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E-learning based on Cloud Computing

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Abstract : *The popularity of learning on the internet, the construction of perfect web-based learning environment has become one of the hot points on researching remote education. It is envisioned that, in the near future, cloud computing will have a significant impact on the educational and learning environment, enabling their own users (i.e., learners, instructors, and administrators) to perform their tasks effectively with less cost by utilizing the available cloud-based applications offered by the cloud service providers. This paper discusses the use of cloud computing in the educational and learning arena, to be called "Education and Learning as a Service" (ELaaS), emphasizing its possible benefits and offerings. It is essential for an educational and learning organization, with its budget restrictions and sustainability challenges, to use the cloud formation best suited for a particular IT activity. In this paper, web-based learning environment and the concept of cloud computing are discussed. The latest development of cloud computing.*

Keywords-cloud computing; Saas, IaaS, PaaS, ELaaS, architecture

I. INTRODUCTION

When compared to the existed traditional IT services provisioning models, cloud computing has many advantages such as reduced upfront investment (i.e., software, hardware, and professional staff to maintain servers and upgrade software), reduced launching time, where days become hours, expected performance, high availability, infinite scalability, tremendous fault-tolerance capability, and enhanced collaboration, accessibility, and mobility, allowing users to use any device, such as a personal computer (PC), or a mobile phone, etc. . Therefore, the use of cloud computing will have a profound

positive impact on the cost structure of all the industries using IT resources by lowering the total cost of ownership (TCO), resulting in an indirect crucial impact on business creation and the macroeconomic performance at national levels, extending to a global level. This benefits the private as well as the public sectors, including healthcare, education (especially for e-learning), and the activities of government agencies. In both academia and industry, cloud computing has been recently attracting significant momentum and attention as one of those opportunities that could prove to be of immense benefits and empowering in some situations, due to its flexibility and pay-per-use cost structure, for organizations. In the

educational and learning arena, this will be called "Education and Learning as a Service" (ELaaS).

Approaches to E-learning services:

E-learning services have evolved since computers were first used in education. There is a trend to move towards blended learning services, where computer-based activities are integrated with practical or classroom-based situations.

Computer-based learning:

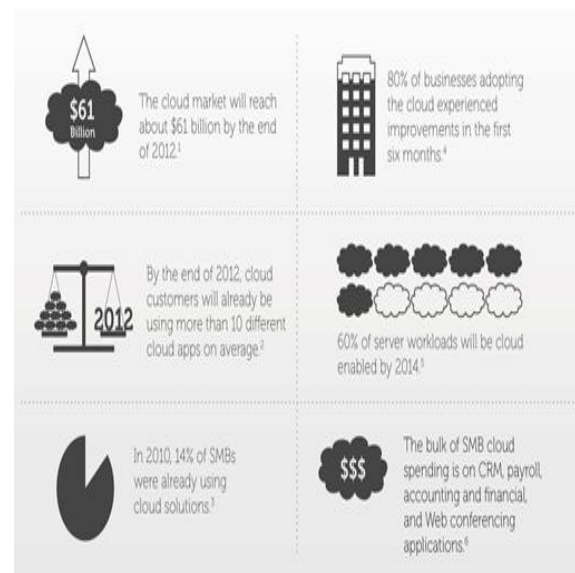
Computer-based learning, sometimes abbreviated to CBL, refers to the use of [computers](#) as a key component of the educational environment. While this can refer to the use of computers in a [classroom](#), the term more broadly refers to a structured environment in which computers are used for teaching purposes.

Computer-based training:

Computer-based trainings (CBTs) are self-paced learning activities accessible via a computer or handheld device. CBTs typically present content in a linear fashion, much like reading an online book or manual. For this reason they are often used to teach static processes, such as using software or completing mathematical equations. CBTs provide learning stimulus beyond traditional learning methodology from textbook, manual, or classroom-based instruction. For example, CBTs offer user-friendly solutions for satisfying continuing education requirements. Instead of limiting students to attending courses or reading printed manuals, students are able to acquire knowledge and skills through methods that are much more conducive to individual learning preferences. For example, CBTs offer visual learning benefits through animation or video, not typically offered by any other means. and certificate programs via the Internet at a wide range of levels and

in a wide range of disciplines. In addition, several universities offer online student support services, such as online advising and registration, e-counseling, online textbook purchase, student governments and student newspapers.

