Technical Bottlenecks and Future Application Trend of Cloud Computing

Shuying Liu
Xianyang Normal University,
Xianyang City, Shaanxi Province, 712000, China
liu_shuying@126.com

ABSTRACT
As the basis of information, computer plays an important role in the information age. Various countries have launched thorough studies on cloud computing to improve the information level. Based on the concepts and characteristics of cloud computing, the present two technical bottlenecks—network bandwidth and computer software technology were analyzed in the work. The future application trend of cloud computing were studied in three perspectives—supercomputer, the cloud of data storage and the synchronization of different devices. It's hoped to provide references for the application of cloud computing.

Keywords
Cloud computing, Technology, Bottleneck, Future application, Trend

1. INTRODUCTION
There is a gap between China and the western developed countries in many areas. But China has a great interest in the research of advanced technology with the improvement on economic and technological level. Survey shows that the advent of computer has changed people's habits in life and work after two industrial revolutions and one technological revolution. The efficiency has greatly increased by using computers. Therefore, computer technology has become the research focus of many experts and scholars. The economy and technology of China started relatively late due to historical factors. The western developed countries had controlled the related technologies such as computer manufacturing, technically blockading China for a long time [1]. The technology development of China was affected. Consequently, improving the level of computer technology is important for development. China has had a lot of communications with Western countries in various fields after decades of reform and opening [2]. Many softwares have been developed to meet the needs of application in different areas, so software technology is the basis of computer application. With the development of the Internet, many softwares have been integrated with network functions. Cloud computing is the present focus among them.

2. ANALYSIS ON CLOUD COMPUTING
2.1 Concept of Cloud Computing
Cloud computing is a gradually formed technology with the development of the Internet. Cloud refers to the network. The network connects different computers to exchange data. In the architecture of the network, each computer is like a cloud, while the network is the entire sky that connects all the computers. According to the architecture, the technology based on network is called cloud computing. Cloud computing is a revolutionary technology in computer field. The conventional computer software and hardware had limitations—they could be used only in one computer. The CPU of a computer, for example, could only be adopted for calculation in this computer instead of other computers. The performance of computer hardware couldn't meet practical needs with technological development, especially in advanced fields. Consequently, supercomputer was invented. It substantially connects a lot of CPUs, making their performance high [3]. Therefore, if ordinary computers could be connected to jointly process tasks, the corresponding performance will be better than a supercomputer. Thus different computers can process the same task based on software technology. This is the initial concept of cloud computing.

2.2 Characteristics of Cloud Computing
Compared with conventional computer software technology, the most distinctive characteristic of cloud computing is the use of multiple computers to process a single task. It has quickly developed since the advent of computer. According to Moore's law, the processing technology of semiconductor is doubled in every eighteen months, so is the performance of the semiconductor-based computers. The performance can already satisfy or even greatly go beyond people's needs in personal computers. However, it's not enough for specific areas such as the calculation of astronomical knowledge [4]. If the appropriate software technology could be adopted to connect the computers of personal users, the vacant performances could be employed. Consequently, many resources could be saved, and the requirements of supercomputer could be satisfied. Investigation indicates that the first software based on cloud computing was to realize the function of the calculation for astronomical knowledge. Since then, people have discovered the technology that not only has an extremely high computational efficiency but also can save a lot of costs. If the computers of personal users were used, supercomputer is not necessary. Thus a great deal of costs can be economized. The more the users are, the better the effects will be. Therefore, cloud computing is valued by people on account of these distinctive features. It acquires great development in a short time.

2.3 Development of Cloud Computing
Cloud computing has been formed for only a few years. It has developed fast that many technologies can't compete with. Due to the distinctive features of cloud computing, people realize its advanced nature and believe it'll acquire more extensive applications with the development of Internet. In the early days of cloud computing, the speed of network transmission was low limited by network bandwidth, largely affecting the applications.

Cloud computing is substantially the result of network applications—a software technology based on network [5]. Thus the development of cloud computing has been greatly promoted by the development of networks. Cloud computing has been constantly perfected with the applications. Currently many software companies have launched their own products of cloud computing. The most extensive application is the use of an expanding function of cloud computing instead of using all the computers for calculation. Based on network, the user can upload data and information to the network so that they could be available for other computers. The achievement of the function is not the complete cloud computing, merely adopting functions such as network hard drives. In addition to data storage, the concept of cloud system is proposed at present. It's one of the future directions of cloud computing. The hard drive of computer could be canceled, and any data could be placed in the network.

