E-commerce Application Model Based On Cloud Computing

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Abstract—In order to handle the conflict between enterprises’ e-commerce activities and the shortage of resources, enterprises have, by the application of advanced cloud computing service model, solved the problems of the shortage of funds, man power and technology which were required in the activities of e-commerce. This paper introduces the e-commerce application model based on cloud computing and copes with the problem of e-commerce and the shortage of resources by establishing the framework of e-commerce application based on the environment of cloud computing. Studies have shown that, in enterprises and their own e-commerce through the network’s resources, if cloud-based e-commerce application model is used, problems will be solved. Cloud-based e-commerce application model allows enterprises to lower costs through the effective implementation of e-commerce activities, and solves the problem of enterprises’ can not develop e-commerce activities due to lack of resources.

Keywords—cloud computing; e-commerce; architecture; application model

I. INTRODUCTION

Enterprises’ developing e-commerce needs to invest resources in hardware, software system established by the person with a certain expertise to run and maintain. As the business expanded scale, the required resources will surge up beyond the capacity of enterprises. The cloud computing as a new service model, with network storage, on-demand access to nature, provides a new information resource sharing and processing mechanisms. In the existing conditions, cloud computing model allows enterprises with less investment to e-commerce business activities. Currently, the combination of e-commerce and cloud computing research focuses on the technical level, therefore, to start cloud-based e-commerce application model research will have a high practical value.

II. DEFINITION OF CLOUD COMPUTING

Cloud computing is the fusion of distributed computing, parallel computing, grid computing and virtualization technologies, and it is the result of technology and application development. The concept of cloud computing is appeared not long age, while a number of IT companies and related researchers get into this field of research and exploration, and obtain preliminary results. Because of their respective backgrounds, different base and starting point for understanding and definition of cloud computing has not formed a unified, so the business community and academia have different understandings.

Google is a pioneer in cloud computing, and in its concept that cloud computing is “to offer secure, fast, convenient data storage and network computing services based on open standards and service, Internet-centric[1]”. In 2007 IBM’s cloud computing initiation and they understand cloud computing as “cloud computing is a term used to describe both a platform and type of application. [2]” IBM regards cloud computing as “a pool of virtualized computer resources, which manages a variety of workloads by quickly providing the virtual machine or physical machines, rapid deployment and increased work load [1]”. Microsoft has put forward a “Cloud Computing” concept, which is the clouds and the terminal will have a strong computing power, all applications use the local terminal is not necessarily reasonable, and therefore stressed the clouds and the terminal would be a reasonable balance way [4].

The industry delegates and researchers have declared themselves on cloud computing, and made an explanation, Markus Klems considers, “you can scale your infrastructure on demand within minutes or even seconds, instead of days or weeks, thereby voiding under-utilization (idle servers) and over-utilization (blue screen) of in-house resources... [3]”.

In fact, weather in the world of business or academy, the understanding to cloud computing is no more than a concept which includes various presentations. Because the men or companies engaged in cloud computing research may come from different backgrounds or run different businesses such as internet service, grid computing, software engineering, database management, etc., they most probably look upon it from different angles (eg. technology or application). Meanwhile the enabling technology which supports cloud computing is various and evolving, thus the understanding to it is also changing constantly. And furthermore the application scale of cloud computing is small currently, each party's analysis to it and its prospect is based on their own interests. All factors mentioned above have caused the concept of cloud computing can not be uniform.

In spite of that, the development and enthusiasm in researching it are undifferentiated. And the fundamental features contain the following:

- Network infrastructure resources are rentable.
- Network resources are used according to demands.
- The transparency of resource access has been realized.

III. MODEL OF CLOUD COMPUTING APPLICATION

According to the type of service, the application mode of cloud service can be divided into Infrastructure as a Service(IaaS), Platform as a Service(PaaS), Software as a Service(SaaS)[5]. As illustrated in Fig. 1.
A. Infrastructure as a Service

Infrastructure Providers manage a large set of computing resources, such as storing and processing capacity. Through virtualization, they are able to split, assign and dynamically resize these resources to build ad-hoc systems as demanded by customers, the Service Providers. They deploy the software stacks that run their services.

B. Platform as a Service

Cloud systems can offer an additional abstraction level: instead of supplying a virtualized infrastructure, they can provide the software platform where systems run on. The sizing of the hardware resources demanded by the execution of the services is made in a transparent manner.

C. Software as a Service

Finally, there are services of potential interest to a wide variety of users hosted in Cloud systems. This is an alternative to locally run applications. An example of this is the online alternatives of typical office applications such as word processors.

