

A TOTAL MODEL FOR DEPLOYING HYBRID CLOUD COMPUTING PARADIGM FOR B2C E-COMMERCE IN SMEs.

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Abstract -- Over the last years, technology developments have permanently changed the way how businesses are working. Organizations are forced to become visible online and stay connected to take advantages of costs reduction and improved utilization of existing resources. The approval and the application areas of the cloud computing has considerably increased since it was offered by Google in 2007. Cloud computing has attracted the IT enterprise attention especially the e-commerce enterprise. At this time, there is a great issue of environmental costs during the enterprises apply the e-commerce, but with the coming of cloud computing, most of the problem will be solved. Organizations around the world are fronting with the continued budget challenges and increasing in the size of their computational data so, they need to find a way to deliver their services to clients as economically as possible without bargaining the achievement of anticipated outcomes. E-commerce companies are need to provide better services to satisfy their clients.

In this paper, the researcher proposed a comprehensive paradigm that use and deploy cloud computing technology environment to be used for B2C style of e-commerce in small to medium enterprises. Cloud computing might be a suitable model for implementing B2C e-commerce architecture to improve e-commerce efficiency and user satisfaction.

Index Terms -- E-commerce, Cloud Computing, B2C, SaaS , Business Models, SME, Cloud Model

1. INTRODUCTION

Electronic commerce or E-Commerce allows consumers to electronically exchange goods and services with no barriers of time or distance. It is any type of business, or commercial transaction, that involves the transfer of information across the Internet. It covers a range of diverse types of businesses, from consumer based retail sites, through music sites or auction, to business exchanges trading products and services between firms and/or individuals. E-commerce has expanded rapidly over the past years and is expected to continue at this rate, or even accelerate. At this time and in the near future the boundaries between "conventional" and e-commerce will become increasingly blurred as more and more firms move some of their operations to Internet. E-commerce was first presented at the ends of 1970s. It was invented to provide how the business transactions are made electronically via EDI (Electronic Data Interchange). There are many types of e-commerce systems such as business-to-business (B2B), business to- consumer (B2C), business-to-government (B2G), consumer-to-consumer (C2C) and mobile commerce (m-

commerce). Business-to-consumer e-commerce, or commerce between companies and consumers, involves customers gathering information, purchasing physical or information goods, and for information goods, receiving products over an electronic network.

Cloud computing and e-commerce are both broadly used due to their cost effectiveness. The cloud computing technology lets organizations to perform business without having to develop and maintain IT infrastructure: hardware or software. E-commerce gives the flexibility for business to trade products or services online without having to physically rent an office space. Now days, many more e-commerce companies take advantage of the benefits of cloud computing [1]. There are five basic elements for e-commerce activities in cloud computing; i) clients of e-commerce businesses, ii) cloud computing in e-commerce suppliers of e-commerce businesses, iii) financial banks, iv) e-commerce businesses and v) cloud service provider (CSP) [2].

E-commerce is composed of two layers: i) the technical architecture with hardware and software and ii) the related commercial transactions that are built on the technical architecture. Laudon [3] reported that the technical architecture is the base

of e-commerce. Moreover, the business types and marketing techniques can be applied only through this base. It is important that the technical architecture retains its security for the online services and products. It is estimated that the cloud computing will make significant impact on the technical architecture of the e-commerce. The cloud computing makes workings easier for e-commerce business as these businesses might just rent the necessary technology instead of purchasing it. Therefore, the businesses do not need to have physical space to hold these technologies that brings the cost down significantly. Through this simplicity of use, e-commerce business might just concentrate on the core business processes.

Cloud computing [4] is a computing model, where a huge pool of systems is connected together in private or public networks, to offer dynamically scalable infrastructure for application, data and file storage, see figure 1. With the advent of this technology, the cost of computation, application, storage and delivery is reduced significantly. Cloud computing services have three distinctive features that distinguish it from traditional hosting. It is traded on demand, typically by the minute or the hour; it is flexible; a user can have as much or as little of a service as they want at any given time; and the service is fully managed by the cloud computing service provider.



Figure 1: Cloud Computing Technology
Cloud computing offer feature to e-commerce enterprises to reduce manpower, financial and material cost to implement all e-businesses system and also maintenance of back-end services or software. These all processes might be maintained by cloud computing service providers. E-commerce is a typical industry that is being effected by the features of the cloud computing services. The main aim of this paper is to discuss the effects of cloud computing on e-commerce business and proposed a comprehensive model for e-commerce built on cloud computing technology. This new model will make e-commerce more

effective and more customers and suppliers satisfaction.

