Based on Cloud Computing E-commerce Models and Its Security

Shen Juncai and Qian Shao

***Abstract*—as a new concept, cloud computing has attracted the IT enterprise attention especially the e-commerce enterprise. At present, there is a great problem of environmental costs during the enterprises apply the e-commerce, but with the coming of cloud computing, all of the problem will be solved. Therefore, this article will introduce the concepts, the origins and development trend of cloud computing and on the basis of this issue, analyzing the e-commerce models. On the other hand, from the characteristics of clouds, analyzing the network security problems and solutions.**

***Index Terms*—cloud computing; E-commerce; Network storage; Network security**

I. Introduction

With the growing popularity of Internet, the service of network storage has impressive most people. The cloud storage of IBM, Google and other large IT enterprises are ready to come out. Cloud storage is the networking storage with super computational capabilities. At present, though the cloud computing is a relatively new concept to most people, to IT enterprise, it is no longer strange. More and more enterprise pay attention to cloud computing. Perhaps the users can use a laptop or cell phone to realize everything by Network service in the future. Some experts evaluated, as a new business mode, the effects of cloud computing is superior than E-commerce. The development of E-commerce makes more new competitions among the enterprises. It will supply the products and service to consumers through the Internet. This called E-commerce. It bring the huge profit to enterprises, however, the E-commerce cost is huge. Though there are some application service providers offer the service to enterprises, but the fee is expensive. The appearance of cloud computing give a new opportunity to ecommerce companies, there is no need for those companies to spend a lot of manpower, financial and material resources to set up e-business system and the maintains of the background with software. All of the tasks can be handled by the cloud computing providers. On the other side, the enterprise can pay attention to potential customers, to study how to improve the loyalty of customers and improve enterprise benefit.

Manuscript received July 3, 2011; revised July 8, 2011.

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II. The Introduction of Cloud Computing

A. The Concept of Cloud Computing

At present, there are so many definitions of cloud computing, and there are no uniform definition criteria. Garter defined cloud computing is provide IT ability with huge extension force to different external customers through the internet service; Wikipedia defined it as new label under the grid computing, It uses the public to calculate or other way to shared resources. The calculation is another alternation that depends on the server, or personal equipment to deal with the user application. News bog thinks the calculation is a concept of packing hardware and software to the internet service providers; however, many websites and organizations, including Forrester, think the cloud computing looks like a typical disruptive technology. In a word, the calculation is based on the internet for the super calculation mode, which is put a large number of information that stored in personal computer, mobile phones and other equipment and processor resource together to work cooperatively. It is an emerging sharing of infrastructure that can connect the huge system storage pool together to provide all kinds IT service. There are many factors contributed to the environmental requirements, including connection device, real-time data steaming, the use and search of SOA, opening cooperation, social network and mobile commerce and so on such as application for growth of web 2.0.In addition, the promotion of digital element component makes a large improving of IT environment scale, to further strengthen a unified cloud management demands.

So-called "cloud" actually refers to the all kinds of computing center distributed in the Internet which containing thousands or even hundreds of thousands, hundreds of millions of computers or servers. Rather than purchase of high-performance hardware or the development of various features of the software, users can use any Internet-connected devices to connection the "cloud" , and processing and storing data in the "cloud" by using the software or services it provided. The application of cloud computing model shown in Figure 1:

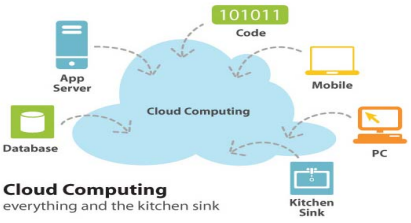

Figure1. Model of cloud computing applications

Therefore, cloud computing can be seen as the development of Parallel Computing, Distributed Computing

and Grid Computing. The main difference between cloud computing and grid computing is listed below: Grid computing focus on address the allocation of computing and storage resources, in other words, it redistributes computing and storage resources which provided by all users according to the needs of each user. While cloud computing tend to sharing the resources of computing, storage and application, Users neither need to provide computing and storage resources as grid computing nor need to purchase or develop their own applications, because everything all provided by cloud service providers.

