

# Chapter 15

## Cloud Computing Solution for Internet Based Teaching and Learning

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### ABSTRACT

*This chapter reviews a five-phase solution development process. It points out that a well developed cloud based IT infrastructure should be constructed on a solid requirement analysis and thoughtful design. The selection of cloud technology should meet the needs of educational institutions. The successful implementation of a cloud based IT infrastructure relies on adequate training and tutoring services. The evaluation of a cloud based IT infrastructure gives direction on further improvement. This chapter provides strategies and guidelines for creating a cloud based IT infrastructure for educational institutions.*

### INTRODUCTION

Web based learning and mobile learning have joined the main stream of learning platforms among educational institutions. More and more courses are offered online, even those lab intensive courses. Many of the educational institutions are under pressure to support a variety of online courses with limited resources. On the other hand, cloud computing has become the new computing

platform to improve availability and reduce IT expenditures for a large number of companies big or small. The advantages offered by cloud computing have gained attention from educational institutions in recent years. Most of the educational institutions are looking for the improvement of affordability, availability, flexibility, and efficiency of their IT infrastructure. Cloud computing has the potential to meet these demands. Therefore, the cloud should be designed to speed up the implementation of new course deployment and dramatically reduce the cost. The main goal of

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this chapter is to investigate the strategies for designing, developing, and implementing the cloud solution to support online teaching and learning. With a properly designed and implemented cloud platform, some or all of the computing tasks can be carried out through cloud computing.

By shifting some of the daily computing tasks to cloud, educational institutions can limit the capital expenditure and operation overhead on IT infrastructure expansion and maintenance. Educators can subscribe pre-tested and fully supported services from cloud providers to quickly deploy and manage their online courses. The operation cost to subscribe a cloud service in general is lower than developing and managing an IT infrastructure. Many of the cloud providers even offer free cloud services, such as the cloud based e-mail services, to educational institutions; each educator or student is offered 10GB or more online data storage by some of the cloud providers. Some of the cloud providers also provide technical support to educators and students to plan, develop, implement, and manage cloud based teaching and learning. Later in this chapter, more details will be given about these cloud providers and the free or low cost of cloud services offered to educational institutions.

## **BACKGROUND**

Today's educational institutions are not limited to their campuses. With the Web based teaching and learning system, students around the world are able participate in the learning process through the Internet. To support globalized e-learning, it requires a complicated IT infrastructure. Such an IT infrastructure is able to host online courses for a variety of curricula. It is able to store and manage the data for thousands of or even millions of students. It supports communication and collaboration among multiple campuses around the world. It can manage teaching and learning of different cultures and in different languages. It responds to laboratory activities in real time.

It is able to quickly update the e-learning system to reflect the changes in a curriculum. The design and implementation of such a complicated IT infrastructure requires thoughtful design and careful planning. For many years, information system developers have summarized their experiences and developed theories of solution development. According to one theory, a solution development process consists of five major phases, requirement analysis, solution design and validation, solution development, solution implementation, and solution assessment (Betz, 2007).

In the requirement analysis phase, solution designers analyze business requirements and identify the proper infrastructure for meeting the requirements. Once the requirement information is collected, the solution designers convert the requirement information into a solution model and use the model to verify if the requirements can be met by the corresponding IT infrastructure. The solution model should include the specifications of the network configuration as well as the hardware and software.

The development process may include the selection of hardware and software. A solution development process consists of two components, software development and infrastructure deployment. During the deployment of the infrastructure, the solution developers install network work equipment, computer hardware and software, and configure the system according to the solution model created in the design phase.

During the implementation phase, the IT service department tests the IT infrastructure. Instructors and students may also participate in the testing. After the IT infrastructure is thoroughly tested, the IT infrastructure will be deployed to the public and the instruction for remote log on will be prepared. Then, the IT service department will schedule training and technical support for the instructors and students.

The last phase of the solution development is assessment. The result of the assessment of the IT infrastructure provides a guideline for further

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