

Secured E-Learning Constructed With Cloud Computing Architecture

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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. They are based in the use of approaches with diverse functionality (e-mail, Web pages, forums, learning platforms, and so on) as a support of the process of teaching-learning. This paper introduces the characteristics of the current E-Learning and then analyses the concept of cloud computing and describes the architecture of cloud computing platform by combining the features of E-Learning. The authors have tried to introduce cloud computing to e-learning, build an e-learning cloud, and make an active research and exploration for it from the following aspects: architecture, construction method and external interface with the model.

Index Terms— E-Learning, cloud computing, web-based learning.

I. INTRODUCTION

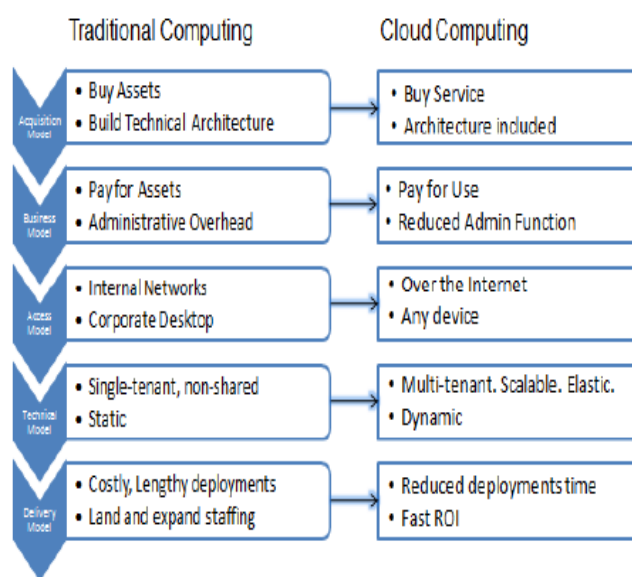
The Electronic Learning, better known as E-Learning, is defined as an Internet enabled learning. Components of e-Learning can include content of multiple formats, management of the learning experience, and an online community of learners, content developers and experts. The study summarized the main advantages, which include flexibility, convenience, easy accessibility, consistency and its repeatability[1].

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[2], [3].

As cloud computing has become a research hotspot among modern technologies, researchers pay more attentions to its applications. As concerned as cloud computing applied in the field of education, a lot of problems had been studied, such as the technology for future distance education cloud [4], teaching information system [5], the integration of teaching resources [6], teaching systems development [7], [8]. From the above we can see that until now, scholars have made a lot of researches on the following two aspects: cloud computing used in the field of education, and integration of network and e-learning[9]. The former places the emphasis on distance education, information system application, instructional system design, information resource development, online course-building, etc. The latter's emphasis is placed on construction of campus e-learning system, e-learning model

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on campus network, e-learning system based on agent model and e-learning grid and so on. But until now the research applying cloud computing to e-learning is not significantly reported. In order to give a full play for the advantages of cloud computing, in this paper, we tried to attach cloud computing to e-learning, build an elearning cloud, and made an active research and exploration for it. Figure 1 shows the traditional e-learning versus cloud e-learning



Traditional E-Learning versus Cloud E-Learning [1]

II. TECHNOLOGICAL CHALLENGES IN CLOUD COMPUTING

Cloud computing has shown to be a very effective paradigm according to its features such as on-demand self-service since the customers are able to provision computing capabilities without requiring any human interaction; broad network access from heterogeneous client platforms; resource pooling to serve multiple consumers; rapid elasticity as the capabilities appear to be unlimited from the consumer's point of view; and a measured service allowing a pay-per-use business model. However, there are also some weak points that should be taken into account. Next, we present some of these issues[10]:

- Security, privacy and confidence: Since the data can be distributed on different servers, and "out of the control" of the customer, there is a necessity of managing hardware for computation with encoding data by using robust and efficient methods. Also, in order to increase the confidence of the user, several audits and certifications of the security must be performed[11].
- Availability, fault tolerance and recovery: to guarantee a permanent service (24x7) with the use of redundant systems and to avoid net traffic overflow[12].

- Scalability: In order to adapt the necessary resources under changing demands of the user by providing an intelligent resource management, an effective monitorization can be used by identifying a priori the usage patterns and to predict the load in order to optimize the scheduling.
- Energy efficiency: It is also important to reduce the electric charge by using microprocessors with a lower energy consumption and adaptable to their use.

III. E-LEARNING FRAMEWORK

The e-learning cannot completely replace teachers; it is only an updating for technology, concepts and tools, giving new content, concepts and methods for education, so the roles of teachers cannot be replaced[13]–[15]. The teachers will still play leading roles and participate in developing and making use of e-learning cloud. The blended learning strategy should improve the educational act. Moreover, the interactive content and virtual collaboration guarantee a high retention factor.

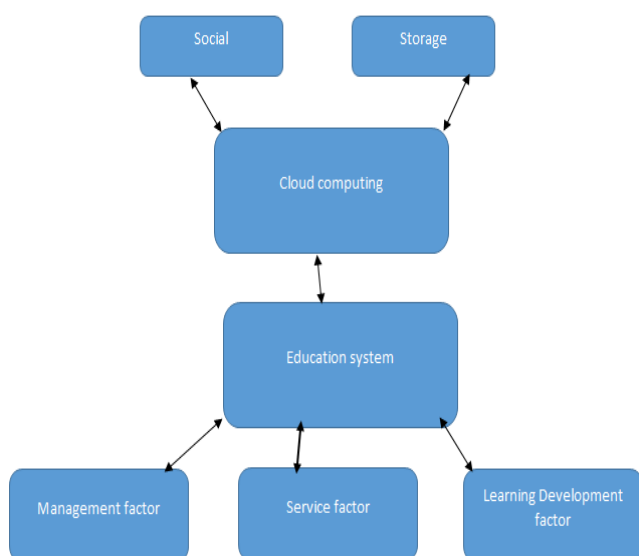


Figure 2: The proposed conceptual framework

The proposed framework indicates the factors of e-learning such as management, service and learning factors which are in the first layer follows by Education factor the include the cloud computing layer and finally reaches the end user layer which are social and storage as shown in Figure 2.

IV. CONCLUSION

Cloud computing has recently emerged as a compelling paradigm for managing and delivering services over the internet. The rise of cloud computing is rapidly changing landscape of Information technology and ultimately turning to the long-held promise of utility computing into a reality. Cloud computing can help communities and nations, can transform education. An entire world of knowledge can now be made available to teachers and students through cloud based services that can be accessed anytime, anywhere, from any device. By helping countries worldwide, lowering the

cost and simplifying the delivery of educational services, cloud computing enables students across the globe to acquire the 21st-century skills and training they need to compete and succeed in the global information society.

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