B. The Origin And Development Trend Of Cloud Computing

The precursor of could compute is the"grid computing". As a matter of fact, as early as in the 1990 s, a grid computing is proposed, as considering making full use of leisure CPU resources, and then structures parallel distributed computing. But the SETI@home in 1999 is even more successfully put the idea of grid computing into practice, and to build a successful case. Could computing also want to use the most of computers to build a powerful computational capability? However, compared with grid computing, cloud computing has more ambitious goal, it hopes using such computational capabilities to build stable and rapid storage and other services. At the same time, in terms of cloud computing, it will probably completely change the habit of users to use computer and then make the user from the use of the application to the web to the activities. And the computer also can degenerate into a simple terminal, it is no longer need to install kinds of software's and be upset with the gyration and upgrade. The computer might just as internet connection and the various services of using cloud computing.

In the short term, the variety changes from cloud computing have less effect on personal, it may the same as the many formal technical. The clouds will give enterprises (especially small and medium-sized enterprises) with the most direct changes firstly they are able to build the application they want rapidly without worrying about the sever resources. And whether the cloud computing can make to individuals eventually, I'm afraid we need to look for the development of the future for a period. Furthermore, the cloud computing is never merely a calculation problem, and it requires integrated technology and results. But the cloud computing could change human life in the future, enabled mankind to the new technological era.

III. BASED ON CLOUD COMPUTING E-COMMERCE MODELS

The cloud computing is companied with the economic and commercial community, based on Cloud Computing E-commerce models is the specific application in the economy, commerce and management, this model finally will lead to the significant change of enterprise organization, the profits, marketing management and knowledge management, this model is called e-commerce model. It is a variety of entities that have business activities capability and demands. To cross the time limit and in the rule of improving business, making good use of the cloud technology application in the business field, taking effective use of resources and reduce costs, thus it will enchanting enterprise's kernel competitive power and eventually finished goods and services trading.

The new trend of enterprise use ecommerce service is based on the electronic outsourcing of cloud computing technology. Enterprises only need to access the software libraries that build by the services provider, then the enterprise will get the management processes and commercial database information they need, there is no need to solo invest and establish the whole internal software and procedures, the cost is relatively low, it only need to pay the rent. In fact, electronic outsourcing is a form of e-commerce that "changes by the demands". This model is use the cloud computing to make the enterprises feel like as convenient as use electricity or other public service when they use the network infrastructure and application program. It is not only can provide service for multiple clients at the same time, but also can guarantee a high degree of security of its application environment. When use electronic outsourcing models for business, the enterprises according to the "client-centered", through extroverted resources configuration, to avoid new additional hardware, software and the program development costs. That is to say, when a business IT resources meet the demands of business, during the using process, to ensure the uninterrupted operation, there's no need to put into new equipment, no longer to pay for the high cost of software and application development, only need to assign the task to any free IT resources in the clouds and to help it fulfill the task. As a matter of fact, the business mode of enterprise is use the cloud computing platform, virtual constructing the distributed resources in all different places, realize the resource sharing of application, there is no need for the enterprises to know the details of sharing and how to achieve it.

IV. THE FACE OF THE NETWORK SECURITY

A. Client Information Security

The cloud calculation is based on the existing distributed network; the internet computing is treat as a node. Computer could be a part cloud computing as soon as it connects to the Internet. Electronic business services publish the personal information data, such as bank data, identity, etc. If there is no believable privacy, so the attacker will gain the individual privacy by using multiple links between data. If we get the medical information from the purchase medical insurance for the government employees, and get the voter information from the organization department. The medical information can be regarded as anonymous, because there is no patient name and so on such only information. When the aggressor combine the medical information with the voter information, matching the date of birth, gender and the zip code, and then he will have the name and disease of voter, and received very privacy of personal information.

B. Server Information Security

Once referring to the security and privacy, the prospect of the cloud service is not so bright. If the user put personal data together with those procedures to other's hardware, it will lose control of that sensitive information. For example, an investment bank staff uses Google spreadsheets to

organize and manage social security number list. So Google is responsible for protecting this information from hackers and internal data un-encryption events. Government investigator is probably asking Google to hand in the social security number without notice the owner of the data. So once you decide to let the other ones to save your own information, it has passed the first safety gate. The next major issue is that how do you trust the company which have your personal information? From the security case, a growing number of network criminals' invasion and company lost data and other events will bring all kinds of problems to cloud computing. For example, in 2007, 45 millions credit card numbers of TJX retailer were stolen by a group of hackers；The British government lost 25 million taxpayers' records.