2. RELATED WORK

Cloud Computing has become one of the most spoken about technologies in latest years and has got lots of attention from researchers, media as well as analysts because of the opportunities it is presenting. The market research and analysis firm IDC [5] suggests that the market for Cloud Computing services was \$16billion in 2008 and will rise to \$42billion per year by 2012 [6].

Many studies have inspected the general idea of cloud computing. Yet, it should be noted that cloud computing is still an evolving technology. Since its rise, the powers of cloud computing has been discussed by different literatures. Li J. and Liu J. [7] examines the issues such as the lack of instruction resources that are preventing the general educational information rural China and conclude that cloud computing could help to resolve issues. Ambrose and Chiravori [8] studied the role of three factors in the personal use of Cloud Computing. Using partial least squares analysis technique, both discovered that two factors (age, experience) have a significant role in a person's intention to adopt cloud computing. Students of community colleges have become early adopters of the cloud computing. Researchers used the Technology Acceptance Model to examine whether community college students would use cloud computing technology. Observations were done in a small virtual laboratory in a community college setting. They found that students are more expected to adopt cloud computing technology if it is easy to use and needs little training [9].

Kashfi, F., et al. [10] study the significant influences of cloud computing on the processes and propose a new approach of cloud computing. The research defines the positive impacts of cloud computing based on the cases of the major organizations such as Google that make the points more convincing. However, the authors highlight the technical impacts of cloud computing rather than analyze its business impacts.

La, S. [11] analyzes the effect of cloud computing on the traditional software project and records out that the traditional software project must migrate cloud computing. Particularly, it suggests the migration strategies, security strategies and the corresponding migration tools. The contribution of the research is that it is not only defines the positive influences of cloud computing on the

traditional software project but also suggests the exact strategies by which cloud computing can be correctly applied to the software project development. Through review of the literature review, it could be found that few literature mentions the influences of cloud computing on e-commerce. Actually, the rapid development of e-commerce needs the participation of cloud computing into its technical architecture, business mode and service mode. As a result, the development of e-commerce businesses and industry will be significantly influenced.

3. MEANING AND SIGNIFICANCE OF CLOUD COMPUTING

There have been many definitions of Cloud Computing by different researchers and scientific institutions. According to NIST [12], cloud computing is a model for supporting convenient, on-demand network access to a shared pool of configurable computing resources (e.g., servers, networks, storage, services, and applications) that could be rapidly provisioned and released with minimal management work or service provider interaction [12].

Google considers that the cloud computing would provide consumers data storage and computing services in a secure, fast and the most convenient possible way [13]. According to Mel and Grance [14], cloud computing permits users to customize network related resources, applications, and services depend on the demand. Additional definition of the cloud computing is a dynamic computing environment that permits scalability and provides virtualized resources as service over the Internet [15].



Figure 2: Types of Cloud Computing

CCT offers services that might be categorized into the following categories, [15], see figure 2:

Infrastructure as a service (IaaS): HW resources and computing power offered as services to clients.

Software as a service (SaaS): SW applications are offered as services on the Internet.

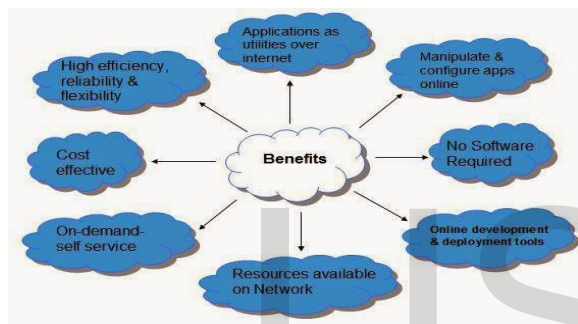
Platform as a service (PaaS): In this category, the cloud service provides facilities to support the entire application development lifecycle.

Cloud computing is a revolutionary model for several businesses, governments and individuals. According to Gather, by 2012, 20% of businesses will adopt cloud services and own no IT assets [16]. One of the reasons why cloud computing has multiple definitions is that cloud computing does not refer to a specific technology but rather to a concept comprising a set of integrated technologies [17].