The recent trend in the E-Learning sector is [screencasting](#). There are many screencasting tools available but the latest buzz is all about the web based screencasting tools which allow the users to create screencasts directly from their browser and make the video available online so that the viewers can stream the video directly. The advantage of such tools is that it gives the presenter the ability to show his ideas and flow of thoughts rather than simply explain them, which may be more confusing when delivered via simple text instructions. With the combination of video and audio, the expert can mimic the one on one experience of the classroom and deliver clear, complete instructions. From the learner's point of view this provides the ability to pause and rewind and gives the learner the advantage of moving at their own pace, something a classroom cannot always offer.



II. CLOUD COMPUTING PLATFORM ARCHITECTURE

Cloud computing is a calculation of providing leasing services to users, the user can use a simple terminal to access powerful computing capabilities, regardless of the complexity of the background. To meet the users' needs, which the back-end cloud concerns care is the number of machines required to achieve cooperation. Now Google, Amazon and other companies have built the cloud platform to provide services for their clients, include hundreds of back-end machines at least. It is obvious that cloud platform back-end is a large distributed system, rather than a single machine which user interface displayed[2]. Cloud computing turn the hardware resources into virtual resources with virtual machine monitor, and manage hardware resources with virtual hardware.

III. CLOUD COMPUTING SERVICES

A. IaaS

Infrastructure layer corresponds to IaaS infrastructure services, is the lowest layer of the network. Users can household to provide standard services, including computing power and storage resources. It turn the memory, storage and computing power into a virtual whole resource pool for the entire industry to provide the required of computing power and storage resources.

B. PaaS

Platform layer correspond to PaaS (Platform as a service) that made a higher level of abstraction on the base of IaaS layer. to Provides a development environment, test environment, server platforms and other services, users can develop applications based on Internet and other servers service

providers infrastructure, then share it to other users.

C. SaaS

SaaS (Software as a service) is a software distribution model, designed for web delivery, user can deploy and access through the Internet hosting. SaaS providers need to build information for all network infrastructure, software, hardware, operating platform, and is responsible for the implementation of all post-maintenance and other services. Compared with the traditional method of service, SaaS not only reduces the cost of traditional software licensing, and vendors deploy application software on a unified server, eliminating the end-user's server hardware, network security devices and software upgrade and maintenance expenses, the customer does not need other IT investment in addition personal computers and Internet connections to obtain the required software and services[3].

IV. FRAMEWORK FOR CLOUD BASED E-LEARNING:

A. The base layer of e-learning cloud

The base layer of e-learning cloud shares IT infrastructure resources and connects the huge system pool together to provide services. Cloud Computing allows the hardware layer to run more like the internet, to make the hardware resources shared and accessed as data resources in secure and scalable way. Virtualization technology separates the physical hardware from operating system, which on one hand can make computing and storage capacity of the existing server into smaller size and re-integration, to improve the utilization and flexibility of IT resource; on the other hand can provide a common interface for large-scale cloud computing integration that enables the publication of calculation. The

base layer can provide the basic hardware resources for the platform layer, and the users can also make use of it as the same as using a local device to use.

B. The platform layer of e-Learning cloud

With the support of the powerful hardware, platform layer carries out the tasks of data storage, computing and software development, and it can even achieve the tasks of completion of the original mass data storage, business intelligence processing and so on which have been difficult to complete. Users can choose the devices and the number of devices according to the complexity of dealing with the content. Virtualization technology enables the platform to show a strong level of flexibility.

