The Architecture and Analysis of a New Cloud Collaborative Commerce Model

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ABSTRACT

Cloud Computing IT infrastructure has the potential to be particularly suitable for collaborative commerce (c-commerce) applications; because it generally requires less efforts and interferences for development, customization, integration, operation, and maintenance than other traditional IT infrastructures (e.g., on-premises and data centers). However, upgrading c-commerce applications running on traditional IT infrastructures, to run efficiently on cloud computing infrastructure, faces a number of challenges, mainly, lack of effective and reliable architectural model. This paper presents a description of a new architectural model for developing cloud computing based c-commerce applications; which is denoted as cc-commerce model. The model is basically based on the standard cloud computing model, and it consists of six main components; these are: client, provider, auditor, broker, security and privacy, and communications network. The new model is implemented in a simple and flexible Web-based test tool, namely, the cc-commerce test (3CT) tool, which is used to evaluate the performance of the model through measuring the response times for four different configurations. The analysis of the obtained results demonstrates that the cc-commerce model can provide better response time than equivalent c-commerce models.

Keywords: Cloud Collaborative Commerce, Cloud Commerce, Cloud Computing, Collaborative Commerce, Electronic Commerce

1. INTRODUCTION

Electronic commerce (e-commerce) is one of the fastest growing applications for the Internet, which represents the sales aspect of electronic business (e-business) (Schneider, 2010; Turban, 2010). E-commerce is about performing transactions on the Web, such as purchasing and selling products, procurement, supply chain management, and training. While these fields have evolved somewhat independently over the past few decades, they have a lot to contribute to each other, i.e., collaborate. Organizations have realized that effective collaboration is a key to
knowledge management and good knowledge management practices are essential for a successful organization; therefore, in recent years, many organizations are willing to go beyond private e-commerce and work collaboratively with other organizations. In other words, carry out transactions, as well as share and collaborate on activities and projects using the Web to go beyond organizational boundaries, while remain autonomous (Khosrowpour, 2004). This new form of collaboration is known as collaborative commerce (c-commerce) (Chen, Zhang, Zhou, 2007; Huang & Fan, 2007; Nerve Wire, 2002).

C-commerce enables organizations to share information, and at the same time should provide all means to protect their privacy as well as all sensitive information. Furthermore, organizations usually build their resource management systems (RMSs) independently; therefore, it is highly expected to have disparate heterogeneous RMSs. Organizations usually run their RMSs on local area networks (LANs), which are accessed and interconnected through the Internet using wide area network (WAN) protocols and infrastructure (FitzGerald & Dennis, 2011). Consequently, it is necessary to work on integrating these local systems to form applications that able to collaborate effectively.

While developing c-commerce applications, many challenges must be addressed to meet users, organizations, and applications satisfactions and maintain satisfactory quality-of-service (QoS); such as: high access bandwidth, low-cost bit-rate, high network and link reliability, high efficiency, availability, scalability, security, etc. Adding to the above challenges are the high cost of the installation and operation of local RMSs. Also, all local resources need to be continuously maintained and updated (Li & Xia, 2011; Issa et al., 2010).

Cloud computing is defined as the delivery of computing resources (hardware and software) as a service rather than a product, whereby shared resources, software, and information are provided to computers and other devices as a metered service over a network, typically the Internet (Sasikala, 2011). Cloud computing providers deliver applications through the Internet, which are accessed from Web browsers running on desktop and mobile applications, while the business applications and data are stored on remote servers (Peiris et al., 2011; Wu & Duan, 2006). It is very interesting to perceive how c-commerce can benefit from this tremendous cloud computing technological development and relax the above challenges (Li & Xia, 2011).

Information technology (IT) has a tremendous effect on business success; therefore, many businesses give a great attention to this vital success factor. Many businesses, especially, small and medium businesses (SMBs) are often unable to possess their own suitable IT technologies for their c-commerce applications to enable those providing satisfactory services to meet their business and customers’ needs on one hand, and to compete against large businesses on the other hand. This is a result of: shortage of financial resources to build a suitable infrastructure, costs of software license for a start-up, shortage of IT experienced human resources, shortage of technical knowledge to maximize benefits of IT systems, and high operation and upgrading costs (Issa et al., 2010). Cloud computing platforms have the capacity to be particularly suitable for applications required collaboration between participating parties, such as those imposed by c-commerce applications (Li & Xia, 2011).

In this paper, we first develop a new c-commerce model that utilizes cloud computing concept as a platform for running c-commerce application, which is referred to as cloud collaborative commerce (cc-commerce). The cc-commerce components and the architecture and the deployment configurations for the proposed model are described in details. Second, the performance of the new model is evaluated through a number of scenarios.

This paper is developed into seven sections. Section 1 introduces the main theme and concept of the paper. The remaining part of the paper is organized as follows: Section 2 presents a background on c-commerce, traditional computing systems and cloud computing. Section 3 provides a review on some of the furthest recent and related work. A detail
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