Research on System Architecture to Provide Maximum Security, End User Device Independency and User Centric Control over Content in Cloud

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ABSTRACT

Cloud computing is the emerging technology providing IT as a utility through internet. The benefits of cloud computing are but not limited to service based, scalable, elastic, shared pool of resources, metered by use. Due to mentioned benefits the concept of cloud computing fits very well with the concept of m-learning which differs from other forms of e-learning, covers a wide range of possibilities opened up by the convergence of new mobile technologies, wireless communication structure and distance learning development. The concept of cloud computing like any other concept has not only benefits but also introduces myriad of security issues, such as transparency between cloud user and provider, lack of standards, security concerns related to identity, Service Level Agreements (SLA) inadequacy etc. Providing secure, transparent, and reliable services in cloud computing environment is an important issue. This paper introduces a secured three layered architecture with an advance Intrusion Detection System (advIDS), which overcomes different vulnerabilities on cloud deployed applications. This proposed architecture can reduce the impact of different attacks by providing timely alerts, rejecting the unauthorized access over services, and recording the new threat profiles for future verification. The goal of this research is to provide more control over data and applications to the cloud user, which are now mainly controlled by Cloud Service Provider (CSP).

Keywords: Auditing in Cloud, Cloud Computing, Cloud Identity and Access Management, Cloud Security, Intrusion Detection System (IDS), M-Learning, Policy Management in Cloud

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1. INTRODUCTION

All humans have the right to access learning materials and information to improve their quality of life regardless of where they live, their status, and their culture. Mobile learning, through the use of mobile technology, will allow citizens of the world to access learning materials and information from anywhere and at anytime. This idea will literally come true only after a worldwide successful implementation of presentation of device independent learning content (Christ & Feisst, 2010) which should be prepared and saved in the cloud server before (Sultana et al., 2013). Here the cloud services such as Software as a Service (SaaS), and Infrastructure as a Service (IaaS) provide Application and Storage space for the learning content in the cloud.

Cloud computing is an on demand provisioning of software, hardware, and data services achieving economics of scale in IT solutions deployment and operation (Dikaiakos & Katsaros, 2009). The underlying concept of cloud computing dates back to the 1950s, when large scale mainframe became available in academia and corporations, accessible via thin clients / terminal computers, often referred to as “dumb terminals”, because they were used for communications but had no internal computational capacities. To make more efficient use of costly mainframes, a practice evolved that allowed multiple users to share both the physical access to the computer from multiple terminals as well as to share the CPU time. This eliminated periods of inactivity on the mainframe and allowed for a greater return on the investment. The practice of sharing CPU time on a mainframe became known in the industry as time-sharing (Strachey, 1959). In the 1990s, telecommunication companies, who previously offered primarily dedicated point-to-point data circuits, began offering virtual private network (VPN) services with comparable quality of service, but at a lower cost. By switching traffic as they saw fit to balance server use, they could use overall network bandwidth more effectively. They began to use the cloud symbol to denote the demarcation point between what the providers was responsible for and what users were responsible for. Cloud computing extends this boundary to cover servers as well as the network infrastructure (ATM working group, 1993). As computers became more prevalent, scientists and technologists explored ways to make large scale computing power available to more users through time sharing, experimenting with algorithms to provide the optimal use of the infrastructure, platform and applications with prioritized access to the CPU and efficiency for the end users (Corbató, 1962).

The concept of Cloud Computing mainly comprises of five characteristics, three service models, and three deployment models as shown in Figure 1.

The identified barriers that have to be taken care of to support mobile learning in cloud are: 1) various kinds of devices used by different users or in different times or parallel by the same user which is not predictable and have to be recognized by the system in order to know device capabilities. In a stable place like at home or at office it is more convenient to use a PC. While on the move it is very obvious that a user would like to access same content with the same outlook and feel by using his mobile device. So a system is necessary which is device dependent from the point of communication functionality, interactivity, 3D capabilities, and information presentation and information depth. But at the same time it must be device independent from the point of information access. 2) The overall number of users of specialized content or interactive applications is too low to adapt the application/content to all possible devices manually. 3) Content and User Interfaces could include different kinds of data format like text, image, audio, video, 3D Virtual Reality data and upcoming other formats. The system should be able to deal with all the existing and upcoming formats of data without requiring any huge enhancement.

In order to realize such a system three major requirements have to be fulfilled: 1) Identification of the connected device 2) Generation, structuring and storage of generalized content...
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