IEEE defined Cloud computing as: A model in which information is commonly kept in servers on the Internet and cached temporarily on clients' devices which include mobile devices, desktops computers, entertainment centers, computers, notebooks, handhelds, etc. [18]. It is the distribution of computing as a service rather than a product, where by shared resources, software and information are produced to computers and other devices as a metered over a network. Cloud Computing is also about how IT is provisioned and used and not only about technological advances of information centers [19]. Originalities need to consider the benefits, weaknesses and other effects of Cloud Computing on their processes and usage practices before adopting Cloud Computing [20].

Khajeh et al. [20] decided that Cloud Computing is a disruptive technology that is set to change how IT systems in organizations are deployed because of its low-cost, easy and scalable nature. Cloud Computing can be significantly inexpensive in comparison to purchasing and maintaining in-house information system as it eliminates the support related issues because there is no physical infrastructure to maintain. Still, there are many social-technical issues that organizations need to consider before adopting Cloud Computing IT[20]. Industry experts consider cloud computing would only continue to develop even further in the coming few years. While cloud computing is certainly beneficial for mid-size to large businesses, it is not without its downsides, particularly for smaller businesses. There are many benefits stated of Cloud Computed by different researchers which make it more preferable to be adopted by enterprises. Cloud Computing infrastructure allows organizations to achieve more efficient use of their IT investments. This is attained by

breaking down the physical barrier inherent in isolated systems, automating the management of the set of the systems as a single entity. Cloud Computing might also be described as ultimately virtualized system and a natural evolution for information systems that offer automated systems management [21]. Organizations need to consider the benefits (see figure 3), drawbacks and the effects of Cloud Computing on their processes and usage practices, to make decision about the adoption and use. Adoption of Cloud Computing is as much dependent on the maturity of organizational and its cultural processes [22]. Many businesses have invested in Cloud Computing by building their public clouds, which include Google, Amazon and Microsoft. These businesses are often releasing new features and



updates of their services. For example, Amazon Web Services (AWS) released a Security2 and Economics3 center on their website to have academic and community advice regarding these issues [23].

Figure 3: benefits of Cloud Computing

Maybe, the major benefit of cloud computing is its capability to assist organizations to increase their productivity and decrease their cost of operations and maintenance while offering new products or/and services to their clients. The pay-as-you-go pricing technique is flexible in the sense that it allows the users to try the applications or infrastructure before they obligate themselves to renting them. The current customers might benefit from volume discounts by paying in advance for example. When the users rent assets, the maintenance of the information systems become the responsibility of the cloud vendor, thus the users do not need to worry about operation and maintenance. The cloud users are mostly satisfied with the fact that the systems in place are up-to-date, reliable and flexible to respond to the user demands. The up-front expenses of the businesses could be reduced by placing the information system into the cloud. The savings could be then

invested back into the primary business to provide added value services to the clients of the businesses. The productivity of the teams would depend on the services provided by the highly reliable networks and Internet. The cloud services are available 24/7 and accessible from various browsers (i.e., Chrome Firefox, Mozilla, Safari) and devices (i.e., laptop, smartphone, desktop, iPad) in any time. This gives enormous flexibility for everybody to do their work [24]. Cloud computing could also benefit organizations, industries, and economies by:

Providing companies ways in that they might develop new products and offer new services to its clients by letting the developers efficiently collaborate with each other with access to the reliable and powerful computing resources

Giving capability to organizations to analyze their data using data analytics tools to determine the changing needs of the clients to stay competitive in the market

Permitting information access to businesses from small to large though in the past only the larger businesses had such competitive edge

Helping economies to move forward to higher level of technological progresses by providing fast and low cost access to infrastructure, tools, and applications

4. IV. THE PROPOSED CLOUD B2C E-COMMERCE MODEL

Before representing the e-commerce B2C architecture based on Hybrid cloud computing, the system architecture of a traditional e-commerce is given. Figure 4 shows the high-level system architecture of an e-commerce B2C model. First of all, the system composed of three layers: Logistics layer, Background layer, and Frontend layer. the logistics layer is the management of the flow of products, services, and associated data from point of source to point of consumption. Logistics activities is connected with Inventory management system, shipping system, stock receipt, and return shipment. Then, the background layer is where the administrator or e-seller might manage web content, data catalogue, track of consumers, manage enterprise resource planning(ERP), and far more. In this layer, customers and suppliers are taking part in the process through information, customers and prospects are making decision to purchase products or not as seen in figure 4.

