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Research of high quality resources sharing platform based on cloud computing

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ABSTRACT

The concept of cloud computing was first put forward in 2007. Efficient operational capability, infinite storage capacity and effective allocation and dispose of resource are the greatest advantages of cloud computing. After put forward, more and more people begin to study cloud computing, especially in universities which apply cloud computing to the construction of superior resource sharing platform positively. This research put forward a superior resource sharing platform which can realize the informationization, networking and automation of education, through a further study of existing superior resource sharing platform. The platform can provide a strong technical support for a better and faster service, a rapid development and a major revolution in universities. Applying cloud computing to superior resource sharing platform, this research put forward a superior resource sharing platform based on cloud computing. This platform can integrate service information resources of education and improve service quality of universities. Public education information service platform based on cloud computing can be realized by analyzing and studying characteristics of cloud computing and superior resource sharing. Practices show that this platform made great progress compared with information service of traditional education in respects of informationization, networking, reducing of education cost and flexibility. It could be argued that efficient computing capability and powerful computing and storage capacity are fully manifested on public education information service platform, making an overall improvement of superior resource sharing for education.

KEYWORDS
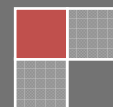
INTRODUCTION

With the rapid development and popularization of network, education model has dramatically changed and distance education is becoming an essential teaching method in teaching[1] as more and more people choose distance education as a main learning method. However, with vast territory and a large population in China, the distribution of computer and network resources is not balanced, so development and extent of distance education are incomplete. In practical use of, distance education platform exposes different kinds of problems inevitably, which need to be improved and updated. The concept of cloud computing was first put forward in 2007. Efficient operational capability and infinite storage capacity are the greatest advantages of cloud computing. Therefore, after put forward, more and more people begin to study cloud computing. This research studies the advantages and feasibilities of the application of cloud computing on distance education platform. Through comprehensive demonstration, the research raises the application of cloud computing on distance education platform in order to overcome shortage of traditional distance education platform with the help of powerful computing and storage capacity[2]. It was found in practice that distance education platform combined with cloud computing make a great progress in improvement of teaching quality, education resources sharing, reducing of education cost and teaching flexibility, which is more conducive to widespread of distance education.

THE ADVANTAGES OF SUPERIOR RESOURCE CONSTRUCTION OF EDUCATIONAL INFORMATIONIZATION BASED ON CLOUD COMPUTING

At present, network speed in China is not fast enough and networks and servers can't bear centralized access. Schools developing the distance education usually have many redirection servers for learning center outside of school which apply B/S mode. The whole construction is shown in Figure 1. These schools build central server of learning center in headquarters and other learning centers build teaching resources server themselves. Learning resources including document and video are stored on all background servers of this system provided for users freely. At present, there are two obvious shortages of this operation mode from the effect[3]. (1)With big volume of learning resources in education system, the network speed in China can not satisfy the resources transmission. Thus some resources on the servers on this platform can't be synchronous with resources on other servers because of transmission, which makes learning resources incomplete and materials not updated. Therefore, learners can't get latest knowledge in time. (2)Under this combination, students have to register repeatedly because the account can not be shared among servers. In other words, students can't learn and download the resources on one server by the account registered by another server. Students have to register once again when they access another server, which is rather troublesome[4]. The new education platform put forward by this research take full advantage of cloud computing, putting resources on each center server on "cloud" tohether. Distance education resources provide the function of automatic search and choose the best way to transfer data intelligently. Servers can be standby for each other and can be switched. Once a server is broken, platform system will switch to the nearest server automatically which can't be felt by users. This design keeps students from repeated registrations for different servers. Once registered, all resources on servers can get, realizing resources sharing to the greatest extent. At the same time, reliability of the overall platform system can be improved a lot. The system applies the idea of modular design whose logical structure is clear. The integration of cloud computing significantly improves service capabilities of this system. What's more, usage and interface can be adjusted freely according to students' real situation, with strong flexibility and practicability as shown in Figure 1 below.
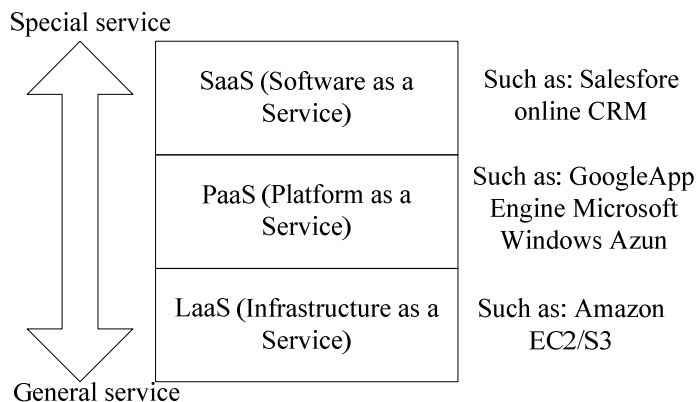

