Cloud-e commerce: Synthetic platform for e-commerce transactions and services

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Abstract-   Cloud computing is a new Internet-based computer technology. As a new concept, cloud computing has attracted the IT enterprise attention especially the e-commerce enterprise. At present, there are great problems of environmental costs during the application of e- commerce by the enterprises, but with the advent of cloud computing, all such problems can be shorted out. The paper puts forward that cloud computing has a wide perspective in the application of E-commerce by describing the conception and characteristic of cloud computing, and special analysis of the main aspect of improving E-commerce by cloud computing. Although Cloud Computing can bring lots of opportunities for e-commerce companies, there are still some issues that needs to be address before we move on to the "cloud". For examples, there is no unified Cloud standards yet which may cause trouble to use Cloud Computing; the quality of Cloud service cannot be guaranteed; migration effort should be considered, etc.

Keywords – E-commerce, Cloud computing, Mobile Terminal, SCM

I.   INTRODUCTION

Cloud computing which is a buzzword nowadays is applied to many industries at present. For instance, there has been a new trend for e-commerce companies to adopt Cloud Computing. Most organizations are attracted by Cloud Computing because Cloud can save time and money for them in investing in IT infrastructure. There is no doubt that this may be the biggest benefit brought by Cloud Computing, but Cloud Computing also brings a number of other benefits.

For e-commerce companies, Cloud Computing provides some specific benefits. For example, it is quite important for e-commerce companies to keep their customer's information secure. Cloud Computing helps to improve the security performance in e-commerce by providing a safer way to store the information. This paper will address other benefits that offered to e-commerce companies by Cloud Computing.

Although Cloud Computing can bring lots of opportunities for e-commerce companies, there still have some issues that needs to be addressed before we move on to the "cloud" . For examples, there is no unified Cloud standards yet which may cause trouble to use Cloud Computing; the quality of Cloud service cannot be guaranteed; migration effort should be considered, etc.

In addition, it should be noted that, while Cloud Computing can help e-commerce achieve competitive advantages, it intensifies the competition in e-commerce market since it gives chances for more small business to do e-commerce.

A.   The concept of Cloud Computing–

Everyone is talking about "the cloud." But what does it mean? Business applications are moving to the cloud. It's not just a fad—the shift from traditional software models to the Internet has steadily gained momentum over the last 10 years. Traditional business applications have always been very complicated and expensive. The amount and variety of hardware and software required to run them are daunting. You need a whole team of experts to install, configure, test, run, secure, and update them. When you multiply this effort across dozens or hundreds of

applications, it's easy to see why the biggest companies with the best IT departments aren't getting the applications they need. Small and mid-sized businesses don't stand a chance.

With cloud computing, you eliminate those headaches because you're not managing hardware and software—that's the responsibility of an experienced vendor like salesforce.com. The shared infrastructure means it works like a utility: You only pay for what you need, upgrades are automatic, and scaling up or down is easy.

Cloud-based applications can be up and running in days or weeks, and they cost less. With a cloud application, you just open a browser, log in, customize the application, and start using it. Businesses are running all kinds of applications in the cloud, like customer relationship management (CRM), HR, accounting, and much more. Some of the world's largest companies moved their applications to the cloud with salesforce.com after rigorously testing the security and reliability.

As cloud computing grows in popularity, thousands of companies are simply regrinding their non-cloud products and services as "cloud computing." Always dig deeper when evaluating cloud offerings and keep in mind that if you have to buy and manage hardware and software, what you're looking at isn't really cloud computing but a false cloud.

The latest innovations in cloud computing are making our business applications even more mobile and collaborative, similar to popular consumer applications like Face book and Twitter. As consumers, we now expect that the information we care about will be pushed to us in real time and business applications in the cloud are heading in that direction as well.