C. System Architecture And The Main Form

Cloud computing is a kind of computing based on Internet. In cloud computing, storage and computing will no longer be running on the local computer or web server, but running on a large number of distributed computers which from the Internet. That is, could computing give the task to large-scale computing centers that shared by all users on internet which supposed to be completed by personal computer and private data center. In the way, it fully shares the resources of computer hardware, software and other computing resources, and service resources like installation, configuration and maintenance for those resources above.

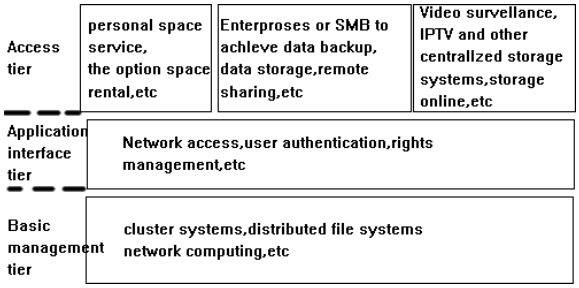

Figure 2. cloud computing system architecture model

At present, the form of cloud computing has mainly the following five:

(1) SAAS (Software as a Service): This form of cloud computing using multi-user architecture, it provides single software through a browser to thousands of customers. Google's Google Docs is a typical example of SaaS.

(2) PAAS (Platform as a Service): This form of cloud computing is another SaaS, it provide development environment as a service. Enterprises can develop their own application which can run on provider infrastructure, and provide to the user through the provider's server. The application of Face2book platform functionality and Salesforce's Force.com platform is a typical example.

(3) Web Services in cloud: This form of cloud computing allows developers to utilize the API provided by service provider develop software based on it, rather than develop all of the features of software. Google's Google Maps and Google Earth is a typical example of this kind of cloud computing.

(4) Manage Service Provider, MSP: This is the oldest forms of cloud computing (In fact it is also a Web services in cloud). In this form, the manage services basically provide applications for IT users not an end-user, such as email virus scanning service or application monitoring service, typical examples include the manage security services provided by Secure Works, IBM and Verizon, and Google's cloud-based anti-spam service. Utility computing: This form of cloud computing allows users to use the storage and virtual machine provided by service providers on-demand. Typical examples include Amazon's S3 (storage) and EC2 (virtual machine).

V. CLOUD COMPUTING AND INFORMATION SECURITY

A. Challenge

Safety is one of the main problems of cloud computing, although many research institutions think that cloud provides the most reliable and secure data storage center. The cloud seems to be safe on the surface, but you will find the "cloud" is actually opaque in terms of external if careful analysis. Cloud computing service providers did not give many details specified to the user, as its location, the staff situation, the technology used and the mode of operation, etc. When calculating service is provide by a range of service providers (that is, outsourcing of computing services may be followed). Each outsourcing service providers provide service of computing or data storage for the previous service providers by an invisible way. In this way, each service provider using the technology in fact is not controllable, there even may be a service provider access user data unauthorized by a way user unknown. What's more, although each provider of cloud computing is emphasizing the use of encryption technology (such as SSL) to protect user data, but even if the data is encrypted using SSL technology, it simply refers to the network is encrypted when data is transfered, data processing and storage protection is still not resolved. Especially when the data is processing, since then the data must have been decrypted, how to protect is difficult to solve, it is hard to win the trust of users even with the technical process isolation class to solve a certain extent.

