Chapter 101
Advances in Information, Security, Privacy and Ethics:
Use of Cloud Computing for Education

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ABSTRACT

The future of education lays in the hand of Cloud Computing given the benefits of learning delivery, costs reduction, and innovation. At the same time, the threat of cyber-attacks and security breaches are also mounting for education based organizations and are a prime target given the amount and type of personal information available. This manuscript discusses the cloud security, privacy, and ethical mechanisms required from a teacher, student, and administrator perspective.

INTRODUCTION

The future of education lays in the hand of Cloud Computing, with easy to configure hardware and software components. Utilizing Cloud Computing to their advantage, teachers, administrators, and students are able to deliver content and learn much more effectively within an integrated environment. Given the ability to access anytime anywhere, this enables teachers, administrators and students to target individual needs of students and customize educational delivery. Instead of maintaining all systems separately at each institution and in order to eliminate infrastructure that is dated by 10-20 years at most institutions, Cloud Computing offers the flexibility to delivery current learning technology for the 21st century.

In an effort to reduce costs, increase efficiency and availability, increase enrollment, and innovate with technology many educational institutions are moving to a Cloud Computing model. At the same time, the threat of cyber-attacks and security breaches are also mounting for education based organizations and are a prime target given the amount and type of personal information available. In recent example cases, financial and legal costs are estimated in the millions of dollars with several hundred thousand student and personnel records compromised. In another instance at a state university, some

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30,000 student's social security numbers were compromised. It is estimated that many data breaches in education go undetected more than in other industries, and the impact is often realized in the forms of enrollments and endowments.

Learning Objectives

This chapter includes the cloud security, privacy, and ethical mechanisms required from a teacher, student, and administrator perspective. For cloud security, the paper outlines the access strategies, service-oriented architectures, and implementation components required to successfully utilize cloud computing in education. For privacy and ethical considerations, several federal laws have been passed to develop a minimum standard for protection of records, and must be developed with flexibility of changing technology and regulations, along with established techniques for privacy preservation.

CLOUD COMPUTING

Cloud computing enables convenient on demand access to an elastic set of shared computing resources. Generally cloud computing is broken into 3 categories of software as a service (SaaS), infrastructure as a service (IaaS) and platform as a service (Paas). SaaS is anticipated to grow the fastest and is typically what users see and interact with directly. The cloud computing market is anticipated to be nearly $200 Billion in 2020 according to Forrester, up from $58 Billion in 2013 (Seeking Alpha, 2015).

SaaS

Software as a Service (SaaS) is software that can be deployed over the Internet and is licensed to customers typically on a pay-for-use model. In some cases a service may be offered at no charge if supported from other sources such as advertisements. SaaS is quickly growing and double-digit growth of 21% is anticipated, with a forecast of $106B in 2016 (Seeking Alpha, 2015).

Cloud computing support SaaS by providing a scalable and virtualized services to the end-user via a simple web browser. A third party manages the computing infrastructure, and provides the software as a service (SaaS). Salesforce.com, Google Apps, Amazon, and Facebook provide have cloud computing offerings. Cloud computing allows organizational to reduce IT capital costs, and buy computing on an as needed basis. There are economies of scale through shared use of systems and resources by multiple customers. Cloud computing reduces the entry barriers by eliminating software distribution and site installation requirements. This also permits organizations to develop new business models and sources of revenue through on demand services (Woodside, 2010).

SOA is used as the access point for all systems through web services and XML is utilized for the data representation. SOA promises improved agility and flexibility for organizations to deliver value-based services to their customers. A service is the application of knowledge for co-creation of value between interacting entities. Service systems involve people, technology, and information. Service science is concerned with understanding service systems, and improve and design services for practical purposes. SOA includes Web service, technology, and infrastructures, and is a process that add value, reuse, in-