Relative to three service types of cloud computing, three cloud modes can be formed, namely Infrastructure Cloud, Platform Cloud, and Application Cloud[6]. Infrastructure cloud provides computing and storage for users in the form of authorization service, of which essence is virtualizing, computing or storage resources in one or several data centers, so as to divide resources flexibly. Typical applications of this model are Amazon's Elastic Compute Cloud[7] and IBM's Blue Cloud. The platform cloud make developers not worry about work details of large-scale server in background, and provide a transparent, safe and powerful operating environment and developing environment for them. Typical applications of this model mainly contain Google App Engine, Heroku, Azure, Force.com[8]. Application cloud faces directly final software users, usually presenting itself in the form of SaaS. Each module of software system can be customized, configured, assembled and installed, and tested by users themselves, to get the software system which can meet the needs of users and to lower the cost of using, maintaining, operating, and supporting. Typical applications of this model include SalesForce CRM, Google Apps, Zoho[8].

IV. A FRAMEWORK FOR ELECTRONIC COMMERCE BASED ON CLOUD COMPUTING

Cloud computing subverts the traditional network architecture model, which enables the users to make use of the network resources freely and cost-effectively, as well as to get rid of the effect caused by a single computer equipment failure, such as, unavailable devises, the loss of data and so on. With cloud computing, the majority of users need not to buy their own hardware and software, even need not to know who is providing the service, as long as you focus on the resources or services that you really need. If the cloud-based e-commerce service called e-commerce cloud, based on the basic application form, we can describe the overall pictare of infrastructure of the e-commerce cloud, as shown in Figure 2.

A. The base layer of e-commerce cloud

The base layer of e-commerce cloud shares IT infrastructure resources and connects the huge system pool together to provide services. Cloud computing allows the hardware layer to run more like the internet, to make the hardware resources shared and accessed as data resources in secure and scalable way. Virtualization technology separates the physical hardware from operating system, which on one hand can make computing and storage capacity of the existing server into smaller size and re-integration, to improve the utilization and flexibility of IT resource; on the other hand can provide a common interface for large-scale cloud computing integration that enables the publication of calculation. The base layer can provide the basic hardware resources for the platform layer, and the users can also make use of it as the same as using a local device to use.

B. The platform layer of e-commerce cloud

With the support of the powerful hardware, platform layer carries out the tasks of data storage, computing and software development, and it can even achieve the tasks of completion of the original mass data storage, business intelligence processing and so on which have been difficult to complete. Users can choose the devices and the number of devices according to the complexity of dealing with the content. Virtualization technology enables the platform to show a strong level of flexibility.

C. The application layer of e-commerce cloud

The applications software or services provided by a professional company e-commerce, the companies to pay in the similar way of on-demand access, according to the amount to calculate the cost, complete the production,
marketing, trading and management. Companies use e-commerce system in lower cost to avoid wasting, and more resources can be used for business activities.

E-commerce cloud environment provides user-oriented ubiquitous adaptive hardware resources, computing environment and software services. In e-commerce cloud space, users can access to digital services transparently at any time in anywhere. The users can obtain the necessary network and computing services very naturally at any position. The information space and physical space will be integrated because of ubiquitous computing capability. And the ubiquitous information terminals together with the embedded system equipment will be the vehicles of e-commerce in the future.

V. E-COMMERCE APPLICATION MODEL BASED ON CLOUD COMPUTING

A. The integration of cloud computing and e-commerce

In the progress of E-commerce development, the relating factors it needs are changing into its constraints because of the limitation of enterprise size, economic strength, and technical force, which is mainly showed in following aspects:

- Talent and technology. Some technical problems such as mass data storage, data mining, information security etc., become a tough test, especially for small and medium-sized e-commercial businesses. They usually can not expand further business by reason of lacking professional technical talents and power.
- Cost of construction and operation. E-commerce activity requires a large number of computer hardware and software resources. With business expansion and growth in the amount of data, the demands to resources will surge, and cost will increased naturally. Thus, growing equipment cost and operation cost are bound to make troubles in the development of e-commerce business.
- Collaborative management between enterprises. Limited by economic strength, decision-making, personal, small and medium-sized e-commerce business often cannot work collaboratively well in supply chain. Such unsmooth communication leads to a direct result of rising costs while decreased operating efficiency.
- Limitation of terminal function. Some problems exist in the terminal equipment, for instance, its information processing capacity is limited, and safety performance is imperfect, all of which impede the development of e-commerce.

Nevertheless with the progress and application of technology, the emergence of cloud computing offers e-commerce good opportunity to develop, so we are convinced that it also can resolve the problem mentioned above properly.