B. Opportunities

Although cloud computing exist security problems it still brings opportunities to information security. Data is centrally stored in cloud computing modes. In this way it brings at least two benefits to data security: &reduce the possibility of data theft, damage and leakage. This is also the most discussed advantage discussed by cloud computing service providers. Data can easily be leaked before the appearance of the cloud computing. Such as portable laptop computer theft, data theft when computer repaired (such as "Pornographic" event). With the popularization and application of cloud computing, users can store their data in the "cloud". Their data can be accessed at any time according to need as long as users can access to Internet. That is to say, users simply do not need to carry the data and there was no need to maintain or repair it. & Data safety monitoring will be more easily. As data is stored in one or more data centers, data center managers can unitary data management, responsible for resource allocation, load balancing, software deployment, security control. What's

more, to conduct real-time monitoring of data security and data backup and recovery. In addition, the most benefits cloud computing bring to the information security is no more than the "cloud security (cloud security). The so-called cloud security is through the mesh of the large number of clients on the network to monitor the behavior of the software, access Trojans, malware-date information from the Internet, and automatically sent to the Server-side analysis and processing. At last, send the virus and Trojan solutions to each client.

C. Credible Cloud

At present, the most security issues to explore of cloud computing is the combination of trusted computing and cloud computing. The main idea of trusted computing is import chip security on hardware platform to improve the end-system security. That is to say, implanted root of trust to each end of a platform let the computer from the BIOS to operating system kernel level, to build trust between the application layer also. On this basis, expanding to the network, establish the appropriate chain of trust. So that we can enter an era immune of computing. When the terminal is attacked, it can achieve self-protection, self-management and self-recovery. Similarly, if implanted a trust root in the cloud, and expand the chain of trust to establish a credible cloud. It will be the basic road to address security issues cloud. Research in this area, the Trusted Infrastructure Project "hang" researched by Furan University, Hashing University of Science and Technology, Tsinghai University and Wuhan University which are China's four topes technical universities are the most noteworthy of the research. The project is dedicated of trust and reliability in the environment of cloud computing which is research and collaboration all global.

VI. The methods to Make Sure the Data Security in Cloud Computing

A. Encrypting For The Saved File

Encryption technology can be encrypted for the files; only with the password the encryption can be decrypted. You can protect your data, the data onto the others in the data center. Encryption can protect your data even when data upload onto the other data center.

B. Encrypting For E-Mail

E-mail is a still been a peeping into the format of the visit to your inbox. To ensure the security, you can use the programs like Hush mail or M Ute mail to automatically enrapt all the email you received and sent.

C. Use Reputation Service

I suggest you use the high reputation service, because there is no need for them to get his own brand name to take risks, they won't make the divulgence of secret data happening, and never share the data with the marketers.

D. Consider The Business Model

Charge of Internet applications service might be more safety than the services that support by the advertisement. Therefore, you need take the charge storage into consideration before you choose the storage environment.

E. Reading Privacy Statement

You should read the privacy statement before you put the data into the cloud computing environment. Because there are so many bugs exist in almost every item on the internet application of the privacy policy so that we can share data in some case. So you can make sure which data can be stored in the clouds computing environment and which data is kept at your own computer.

F. Use Filter

Some company like vent, Web sense and VeriTest and the other companies offer a system for the purpose of monitoring which data away from your network, and then automatically prevent the sensitive data.

VII. Solutions of Cloud Security Problem

A. Cloud computing security means of the users'

Listen to experts' advice, and choice of a relatively reliable cloud computing service providers. Users should clearly understand where the risks of using cloud services is enjoy the service. In general, experts recommend that cloud computing service providers which is large and reputable should be chosen. President and analyst Davidic who is from the consulting firm Gannet said that, the limitations of using cloud computing is that companies must take seriously the issue of sensitive, and business must measure the risk arising from cloud computing when and where it play a role. Business save economic costs by reducing the control of some of the data, that means that companies may need store self-information, customer information and other sensitive business data in the cloud computing service providers' hand. For information managers, they must make a choice whether it is worth such transactions. Based on content-aware technology can help users determine what data can be uploaded and what not upload the data, if it find that someone trying to spread sensitive data to the cloud, system will promptly alarm and block it.

Enhance security awareness. Fortunately, A little bit of common sense and some simple exercises can correct operation of such computer security to minimize the impact of errors. That avoids your confidential information on the cloud. If you really put, for example, when using online banking to avoid an internet café, school or library on public a computer, not too easily give their real contact information. You should avoid each account all use the same password, even if only to change one letter. Under cloud computing we can enhance safety awareness, it also gives us a clear understanding of the risks and take necessary precautions to ensure safety.