Cloud computing is a way of using computers where the computer resources (software and hardware) are provided as a service over the internet and are dynamically scalable and often virtual (i.e. not necessarily in one known place). What this means to users is that the information they use is stored on computers somewhere else (other than there local PC) and can be accessed where, when and how they want it.

Cloud computing customers don't generally own the physical infrastructure on which the applications run and store the data. Instead, they rent usage from a third-party provider and then use the system as they need it, much as people use gas or electricity. The more resources they use (such as more users having access to an application or using more disk space for storing data) the more they pay.

B. Defination of E- Commerce–

The concept e-commerce first appeared in the late 1970's. It was originally used to describe the process of conducting business transactions electronically using technology from EDI (Electronic Data Interchange) and EFT (Electronic Funds Transfer) [1].

Many people consider e-commerce and e-business as the same thing. In fact, this is a common misunderstanding. E-commerce, in some sense, can be regarded as part of e-business which only deals with the transactions and selling products online. It refers to all electronically mediated transactions between organizations and any third party it deals with [2].

As with Cloud Computing, there is no one unique definition for e-commerce. Different people and associations proposed different definitions from various perspectives. Kalakota and Whinston gave the several different perspectives for e-commerce in 1997 which is broadly well known and universally acknowledged [3].

- A communications perspective - the delivery of information, products or services or payment by electronic means.
- A business process perspective - the application of technology towards the automation of business transactions and workflows.
- A service perspective - enabling cost cutting at the same time as increasing the speed and quality of service delivery.
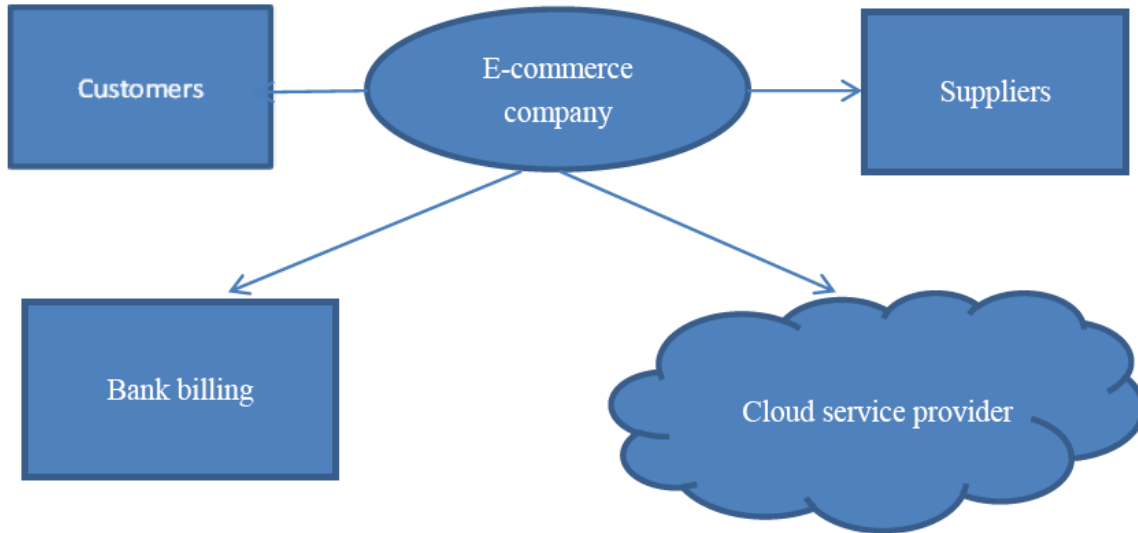- An online perspective -the buying and selling of products and information online.

Figure 1. E- Commerce activity participants after adopting cloud

II. THE INFLUENCE OF CLOUD COMPUTING IN E-COMMERCE

Cloud Computing and e-commerce are two buzzwords nowadays. They are popular because both of them are cost-effective. Cloud Computing saves organizations the cost of IT infrastructure while e-commerce allows merchants to do business without renting or buying an entity shop. At present, more and more e-commerce companies are migrating to the Cloud. Cloud provides positive opportunities for e-commerce, but before adopting it, companies should have a trade-off.

