource requirements and energy costs. Students expect their personal mobile devices to connect to campus services for education. Faculty members are asking for efficient access and flexibility when integrating technology into their classes. Researchers want instant access to high performance computing services, without them responsibility of managing a large server and storage farm. The role of cloud computing at university education should not be underestimated as it can provide important gains in offering direct access to a wide range of different academic resources, research applications and educational tools. Usually, E-learning systems are developed as distributed applications, but not limited to. The architecture of an e-learning system, developed as a distributed application, includes a client application, an application server and a database server (see Figure 2), beside the hardware to support it (client computer, communication infrastructure and servers).

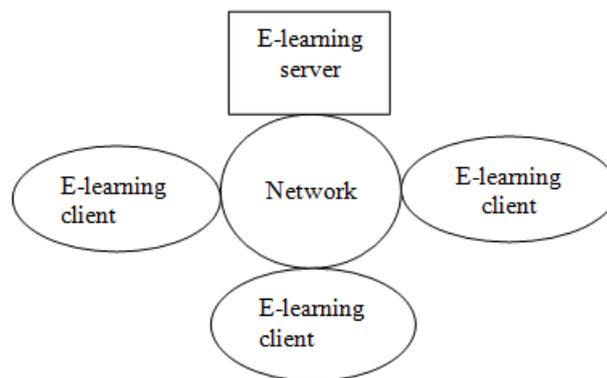


Figure 2—E-learning systems [4]

BENEFITS OF E-LEARNING SYATEM USING CLOUD COMPUTING:-

- A. Infrastructure: use an e-learning solution on the provider's infrastructure
- B. Platform: use and develop an e-learning solution based on the provider's development interface
- C. Services: use the e-learning solution given by the provider.[5][6]

ADVANTAGES:-

There are numerous advantages when the e-learning is implemented with the cloud computing technology, they are:

- A. Low cost:** E-Learning users need not have high end 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. Since the data is created and accessed in the cloud, the user need not spend more money for large memory for data storage in local machines. Organizations also need to pay per use, so it's cheaper and need to pay only for the space they need.[7]
- B. Improved performance:** Since the cloud based e-learning applications have most of the applications and processes in cloud, client machines do not create problems on performance when they are working.

- C. Instant software updates:** Since the cloud based application for e-learning runs with the cloud power, the software's are automatically updated in cloud source. So, always e-learners get updates instantly.
- D. Improved document format compatibility:** Since some file formats and fonts do not open properly in some PCs/mobile phones, the cloud powered e-learning applications do not have to worry about those kinds of problems. As the cloud based e-learning applications open the file from cloud.
- E. Benefits for students:** Students get more advantages through cloud based e-learning. They can take online courses, attend the online exams, get feedback about the courses from instructors, and send their projects and assignments through online to their teachers.[8]
- F. Benefits for teachers:** Teachers also get numerous benefits over 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.[9]
- G. Data security:** A very big concern is related to the data security because both the software and the data are located on remote servers that can crash or disappear without any additional warnings. Even if it seems not very reasonable, the cloud computing provides some major security benefits for individuals and companies that are using/developing e-learning solutions [10]

4 SECURITY IN CLOUD BASED E-LEARNING

Security is one of the primary concern in the greater context of cloud computing as it relates to cloud based e-learning. From 2005-2011, security has been in the top four IT issues as published by Educause, a "non profit association whose mission is to advance higher education by promoting the intelligent use of information technology". When shifting elearning in the cloud, main security concerns are about confidentiality, integrity and availability. Security remains as an integral component of the top ten IT issues in 2012[11]. A. Seven Threats to security in cloud computing[11][12] There are several significant threats that should be considered before adopting the paradigm of cloud computing in elearning. These threats are described as follows:

- 1) **Abuse and Nefarious use of cloud:** Cloud services providers often targeted for their weak registration system and limited fraud detection capabilities. This paves way to the spammers, malicious code authors and other cybercriminals can misuse the various types of services including unlimited bandwidth and storage facilities offered by the cloud providers. Misuse includes creating spam, decoding and cracking of passwords, executing malicious code to access rich information such as question papers, learning materials, assessments etc.
- 2) **Insecure Software Access:** Various software interfaces and APIs are used by the cloud users in e-learning to access and manage the cloud services. These APIs play an integral part during provisioning, management, orchestration and monitoring of the processes running in a cloud environment. Hence these APIs needs to be secured and should include features of authentication, access control, encryption and activity monitoring. Many security issues will be raised if cloud service providers believe on weak set of APIs.
- 3) **Malicious Insider:** Malicious employees who are working in the provider's or user site can be able to perform insider attacks. This insider can steal the confidential data of cloud users in e-learning. Malicious insider can easily get the cloud users in e-learning confidential data such as password, cryptographic keys and files. It will affect the standards and trust of cloud users in e-learning. As a result, it can cause damage on both financial grounds as well as organisation reputation.
- 4) **Data Separation:** Virtual Machine (VMs) are virtualized based on the physical hardware of cloud providers and stores the e-learning user's applications supplied by the cloud providers due to the cloud virtualization. These VMs are isolated from each other by cloud providers in order to maintain the security of users. These VMs are managed by hypervisor who are the main source of managing the virtualized cloud platform so as to provide virtual memory as well as CPU.scheduling policies to VMs. Hypervisors are mainly targeted by the hackers since they are residing between VMs and hardware. Strong isolation is needed to ensure that VMs are not able to access the activities of other VMs under the same cloud computing providers. Even though several vendors offers strong security mechanism to protect the cloud supervisors, however sometimes security of VMs is compromised.
- 5) **Data Loss or Leakage:** Operational failures, unreliable data storage and inconsistent use of encryption keys will lead to a data loss. Operational failure includes deletion, incomplete deletion or alteration without any backup of the source elearning content. It may be either intentionally or unintentionally. Unreliable data storage means storing a data on

unreliable media which cannot be recoverable if the data is lost. Inconsistent use of encryption keys will lead to unauthorized access and data loss such as destruction of sensitive and confidential information. It will definitely affect the reputation of the company.

- 6) **Hijacking:**Controlling the users account through the unauthorised access by the hackers is referred as account or service hijacking. It includes phishing, fraud and exploitation of software vulnerabilities.It is not enough to secure the sensitive and confidential information through the common way of authentication and authorization process e-learning.
- 7) **Unknown Risk:**It is essential for the every e-learning user to know the software versions, security practices, software code updates and intrusion attempts. Cloud service providers usually advertised these futures and functionality with the necessary details such as internal security procedure, configuration hardening, patching, auditing and logging. E-learning users must be aware and clarified how their data and related files are stored. On the other hand, e-learning user may unaware of the unknown risk profile which may include serious threat.[12]

5 CONCLUSION

Cloud computing as an exciting development is a significant alternative today's educational perspective. Students and administrative personnel have the opportunity to quickly and economically access various application platforms and resources through the web pages on-demand. This automatically reduces the cost of organizational expenses and offers more powerful functional capabilities. There will be an online survey to collect the required data for the use of cloud computing in the universities and other governmental or private institutions in the region. This will help us review the current status and probable considerations to adopt the cloud technology. Beginning with the outsourcing of email service seems attractive. The gradually removal of software license costs, hardware costs and maintenance costs respectively provides great flexibility to the university/corporate management. In this paper we discuss a cloud computing based e-learning. Describe its definition and some benefits. 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 we believe that this will happen soon.

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