The data stored in the cloud should often backed up, so that when cloud computing service is attacked or data loss we can recover data.

The establishment of the enterprise private cloud. When the data is too important that no one can be trusted to manage the clouds, enterprise can build their own private cloud. Enterprise cloud is also called private cloud, It is living inside the corporate firewall which is a more secure and stable environment for cloud computing. It is provide cloud computing services for internal users or external customers, enterprise has the autonomy of cloud computing

environment. Corresponding is the "public cloud", through the cloud provider's own infrastructure to provide services directly to users, users access the service via the Internet, but the user does not have a cloud computing resources.

Save the data into the cloud after encryption. Transparent Encryption technology can help enterprises enforce security policy, ensure that the data stored in the cloud is only the form of cipher text and enterprise can control data security all by them, and no longer passively rely on the measures service providers provided.

B. Security Measures of Cloud Computing Service Providers'

State of the cloud computing service providers be regulated and monitored. CIO Carolyn Lawson who comes from California Public Utilities Commission think that: from the government point of view, we do not have all the data migrated to the 'cloud'. Because our data includes personal Social Security numbers, driver's license, and children information, etc. The public give their personal information to us hope that we are well-protected the information. If we give these messages to a cloud computing company, if the company sell this information illegally. What can we do? We have to bear the responsibility". This fully shows the crux of the problem of cloud computing security. That is, the credibility of cloud computing enterprise has become today's security of the main obstacles to cloud computing. The way to solve this problem is not dependent on the consciousness of cloud computing providers, but rather relies on the authority of the government department or departments mandatory for cloud computing company to adopt the necessary measures to ensure the safety of services. Perhaps in the near future, national government departments will formulate appropriate laws for the cloud computing business to conduct mandatory checks which include the irrational commitment Manufacturer promised to customer, how companies keep their promises, how companies treat customer data in the audit and supervision. To state the security of cloud computing vendors to regulate and supervise, as check the water' security which from water companies.

Vendors of cloud computing must adopt necessary security measures. Cloud computing vendors' internal network is very similar to our most enterprise networks. It is also implementation a traditional security measures which includes access control, intrusion prevention, anti-virus deployment, prevention of internal data leakage and network content and behavior monitoring and auditing etc.

Vendors of cloud computing adopt Grade separation of powers. In order to prevent the cloud computing vendors "peeping" of customers' data and procedures we can take parental control and process management approach. Bank is a good example. Although the storage of all bank customers bank cards the bank's internal staff can not obtain the customer's password information. Meanwhile, the banking system, there is also a process to prevent "ghost". For example, cloud computing operation and maintenance system is divided into two. The first class is staff of operation and maintenance, they are responsible for the daily operation and maintenance work, but they can not log the physical host, can not enter the controlled room, and can not reach of the user data. The second class is staff with the core competencies. They can enter the room also can log on physical host but they controlled strictly by the operation and maintenance processes.

C. Peroration

Cloud computing changed the way of services, but did not overturn the traditional security model. In the cloud computing era, the difference is that safety equipment and safety measures are not in the same location. The main responsibility for security has changed. The user to ensure the safety of service themselves in the previous, but now the cloud computing service providers to ensure the safety of services. Cloud computing reliability and availability are as important as cloud security issues, they deserve attention. Cloud computing offers the traditional security vendors with great advantage which to improve service quality and level. Solve the security problem of cloud computing is the same as traditional way to solve the security issues. It is the combination of strategy, technology and human elements.

VIII. CONCLUSIONS

At present, the application of cloud technology in the business field, there is still a distance between ideals and reality, but the cloud computing will solve the problems that exist in the enterprise e-commerce applications, the e-commerce model will have a profound effect on the global economy and change.

On the other side, from the network security point of view, in the background of cloud computing, both of the data privacy, the data dissemination or the location privacy in the location service, the protection of user's personal information is very important. Today, the data on the hard disk are still not safe enough, how to make sure the security of personal privacy could be another difficult issue for cloud computing.

Acknowledgements, This paper were supported by emphasis subject on business information management of Shanghais Business School.

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