3. TECHNICAL BOTTLENECKS OF CLOUD COMPUTING

3.1 Network Bandwidth

Clouding computing is a technology based on network environment according to its name, greatly affected by network bandwidth. In its early days, only small data can be transmitted in a low speed restricted by the bandwidth. Currently the Internet has been universally applied after years of development. The use of optical fiber, in particular, has greatly improved network bandwidth. However investigation shows that with the development of computer technology, the more the stored data is, the more the space of corresponding file will be. Thus the improvement of network bandwidth is able to meet the development of computer technology. Due to historical factors, the network of China has developed for a short time. Thus the present network bandwidth is low, having a backward ranking in the world. The information industry has been valued in China in recent years. The recombination of the network operators has been launched for many times. It's hoped to promote the infrastructure construction of network in China through competition and market economy. In fact, it's a good way to promote the development of network bandwidth. The network of China has transferred from analog dial-up to optical fiber in just a few years. However, investigation indicates that the current network construction is greatly limited by the level of regional economy. The southeast coastal area has better network construction, achieving the fiber-to-the-home service. But the northwest area with backward economy hasn't achieved network coverage so far. The development of cloud computing has been greatly influenced by such network bandwidth.

3.2 Computer Software Technology

Computer has a short history of development. In its early days—a special historical period of China, the level of economy and technology were behindhand. Although China had completed the unity in the middle of last century, its development pattern had been closed for a long time. What's more, the research on computer technology was few with technical blockade of the western countries. The economic and technological levels have been greatly improved with the reform and opening and the more communications with the western countries. Currently China has the maximum computer users of the world with more than 500 million net citizens. However, analysis shows that the current computer software technology of China is poor. Almost all the softwares available in the market are developed by foreign companies. With the attention of the government, many targeted policies have been introduced in recent years to encourage the development of software companies. These companies have studied the latest software technology to catch up with the western countries. As an advanced software technology, cloud computing is bound to become the focus of the study. Companies such as 360 and Baidu have launched their own cloud-based softwares. Cloud computing was produced by the development of computer software technology. Thus the level of software technology is inevitable to be improved in the study on cloud computing. The low level of software technology in China has greatly affected the development of cloud computing.

4. ANALYSIS ON FUTURE APPLICATION TREND OF CLOUD COMPUTING

4.1 SuperComputer

In the early days of cloud computing, personal computers were connected to simultaneously process a complex task. It's an effective solution for the task that couldn't be completed by a single computer. Afterwards, supercomputer emerged with the development of computer hardware. At present, many laboratories have their own supercomputers for the accomplishment of complex tasks. But survey has found that supercomputers require high costs. In the formation of a supercomputer, the central processing units on enterprise level were adopted. They are expensive and numerous. Cloud computing can be used to link many personal computers. In daily use, the users watches videos, chat and play games while leaving many performances of the computer unused. If the idle performances are put together, the corresponding performance will be stronger than that of any supercomputer. And we only need to create a server and cloud-based software. Therefore, cloud computing will have a wide prospect. Although it's feasible to create such supercomputer in theory, the practical achievement is difficult at present. Firstly, a client requires to be installed by the user to achieve the functionality. The client won't cause harm to the computer. But it will take advantage of the idle performance, which is rarely agreed by the users. Secondly, the computer of the user is inevitable to be connected to the network. Thus a certain amount of network bandwidth will be taken up during the operation of the client.

4.2 Cloud of Data Information

Individual and business users mostly use computer data. The data information will be stored into the computer before processing certain tasks. The data written on paper would be lost when affected by environment. However, it's easier for the data of computer to receive damages in a sense. If the data of business users was lost, the efficiency of enterprise would be largely affected. The effects on the special departments that have confidential information would be more extensive. Therefore, the protection of the data information stored in computers has been studied by many experts and scholars. The conventional computer usually uses an external memory for data backup. Many companies would establish two servers. Threatened by the viruses and Trojans, the data information of the computer is in great danger. With cloud computing in recent years, cloud storage such as network hard drive has generated to store data information on network. Consequently, there would be no loss of data even if the computer was attacked. However, the present network hard drive

has been restricted by network bandwidth. Many large data can't be stored on the network, which will be surely solved in the future.

4.3 Synchronization of Different Devices

Many microcomputers such as smart phones has generated with the development of computer technology. They can intelligently handle the tasks with a wider application. Investigation has found that the current users of smart mobile devices are more than that of computers. Thus the future development of cloud computing can't leave mobile devices. For the user of both computer and mobile device, the synchronization of the devices has become an important issue. The system of Apple is good in this field. With the use of the cloud-based icloud software, cellphone data can be uploaded to the network. Afterwards, the data is available in computers and other mobile devices when logging in with the same account. However, computer data can't do that at present. There is no doubt that data synchronization will be better in the future with the development of related technologies. Based on cloud computing, many companies have developed the corresponding cloud-based software for the needs of data synchronization between different devices. Limited by network bandwidth, the current effect is poor since only some small data such as contacts can be synchronized.

5. CONCLUSIONS

As an advanced technology, the development and application of cloud computing has been valued by people. Due to historical factors, China has low level of computer technology and a large gap in cloud computing compared with the western countries. Due to the distinctive characteristics, cloud computing has been valued by people since its advert. Limited by network bandwidth and software technology back then, the application of cloud computing was small. Several simple softwares were developed based on a few users to achieve the functions such as astronomical calculation. Cloud computing has greatly developed with the development of computers and the popularity of the Internet. However, it's still restricted by network bandwidth and software technology. It's hoped that cloud computing will have more applications in the fields such as supercomputer with its technological improvement.

6. REFERENCES

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