- Brand-new deployment of resources. Enterprise neither needs to worry about the construction of the environment of e-commerce software and hardware nor invest enormous capital and human and material resources to construct the system. All those issues can be handed to service providers of e-commerce cloud, who can customize for users, so as to make the enterprises more focus on their core business.
- Brand-new way of data storage. In e-commerce cloud model, data storage is highly distributed, data management is highly centralized and data service is highly virtualization, all of which offer a much safer data service.
- Intelligent business policy-making. E-commerce cloud environment provides large data center in which mass data storage, high-speed computation, data mining capacity lay a good foundation for e-commerce business to develop business intelligence. And furthermore leasing pattern of resource allocation offers small and medium-sized e-commerce businesses a significant cost advantage to develop business intelligences.
- Terminal capacity is not limited any more. E-commerce cloud environment reduce the demand for access to the terminal, that is to say, as long as the terminal can access cloud, the problems of information processing, transmitting, and security can be solved neatly.

B. E-commerce application model based on cloud computing

- Operation and management based on cloud computing. E-commerce business can process data flexibly during its operation and management. So long as the demand of calculation and storage is knowable, cloud computing can be applied to realize the automation of the solutions in application, without considering the position of equipment resources.
- Brand-new building program of e-commerce software system. Through cloud platform, enterprises use e-commerce software system as required at any time and pay in accordance with service time and the scale of resource occupation, all of which save expenses. The software used are the latest version and no personnel is needed to maintain them.
- To realize the cloud marketing. Based on a powerful background data, intelligent analysis and optimal proposal of marketing should be offered to realize the cloud marketing. To minimize the operation cost, enterprises only need to focus on the core sector.
- Facilities rental based on cloud computing. Service providers dismantle the equipments and repack then rent them to e-commerce in a measurable way to collect rents, as thus e-commerce enterprises could focus on their core business process.
- Supply chain management based on the cloud computing. Cloud computing offers safe and reliable service of data storage and calculation, as thus
modify client's demands for terminal equipments greatly, make it easy to share data and distribute resources reasonably for all users, and simultaneously offers almost infinite space and service in time whenever clients need.

- Mobile e-commerce based on cloud computing. Huge distributed cloud system improves information processing capacity and calculation efficiency greatly while on-demand service and provided by cloud computing and brand-new mobile terminal brought out by 3G make users no longer worry about the security of service nor the problems of information processing and data transmission.

VI. MAJOR PROBLEMS

Cloud computing is a new practice mode applied to e-commerce. The integration of cloud computing and e-commerce has not yet reached a mature stage and still needs the test of practice. At present, there are still many problems that need to be solved.

A. Security issues of cloud platform [9]

The traditional security requirements, such as the legitimacy of authority, information integrity, non-repudiation, authenticity of identity issues are easier to be solved in the cloud computing model. However, the confidentiality of information, network security and some other issues haven’t been solved yet. What is more, some new security issues also appear.

B. Challenges [10]

For some e-commerce companies, entrusting the work to the third party contains some elements of risks. Going too much, the risks may be greater than the benefits for the business.

C. Cloud data security [9]

Cloud data security includes data security and confidentiality of privacy. Currently, private cloud, public cloud, mixed clouds and other concepts have been proposed and gradually applied to practice, but whether they are effective remains to be further verified.

D. The standard that cloud computing services provide

The cloud-based e-service model is still in a fragmented state. If we really want to promote and apply these new models, a unified industry standard should be developed.

E. Regulatory issues of services

Information processing, data storage, security, maintenance and other work are usually dealt with by the cloud service providers in cloud computing environment. Then, the service provider’s position will become crucial to properly handle the information that is related to the user’s information security. Therefore, how to monitor service providers, to regulate their services, and control their behavior are the issues that are urgent to be addressed.

F. Lack of relevant laws and regulations

Currently there are no corresponding laws and regulations to regulate the relevant e-commerce activities under the cloud computing environment. Because of lack of laws and regulations, some actual problems in application of the can not be solved and specified in time.

VII. CONCLUSIONS

Through the research we believe that, we can create an e-commerce application model based on cloud computing by means of cloud computing’s mass data storage, high-speed computing capabilities, as well as its ideal allocation and the sharing mode of resources. Thus, this creation will open up a new space for the smooth development of e-commerce. However, these e-commerce models are still in the early stages of exploration and applications. Some problems such as platform security, technical standards, regulatory and other services are not well resolved yet in practice, pending further research and exploration. Either way, e-commerce application model based on cloud computing will not stop its pace to proceed. As the cloud computing technologies become more sophisticated and the applications of cloud computing become increasingly widespread, e-commerce will certainly usher in a new era of cloud computing.

REFERENCES