A. Reduce operation cost–

Since cloud Computing uses virtual machine instead of physical machine, the work of hardware operation is shifted from Cloud consumers to Cloud providers. Organizations can reduce their operation cost in this way. There are also additional benefits which can be offered by Cloud Computing. For instance, start-ups can skip the hardware procurement and capital expenditure phase. They can start their business quickly. What's more, most of the Cloud providers will constantly update their software offering and adding new features.

B. Cloud Computing can improve the safety of E- Commerce Application –

The business enterprise scale is more and more big and the backlog more information resources. Along with the rapid development of network, the business enterprise data gets effectively and savagely to also lead the attack of coming a lot of viruses and black guest at the same time and then makes the safety that the business enterprise data saves be subjected to serious threat and made also more and more big in the devotion on the information safety. Apply cloud in the business enterprise calculation, can is saving the data in the high in the clouds, is computed service by cloud to provide ascend provide profession, efficiently and safety of data saving, thus the business enterprise need not worry again because various safe problem causes the data throw to lose. Therefore, cloud computing can provide the data of credibility and safety saving centre for business enterprise.

C. Cloud Computing can improve the Vivid and professional E- Commerce Application –

Cloud computing can provide economic dependable E-commerce system to make to order service for business enterprise, software's namely serve (SaaS) is a kind of service type that cloud computing provides, it software Be a sow in line service to provide. The business enterprise is adopting cloud computing service, to the E-commerce system carry on a development and get stripe have already no longer needed to cost a great deal of funds and manpower, don't need singly trap software and procedure of investing the establishment inner part. The business enterprise being a customer to carry can more expediently use various service that cloud computing provides and needs to install a network browser then and makes the business enterprise be getting less for supporting and getting stripe E-commerce system but throwing in of expenses like this just at this time.

D. Cloud Computing can carry out common calculation ability to handle data–

In "cloud", cloud computing mode will be according to needing to be adjusted to provide strong calculation ability with numerous calculation resources in cloud while being to hand in one to compute a claim. Compute mode in cloud in, business enterprise no longer from own calculation on board, is not from a certain appointed server either, but passed various equipments(such as move terminal etc.) on the net to acquire from the Internet need of information, therefore the speed got leaping of quality.

III. WHY E-COMMERCE COMPANY ADOPT CLOUD

A. The problems e- commerce company facing–

- **Security: Security** is one of the most significant barriers for the development of e-commerce. In recent years, there are numerous reports about websites and databases being hacked into, and security holes in software [18].
- **Lack of Capital:** Large amount of computer hardware are required to support e-business activities. With the expanding of customer group and increasing of data flow, enterprises need to update their hardware and improve their management of these infrastructures. Many of the enterprises cannot afford the cost for purchasing and maintaining the equipment. Not to say they have to spare capital to keep the company running smoothly.
- **Lack of technology and technical people:** E-commerce is a business activity that based on IT and web technology. The ability to develop, maintain and manage e-commerce website is required to do e-business. With the rapid development of e-business industry, the related technical problems such as data mining, data integration, information security and data storage etc. are challenging for enterprises, especially middle-sized and small-sized e-business companies. The implementation of e-commerce leads to higher requirements for specific skills and techniques [4].
- **Bottleneck of supply chain management:** Supply chain management (SCM) is an essential part when doing business. A good relationship with upstream and downstream organizations is extremely important for a successful enterprise. Christopher defines SCM as the management of upstream and downstream relationships with suppliers and customers to deliver superior customer value at less cost to the supply chain as a whole [5].Middle-sized and small-sized e-business companies are always hindered by capital, decision ability and technical support etc. which make them cannot perform well in supply chain management.
- **Bottleneck of Mobile Terminal:** As the era of 3G is coming, mobile e-commerce steps into our lives. According to latest statistics, the number of 3G mobile users increases million in world wide. Since mobile phones have already become daily necessities, they will become one of the most used terminals for e-commerce in the near future. The promoting and applying of 3G will bring new opportunities for e-commerce. However, mobile terminals have many limitations on, for example, information processing and information security.

