The Application of Cloud Computing Technology in the Construction of Campus Network

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Abstract

As a trend of network development, cloud computing will play a major role in the construction and the application of campus network in the future. With regard to the problems in the campus network, such as the data storage, resource integration and data security, an in-depth analysis concerning the role and advantages of cloud computing technology is very valuable in the construction of campus network.

Keywords: Cloud computing; Data storage; Resources integration.

1. Introduction

Currently, in many universities and colleges, the campus network architecture is still used in the traditional web server model, in which the servers are operating independently. Although some servers provide computing resources operation application system, the resulting data are stored to the local disk directly. Thus the problems, such as many servers, large capital investment and waste of resources, arise accordingly. Cloud computing technology is to integrate the all the computing resources, networks and storages together, via some virtual and automatic technology to define each service so as to apply to the final users. Through the application of the computing technology in campus network, not only can we solve the problems as large capital investment and resources wasting, but also to provide a more secure data storage.

2. The concept and characteristics of cloud computing

2.1. The concept of cloud computing

The concept of cloud computing, put forward by Google Company, is a newly emerging business model. It will distribute the calculating tasks into a large computer resource pool, so that all the application systems can access to the computing power, storage space and a variety of software services according to the specific needs. The narrow sense of cloud computing refers to the necessary resources which the network obtained through easily extensible ways; cloud computing, in the term of broad sense, refers to obtaining the necessary services by easily extensible manner. This service can be linked to the Internet and software, as well as any other services, and it turns out to be virtual, secure and reliable with such a large scale.

2.2. The characteristics of cloud computing

- **Large scale**.

For example, there are millions of servers in the Cloud Computing Centers in the big companies, such as Mi-

crosoft, IBM, Google, and Yahoo. These Cloud computing centers offer the users an unprecedented computing and storage capability through the management of these large-scale servers.

- **Generality**.

Cloud computing is not tailored for any specific applications. With the support of the 'cloud', various applications of the myriads can be constructed. One 'cloud' can support different applications at the same time. Compared with the traditional system, the cloud's versatility makes the resources utilized at a much higher rate, so that the users can fully enjoy the advantage of low cost, only costing several hundred dollars and a few days, rather than tens of thousands of dollars and a few months in the past.

- **Low cost.**

Due to a special fault-tolerant measures and an automatic centralized management, the 'cloud' will decrease the cost of data management fees for a large number of enterprises. At the same time, with the service running in the clouds, local computing needs are lessened, and the users do not need to upgrade their computer configuration as before. Consequently, a cheap internet terminal can make the users access, build and use the information they need.

- **Virtualization.**

Virtualization technology is the biggest characteristic of Cloud computing. Through virtualization technology, users can run several virtual machines on one server, and save the IT spending and fasten the processing speed.

- **High scalability**.

The scales of a 'cloud' can achieve dynamic stretching and shrinkage to satisfy the growing needs of applications and the users' scale.

3. The problems existing in the construction of college campus network

3.1. The problems existing in the infrastructure construction.

At present, in many colleges and universities, in order to fasten and promote the information construction, large acquisition hardware infrastructure are purchased, such as various servers, switches, data storage devices with several million. However, the lag in software construction and professional management personnel makes most of these hardware facilities in an idle state, which virtually raise the cost of information construction.

3.2. The deficiency and low utilization rate in the construction of information resources.

The core of education informatization is the construction of information resources. Yet currently, the construction of information resources in the universities is still far behind. Although there are valuable information resources in each university museum, science museum, exhibition hall, laboratory, library, store, these resources are mostly remained in the material, paper form or an independent application system, making the sharing of information resources impossible and in turn seriously influencing using efficiency of these resources.

3.3. The lack of a unified sharing platform

Because each department or each branch has different needs for information collection and processing, it is necessary to build different management information systems, such as a financial management system, educational management system. Owing to the principles of data confidentiality, it is unable to provide a unified interface, resulting in the maintenance of the unified system cannot be provided

and a large number of investment in professional personnel and funds. It is difficult to bridge between the application systems and the application system integration proves to be difficult. All these factors largely promote the formation of the information isolated island. Therefore, a higher level of information processing, such as data mining, data integration, data acquisition and comparison of decision requiring is more difficult. Cloud computing technology can establish a unified sharing platform, where various departments can position their applications through the virtual platform, with back platform to be processed by cloud computing center. It will greatly simplify the complexity of user deployment and the complexity of maintenance, and also improve the utilization rate of resources.

3.4. Security problems in campus network

Currently, the chief problem in campus network security is caused by the abuse of the pirated software. There are many security vulnerabilities in those software, such as hackers, Trojans, virus. On the other hand, in some schools, the network management is not perfect, management system is not perfect and relevant management personnel are not skillful enough.

4. The application of cloud computing technology in campus network

4.1. To construct network learning environment,to improve the learning efficiency

Cloud computing enables students to build personal learning environment quickly and easily, and it supports and promotes development of the personal learning environment and the informal learning. With the support of cloud computing, the basic elements of personal learning environment, such as text, audio and video, training can be realized and managed by the cloud service. Students can access the data and service to build their learning environment, and they do not need to grasp the complex software, which greatly reduces the threshold of network learning environment construction. Cloud computing technology allows people to access information and other services whenever and wherever they are, and it enhances network learning flexibility and agility， reducing the cost and difficulty of Web learning resource and service and creating rich learning contexts, which is helpful to improve the learning productivity and the learning effect. Cloud computing solutions not only can let students participate in the study, but also allow them to manage their own projects and workload in a better way.

4.2. To build the data center of campus network

At present, data centers with a single server or server cluster are used in many universities. The construction of data center appears serious resources waste during the use and management. There are also some problems in constructing information sharing, and data center of cloud computing appears to be important, for it can provide a new way for resources integration of higher education. Based on SOA architecture and the SAAS, the data center uses conventional data synchronous way to integrate business systems, so as to complete the difficult and complicated tasks in the university information integration. The SAAS system and Cloud computing can provide users a function module and the data synchronization mechanism can exchange and communicate among different systems, which can reduce the complexity and workload in the process of developing. To use Cloud data centers can effectively eliminate the ‘island’ phenomenon in the information system. Therefore, to establish a cloud com-

puting center is very necessary in the colleges and universities.

4.3. To establish secure cloud computing platform in campus network

Owing to the exchange uses of computers and the storage devices, campus network rooms, laboratories, classrooms have become the main spreading channels of the virus. It is impossible to guard against and the antivirus software is not effective enough to kill the virus, sometimes even manslaughter risks arise. With a secure cloud computing platform, we no longer need to worry about data loss, virus attack and other issues. The teachers and the students only need to put their data and materials stored in the cloud. No matter where to go, only with the Internet, they can easily get access to the related information or services stored in cloud. There is strict access control strategy, which can help us share data with the specific people. At the same time, the centralized data storage makes it easier to realize safety monitoring: by storing the information in one or a plurality of the data centers, and the corresponding management of the data can be conducted, such as allocating resources, balancing load, deploying software, controlling security, maintaining the normal operation of the users' data, so as to provide enough storage space. Cloud services is as easy as using a local computer.

5. Conclusion

As a new business model, till now there is no unified standard and way of realization for cloud computing, for it is highly enjoyed by many enterprises because of its flexibility, efficiency, low cost and energy saving. Along with the increasing attention on cloud computing as well as the maturity of cloud computing technology and the popularity of virtualization and SOA, flexible and scalable infrastructure can eventually make each campus a cloud node, which will be a long-term trend. As a powerful means in the integration of educational resources, cloud computing is bound to have more and more applications in the Institutions of higher learning and education network.

6. References

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