Chapter 13
Cloud Computing in Higher Education

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ABSTRACT

This shift involves the movement of applications, documents and other stored content from desktop-based to web-based through the utility known as the ‘cloud’. The cloud links thousands of computers and servers together where users are not limited to one device but are able to access their documents and other contents through any computer device, provided it has the ability to connect to the Internet. This allows for better storage capacity, lower costs, scalability and on-demand access. Higher education institutions are opting to reap the same benefits of cloud computing. Students, academics, administrators, and other users will be able to access computing resources through university applications, e-mail, databases and other cloud hosting services. This book chapter provides a general understanding of cloud computing systems and what benefits and challenges of cloud computing in higher education. It is followed by the trends of cloud computing usage and considerations needed for adopting cloud computing. The chapter will end with recommendations needed for adopting cloud computing.

INTRODUCTION

The recent development of the Internet and its related technology, high-speed connection as well as broadband wireless access to it has made cloud computing, a new computing model, cost-effective and interesting alternative in utilizing computing resources. The new computing model offers many benefits to organizations as they do not need to purchase hardware and expensive software licenses and surely they do not need to worry about software and hardware maintenance. The new computing model considers resources just like a utility. In fact, McCarty’s use the term utility computing, which is very much similar to cloud computing (Garfinkel, 2011). It means that computing resources can be rented or subscribed just like a utility. Customers (users) pay services only if they use them (pay-per-use method of payment).

DOI: 10.4018/978-1-4666-9455-2.ch013
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A cloud computing system is different from the conventional one. In conventional computing systems (mainframe, client-server or personal computer systems), computing resources belonged to an organization and they normally reside in the organization’s premises. Consequently, the organization has to manage and maintain these resources to support in attaining its goals. This implies that organization incurs all costs in owning these resources, which may include investment, operation and maintenance costs. In contrast, an organization does not need to own most of the computing resources in a cloud computing system. Instead, the organization utilizes computing resources offered by a provider and accesses the resources as needed. The organization only needs to own client devices (low cost terminals or thin clients) to utilize the computing resources through the Internet. Consequently, the organization does not need to bear the burden of all the costs mentioned previously. Of course, the organization needs to pay the provider for using the resources with a pay-per-use method of payment (Almunawar & Almunawar, 2015).

As cloud computing is considered a new business opportunity to the numbers of providers offering various computing resources in the cloud are growing. Many big players such as IBM, Amazon.com, Google and Microsoft entered the business and offer attractive services and payment models to their customers (Kim, Kim, Lee, & Lee, 2009). Many higher education institutions are attracted to cloud computing as it offers cost saving and much simpler management.

Higher education institutions around the world are now immersing themselves into technological as well as business innovation of cloud computing. Universities around the world are mostly utilizing both cloud computing services and models for teaching, research, student interactions, multi-university collaborations and administrative affairs (Forrester Consulting, 2012). However, in their effort to pursue this, they faced difficulties in choosing the practical means to use these services due to some security issues. In addition to the current knowledge of cloud computing in general, it is known and clarified by Elamir, Jailani, and Bakar (2013) that one of the many reasons for cloud computing needs to be practiced in schools and universities is mainly due to the economic reasons as it is financially cheaper to use Cloud Computing services than the traditional method of owning computing resources (Elamir et al., 2013). Instead of using out dated computers or the need to constantly update and maintain computing resources, they are moving forward by using fully functional virtual machines where they can enjoy the latest technology, flexibility as well as avoid maintenance problems which can be costly which can be seen in universities in the United States which have successfully affirm that cloud computing possess significant ability to enhance efficiency, cost and provides convenience for the educational institutions which drove them to switch from using locally owned infrastructure to outsourcing computing resource to the cloud (Elamir et al., 2013). Such changes can also be observed in the United Kingdom, where universities in UK have started to use Google Apps due to costly and unreliable in-house mail system and Google Apps provide more than just email applications and it can be seen in developing countries such as Africa are also utilizing the power of cloud computing which are supported by Google and Microsoft (Elamir et al., 2013). The cloud model can be frequently updated and exempted with low financial exertion or even with minimal service provider interaction. (Ezenwoke, Omoregbe, Ayo, & Sanjay, 2013).

There are many definitions of cloud computing. According to McKinsey, a global management consulting firm, there are approximately twenty-two likely definitions of cloud computing (Sultan, 2010). Zhao, Raicu, and Lu (2008) offers a definition and their definition had been quoted by Foster, Zhao, Raicu, and Lu (2008) They defined cloud computing as “A large-scale distributed computing paradigm that is driven by economies of scale, in which a pool of abstracted, virtualized, dynamically-scalable, managed computing power, storage, platforms, and services are delivered on demand to external customers over the Internet”.

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(2017). *Fostering Sustained Learning Among Undergraduate Students: Emerging Research and Opportunities* (pp. 143-160).

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