B. The solutions brought by cloud–

- **Cloud offers new delivery models and deployment models for IT resources**

Cloud-ecommerce includes information technology, marketing, management and other issues. It offers a synthetic platform for e-commerce transactions and e-commerce services. The enterprises do not need to worry about setting up the software and hardware environment any more with the IaaS or SaaS model of Cloud. And, they do not need to invest labour and capital to construct the system. All of the work can be passed to Cloud provider. Thus, enterprises can focus on their core business.

- **A safer way for data storage**

Although Cloud Computing has security problems itself, it still brings opportunities to information security. Data is stored concentrated in the Cloud. This method of data storage brings at least two benefits to data security. First, it reduces the possibility of data theft, leakage and damage. Before the emergence of Cloud, data can be leaked easily, such as laptop theft. With Cloud Computing, users can store their data on Clouds.

In this way, even if the user's computer is lost or damaged, the data still can be found on Clouds. Secondly, data safety monitoring will be more easily. Since data is stored in data centres, managers of the data centres can implement the centralized management such as security control, software deployment and resource allocation [6]. Hence, enterprises do not need to worry about data security too much.
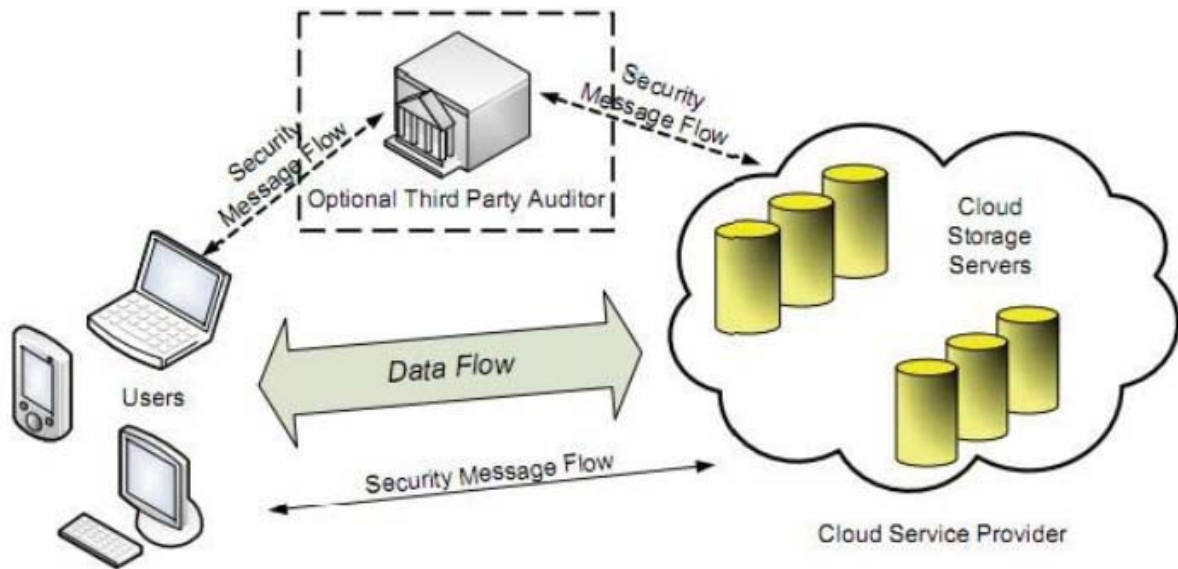
Figure 2. Cloud Data storage Architecture

- **Provide decision-making model on Business Intelligence level**

Business Intelligence (BI) [7] provides valuable knowledge and information for decision makers by leveraging a variety source of data as well as structured and unstructured information. Nowadays, the main difficulties faced by most e-business companies are as follow.

