A SOA Based System Development Methodology for Cloud Computing Environment: Using uHealthcare as Practice

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ABSTRACT

Service Oriented Architecture (SOA) uses a structural approach to create services which can be reused and shared. SOA provides agility and cost saving in software development, transforming vertical applications to various software components, which can be reused in applications. Cloud computing expands the software service accessibility and usage via Web services. To move successfully into cloud computing, an architecture supporting the cloud capabilities is needed. The cloud provides a good platform for deploying Web services based on SOA. Customer satisfaction, improved collaboration, enhanced end-to-end user security and end-user authentication, and business growth are some long term benefits supported by modern technologies in both of cloud computing and SOA. The objective of the paper is to study the effective process and effort required to design and implement a SOA based system development methodology and applying it to construct a u-Healthcare system to provide healthcare services including accessing medical records of patients on a universal end-to-end basis.

Keywords: Cloud Computing, Service Oriented Architecture (SOA), System Development Methodology, uHealthcare, Universal Healthcare Service

INTRODUCTION

The goal of this paper is to design a u-Healthcare system which can universally provide end-to-end healthcare services, such as access to health records of patients with modern information technologies available in the cloud that can be accessed anywhere, by anybody, at any time. Service Oriented Architecture (SOA) has made a significant contribution in interoperabil-
ity towards the Electronic Healthcare Record (EHR) systems (Yina, 2010). EHR systems are connected through a wide variety of distributed systems like patient registration, appointment scheduling, patient demographics, patent medical records, and laboratory testing results. The collective information from all these systems is required to provide an effective treatment to a patient in chronic illness medical conditions. Thus interoperability among these distributed systems is highly important and it is provided through these healthcare systems via “services” based on a SOA framework (Petritsch, 2006).

SOA as well as Cloud, both are about delivery of services to enterprises with better flexibility, agility, cost effectiveness, coverage, and speed that can lead to higher return on investment and improved innovation (Serraano, Elmisery, Foghlu, Donnelly, Storni, & Fernstrom, 2011). To achieve a universal level that the target system can be equipped with functions to service patients and physicians, it is necessary to have the system infrastructures to use in SOA and Cloud. To transform successfully into cloud computing, an architecture that supports the capabilities of cloud computing is required. Additionally, firm service oriented architecture to facilitate the infrastructure is required for successfully implementing the cloud. The cloud provides a good means for deploying services in a service oriented architecture environment (Bergenti & Poggi, 2010).

Time is the instantaneous benefit of combining Cloud Computing and SOA. Approaching the cloud for technology or business capabilities permits initiatives of SOA to narrow down time to value. Customer satisfaction, improved collaboration and business growth are some of the long term benefits of combining cloud and SOA. The paper is focused on developing an SOA based system development methodology using the concepts of SOA and Cloud Computing (Yu & Bhagwat, 2011). Then, apply this methodology to design a uHealthcare application which can be deployed on a Cloud Computing Platform. The methodology has major steps to define and construct information model, service model and governance model. At the stage of forming a governance model, it is the exact place to manage the adoption of universal standard end-to-end security system for data encryption and end-user authentication. There is a non-functional requirement specifically included for this purpose.

At the stage of constructing the governance model, it is the best time to physically design and integrate the universal end-to-end security standards into the system.

The historical slow acquisition and adoption of universal standards could be caused by different understanding and usage agreement. The paper emphasizes designing a governance model to have a structured approach to develop all possible issues and potential solutions. The governance model will also be able to promote better communication and education regarding these universal end-to-end security standards.

**CURRENT ISSUES**

SOA is a structural approach for creating services which can be reused and shared. It transforms present vertical applications to different components known as services, which can be reused in different applications and provide better agility and savings to make cost effective and quick changes (Bowen, 2009). Cloud computing refers to any IT resource, such as database, storage, application services and development present outside the firewall which may benefit enterprise IT over the web. The basic benefit of cloud computing is that it lowers the expenses incurred by leveraging these resources as services, by utilizing and paying as needed. Cloud computing facilitates the utilization of IT resources which can be leveraged on demand (Linthicum, 2009).

uHealthcare is one of the emerging technologies in the health environment. Several organizations are trying to fulfill increasing demands of improved health services by fa-
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