C. The application layer of e-learning cloud

The applications software or services provided by a school or university, the students to pay in the similar way of on-demand access, according to the amount to calculate the cost, complete the production, marketing, trading and management..E-Learning cloud environment provides user-oriented ubiquitous adaptive hardware resources, computing environment and software services. In e-learning cloud space, users can access to digital services transparently at any time in anywhere. The users can obtain the necessary network and computing services very naturally at any position. The information space and physical space will be integrated because of ubiquitous computing capability. And the ubiquitous information terminals together with the embedded system equipment will be the vehicles of e-commerce in the future.

V. E-LEARNING APPLICATION MODEL BASED ON CLOUD COMPUTING

With the progress and application of technology, the emergence of cloud computing offers e-learning good

opportunity to develop, so we are convinced that it also can resolve the problem mentioned above properly. School or the enterprise neither needs to worry about the construction of the environment of e-learning software and hardware nor invest enormous capital and human and material resources to construct the system. All those issues can be handed to service providers of e-learning cloud, who can customize for users. In e-learning cloud model, data storage is highly distributed, data management is highly centralized and data service is highly virtualization, all of which offer a much safer data service. Intelligent business policy-making. E-learning cloud environment provides large data center in which mass data storage, high-speed computation.

This architecture for the cloud platform provides a variety of user interface forms, such as WebService interfaces, Java interfaces, C interfaces, Shell interface etc. Cloud computing platform provide resources services to teachers and students in the form of rental. A module is designed to which is based on the consumption billing to ensure that users only pay for the resources they have used.

A promise of the cloud computing is the virtualization will reduce the number of servers required. Therefore, the key is to identify the user to meet the expected demand for the infrastructure needed to balance the amount of cloud: too few computing resources, the request from the user must wait for the release of resources or reject those requests until more hardware is added to the environment. Too much computing resources, hardware costs and other expenses will be denied cost-cutting promises of cloud computing. In the cloud platform, teachers and administrators enter their requests for IT resources website (server, software, storage, etc.), can

immediately know whether these resources are available. If resources are available, submit a request immediately and automatically routed to the cloud administrator for approval. This process is automated, so it can be met in a very short period of time. Resource use planning and management are important activities of the cloud. Handled properly, the plan will provide needed capacity computing resources to create new solutions and to meet application performance goals, promote teaching and researching goals.

The VDC-OS expands virtual infrastructure along three dimensions. First, it delivers a set of infrastructure services (called Infrastructure vServices) to seamlessly aggregate servers, storage and network as a pool of on-premise cloud resources and allocate them to applications that need them most. Second, it delivers a set of application services (called Application vServices) to guarantee the right levels of availability, security and scalability to all applications independent of the operating system, development frameworks or architecture on which they were built to run. Third, the VDC-OS delivers a set of cloud services (called Cloud vServices). Unlike a traditional OS, which is optimized for a single server and supports only those applications written to its interfaces, the VDC-OS serves as the OS for the entire datacenter and supports the full diversity of any application written to any OS, from legacy Windows applications to modern distributed applications that run in mixed operating system environments. With one of a number of available resources expressed in the form of virtual resources. Virtual resources will select a physical resources to achieve the requirement based on specified criteria. A data center is a facility used to house computer systems and associated components, such as telecommunications

and storage systems. It generally includes redundant or backup power supplies, redundant data communications connections, A growing trend in the IT world is virtualizing servers. That is, software can be installed allowing multiple instances of virtual servers to be used. In this way, we can have many virtual servers running on one physical server. Virtualization allows multiple operating systems with different virtual machines independently on the same physical machine running in parallel. Each virtual machine has its own set of virtual hardware, it can be loaded in the hardware operating system and applications. No matter what the actual physical hardware components used, the operating system will treat them as a set of consistent, standardized hardware..

VI. CONCLUSION

Through the research we believe that, we can create an e-learning application model based on cloud computing by means of cloud computing's mass data storage, high-speed computing capabilities, as well as its ideal allocation and the sharing mode of resources. Some problems such as platform security, technical standards, regulatory and other services are not well resolved yet in practice, pending further research and exploration. Either way, e-learning application model based on cloud computing will not stop its pace to proceed. As the cloud computing technologies become more sophisticated and the applications of cloud computing become increasingly widespread, e-learning will certainly usher in a new era of cloud computing.

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