- With the continuous growing number of users, the volume of data is becoming larger and larger. Thus, higher capabilities in data storage, mining and management are required.
- The constant change of demand requires high real time property of BI. This asks for faster and more efficient running performance of e-commerce companies. Meanwhile, good extensibility is also needed.
- High cost is a main factor that hinders the development of BI in e-business companies, especially middle-sized and small-sized ones. The data centre provided by Cloud Computing offers good basis and conditions for e-business companies to develop BI.

- **Break the bottleneck of Mobile Terminal**

Mobile e-commerce has high requirement on computing ability, information transferring and information processing. If mobile devices and mobile communication network cannot work efficiently and dependably, mobile e-commerce would not be realised successfully. Cloud Computing would solve the problems that AliCloud unveiled its internally developed Cloud-based mobile device operating system on 28th July of 2011. The first mobile phone powered by the Cloud OS, was also unveiled on the same day by AliCloud. A distinguishing feature of Cloud OS is its support for web-based apps. Users could have an Internet-like experience and do not need to download or install application software on their mobile devices. Cloud OS also allows users to store back-up data such as contact information, call logs, text messages, notes and photos to AliCloud's remote data centre, access and update their data across all their PC and mobile devices. AliCloud is planning to provide each Cloud OS user with a total of 100 gigabytes of data storage initially, with plans to expand according to user needs [8].

IV. ISSUES IN CLOUD ADOPTION

A. Security–

Security of data in public Clouds is big concern [9] .Although CSPs always say that the information of clients are stored securely on the Cloud still e-commerce companies and Cloud end-users worry about the security of their data since their sensitive data are in the hands of Cloud service providers.

Since both Cloud Computing and e-commerce have security problems, this issue may be the most serious one that makes customers hesitate to implement Cloud E-commerce. Since most of the customers don't have prior experience of using cloud they fear that they can lose control of their data. As already mentioned that e-commerce

has several security issues, however, after e-commerce migrates to the Cloud, all e-commerce activities would be performed there, the security of Cloud will be the most urgent issue that needs to be addressed.

B. Privacy–

Cloud Computing is normally based on the existing distribute network. Computers can be a part of Cloud as soon as they connect to the Internet. E-commerce activities require customer's personal information, such as name, address, identity, bank data, etc. Attackers can attack the individual privacy by using multiple links between data if there is no believable privacy [6].Cloud providers must try to safeguard their customer's privacy. Particularly, it is essential for the adoption of public Cloud systems that customers are reassured that security and privacy is not compromised [10].

C. Cost–

Profit is always the most important objective which business people are pursuing. Cloud Computing is attractive as it can save them millions of dollars to build their own servers and storage environment. The cost of Cloud service matters a lot to e-commerce companies and other consumers.

At present, price of Cloud service is relatively low. Cloud service providers, such as Google and Amazon, are trying to make the price more transparent to customers. They are constantly making efforts to enhance their competitiveness by reducing their service cost. Amazon has made changes on some parts of its service ten times from March 2009 to September 2010[11].

There is a series of cost for using Cloud Computing. Enterprises pay for the Total Cost of Ownership (TOC) which is calculated from the pricing models of Cloud providers. Software development cost, integration and customization cost, subscription cost (for SaaS Clouds), hardware and middleware cost, data IO transfer cost, etc. are covered in TCO [9].Organizations need to estimate Cloud Computing costs and compare these costs with conventional IT solutions. Cost and benefit analysis is important for IT managers to evaluate whether the benefits outweighs the costs of an IT investments. Different execution plans may result in significantly different costs [12].Hence, to have a precise estimate and plan of usage will reduce the cost of adopting Cloud.

D. Quality–

QoS is a broad topic in distributed system. It is mostly referred to the resource reservation control mechanism to guarantee a certain level of performance and availability of a service [13]It is a crucial factor for the success of Cloud providers as it may destroy a provider's reputation.