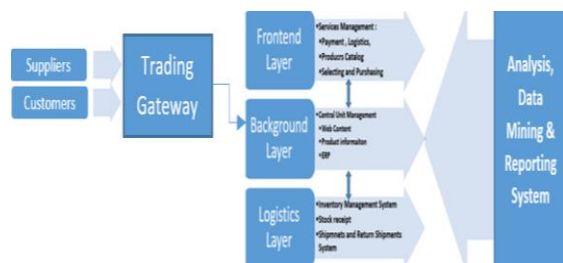


Figure 4: Tradition B2C e-commerce system

With e-commerce business, the suppliers can decrease the cost of managing their inventory of goods that they can automate the inventory management using web-based management system. Indirectly, they can save their operational costs. Lastly, the Frontend layer is where customer might process the ordering. The processing starts with the browsing of the product catalogue. Then, the customer selects a product to cart and checks out the order. This layer also includes handling of payment and logistic service. Additionally, the e-commerce company sellers may have to collect, store, analyze, and afford access to data center to assist company users make better business decisions.

A B2C E-commerce model built on hyper cloud computing is a migration from the above explained traditional e-commerce system to cloud B2C E-commerce system that is a future e-commerce infrastructure. The proposed e-commerce cloud architecture might be divided into three high level layers: Infrastructure layer, Platform layer, and Application layer. The c-commerce cloud model is shown in figure 5. The Infrastructure Layer is placed in the bottom level of cloud architecture. This layer includes the physical components which run applications and store data. Virtual servers are made to run applications, and virtual storage pools are created to house new and existing data into dynamic tiers of storage based on performance and reliability requirements. Virtual abstraction is engaged so that servers and storage might be managed as logical rather than individual physical entities. The Platform Layer offers a unified interface for software developers. To alleviate different software resources, they have developed the applications for the cloud by using the typical

interface and application program interface (API). The Application Layer consists of B2C e-commerce services. This layer provides a software-based for product management, customer management, and enterprise resources planning. E-commerce B2C application provides a software-based for a payment system and an ordering system. The most common mechanisms are an electronic catalog; a search engine that aids the customer find products in the catalog; an electronic cart for holding items until checkout; a payment gateway where payment arrangements might be made; and customer services, which include product and warranty information. Logistic service provides a software-based for stock management and shipping arrangements. It also provides functions and interaction interfaces for customers or other programs. Software-based services are obtained via the Internet that user access by a web browser.

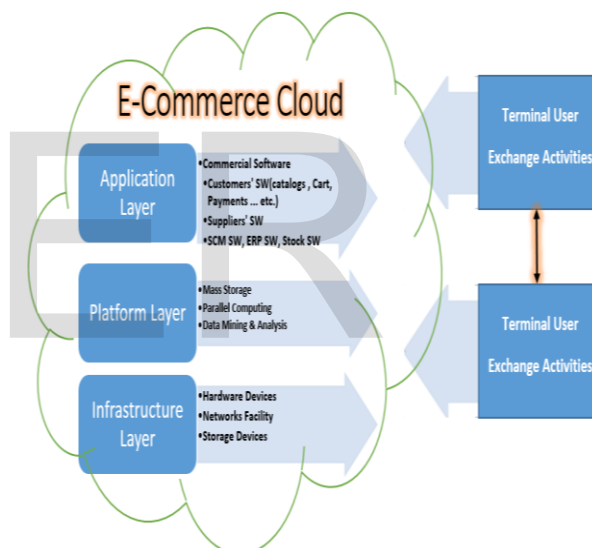


Figure 5: the proposed model for B2C e-commerce based on Cloud Computing

5. CONCLUSION

Cloud computing is a new technology of computing for managing and delivering on-demand information technology resources, applications and services through the Internet on a pay-per-use basis. Cloud computing provides organizations cost-effectiveness. Cloud consumers could access the services at remotely through the Internet. There are a lot of advantages of using cloud computing technology for an e-commerce system, such as, reduced asset cost, scalability, increased reliability, increased auditing, increased disaster protection, and so on. Furthermore, we

propose the strategy for an e-commerce system development life cycle that provides a model for the strategic development of cloud computing. In future research, a study will be conducted regarding the attitude, strategy and challenge of migration to the proposed B2B e-commerce architecture based on clouds.

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