Computing services need to be highly reliable, scalable, and autonomic to support ubiquitous access, composability and dynamic discovery. Cloud service providers such as Amazon, Google, IBM, Microsoft and Salesforce have established their data centers for hosting Cloud applications in various locations around the world in order to provide redundancy and ensure reliability in case of site failures[14].

SLAs assure end-users that they are receiving the services they have paid for by providing a facility to agree upon QoS between end-users and providers and define end-user resource requirements and provider guarantees [13].

In the past few years, crashes of Cloud servers took place frequently. The interruptions of Cloud service have had negative effects among users. Cloud service providers need to improve their service quality to enhance the confidence of users to use their Cloud service. Before purchasing Cloud service, to sign a SLA is essential for consumers. The success of adopting Cloud Computing depends largely on the service quality provided by Cloud provider. Hopefully, more advanced and customizable SLAs are being supported or implemented [15].

E. Migration–

The four factors discussed above (security, privacy, cost and quality) are the issues which all e-commerce companies should consider about before moving to Cloud. For companies which already have their own infrastructure, they should think about migration effort. This effort is due to the discrepancies between the environment provided by a Cloud platform and a traditional platform. In other words, there might be differences in the version of various infrastructures, the libraries available, the programming models, even the semantics of data access [16].

Tran et al. [16] summarized migration influential cost factors. Some of them are similar to traditional software development cost factors; some are specific for migration to Cloud. The following are the factors relevant to migration to Cloud.

- Existing knowledge and experience on Cloud providers and technologies: If the project team already have some prior knowledge and experiences of Cloud and available tools, less effort is required since the learning curve can be improved significantly.

- Selecting the correct Cloud platforms and services (IaaS or PaaS): This factor affects the effort and cost required for the rest of migration activities greatly. Less effort is required for modification if the selected Cloud platform is highly similar to the application's environment in the local server.
- Compatibility issues: This factor is affected by the similarity of Cloud platforms and local servers as well. Compatibility issue can be eliminated when the similarity is high.
- Library dependency: If an application relies on a library to function in local server, it requires a similar library in the Cloud platform. Thus, if there is such a library for Cloud existing, less effort would be required to rewrite that library. Contextualization mechanism, which is proposed by Armstrong et al., could help to save the effort of rewriting the library. The mechanism operates in two stages. The first stage is contextualization of VM images prior to service deployment (PaaS level). This stage involves mounting a template VM image which will be converted to a specific hypervisor and installing proper software packages to support a particular service, such as a database. In this stage, context data is generated for every envisaged VM instance as an ISO CD image. The second is self-contextualization of VM instances created from such a VM image (IaaS level). During this stage, entails reading in context data at run time when the VM image is instantiated. Then the data will be used to configure the installed packages and software in the VM image. Then a single image will be able to spawn multiple instances of the same software component forming a multi-VM service [17].
- Connection issues: In the Cloud migration cases that only some components of the system are migrated to Cloud while the rest is kept in house, the connection between two parts of the system (one in house and the other one in Cloud) may face different issues such as security, latency, etc.

Moreover, the companies which already have their own existing facilities should consider one more factor in migration: cost. They cannot avoid the additional costs for giving up their established infrastructures. There will be a trade-off when making decisions. If an e-commerce company wants to move to Cloud from their existing infrastructure, they must have a complete plan of migration. Otherwise, they may encounter some unexpected difficulties in the adoption of Cloud.

IV.CONCLUSION

Cloud Computing brings many opportunities for e-commerce industry. But the new e-commerce pattern that is based on Cloud is still in an embryonic stage. There are still several problems that need to be solved. However, we are happy to see that Cloud technology is becoming mature. In the near future, more and more e-commerce companies may offload infrastructure, development, and software to the Clouds, and use some form of cloud computing , however there remains ample scope for future improvement and enhancement.

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