Figure 1 : Service model of cloud computing

The distance education platform in this research is composed of base layer, service layer and application layer, with five modules including data processing, monitor, process procedure, decision and basic module. Resource database of base layer needs to ensure the reliability and stability of basic resource database by various techniques of hardware, software and

vitality[5]. Base layer provide basic support for service layer and application layer such as computing processing power and memory function. It could be argued that base layer is just like the energy source of platform system. Because package handling module is on the application layer, application layer is the core of this platform system. Data processing can be divided into smaller modules of comprehensive supervision, right distribution, business process, automatic check-in, file processing, information collection and search. Application layer mainly provide interactive interfaces for students and other procedures. Service layer includes all kinds of service functions such as file transfer service and data query service. The next section focuses on the design of core modules of this system.

It has been mentioned that the core module of distance education can be divided into smaller modules of comprehensive supervision, right distribution, business process, automatic check-in, file processing, information collection and search. As shown in Figure 2, each module in the system has a one-to-one relationship with tenants. A module just can be started by relevant tenant. Identifier reaches each module by metadata channel and modules access needed resources combining with functional area of metadata. Configuration tools of process procedure module only support the process procedures in departments or platform system. Other procedures are not supported currently. The module of automatic check-in is realized by methods of Digital Signature Technology and watermark identification. The function of file processing is adding or transferring files on servers which are kept in the same table. Tenants are independent of each other. It can also manage some special electric files. For example, it can clean due files or temporary files and activate relevant documents. The function of search module is making users to enjoy better search service by collecting and extracting relevant information. Students can search needed materials in database on education platform using this function.
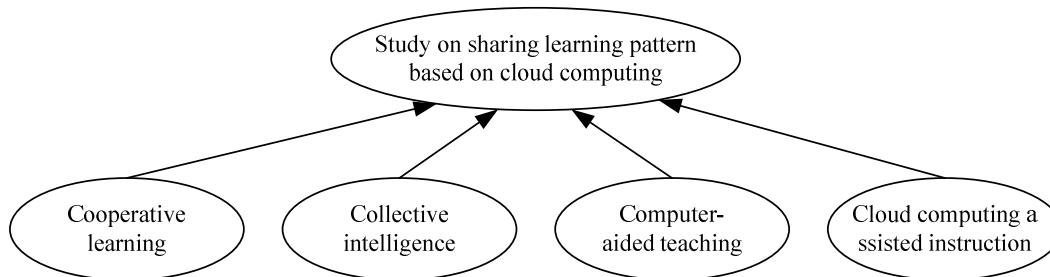

Figure 2 : Theoretical basis

THE DESIGN OF SUPERIOR RESOURCE SHARING PLATFORM OF PRINCIPLE & APPLICATION OF DATABASE BASED ON CLOUD COMPUTING

Security requirements of data

Without human management from schools, distance education platform based on cloud computing make use of background server and database management system to manage date automatically. The maintenance and update of the system is also accomplished by special service providers. Schools needn't maintain and update it anymore. Cloud computing can not run without the Internet. Transmitting of students' requests and data transmission are realized through, so data security is hard to be guaranteed during transmission. Security requirements of data on distance education platform are not as important as that in business system, especially in financial system. However, privacy data like personal information of teachers and students, examination papers, keys to examination papers and teaching documents can't be made public. Therefore, security and reliability of sensitive data should be ensured during the design of new distance education system.

The system in this research is based on B/S mode, with SaaS provided by Web browser. SaaS platform has four layers including interactive layer, processing layer, service layer and information storage layer. Tenants use interactive layer to login system trough browser. Processing layer can handle different requests from users, making the system more flexible. The function of service layer is security services, friendly interface and services of configuration information. Information storage layer usually use shared database and separated data to improve the security of database. In order to make the interface and functions configurable, the allocation of education resources effective and flexible, the system in this research designs a request-oriented scheduling mechanism. Tenant request can be divided into three types roughly. The first is request of interface look, which will be responded to by relevant appearance module. This request need SaaS show specific information without change of service state. The second is request of system configuration which need SaaS revise relevant configuration. Because the design of configuration module is separated from service module, request of configuration, just like in service module, don't change service state. The last is request of education resources, which need change service state. For example, if a user submits a request of learning video, the operation will start the module of procedure management and the platform will allocate resources in system to keep lifecycle of the video. Making use of workflow engine and rule engine, SaaS can deal with various requests smoothly and make better arrangement of applications and services to support resource schedule. By studying major service process, the system uses modular design to divide the distance education platform several logical function modules based on cloud computing. The management and application platform of digital teaching resources Based on Cloud Computing is shown as Figure 3.
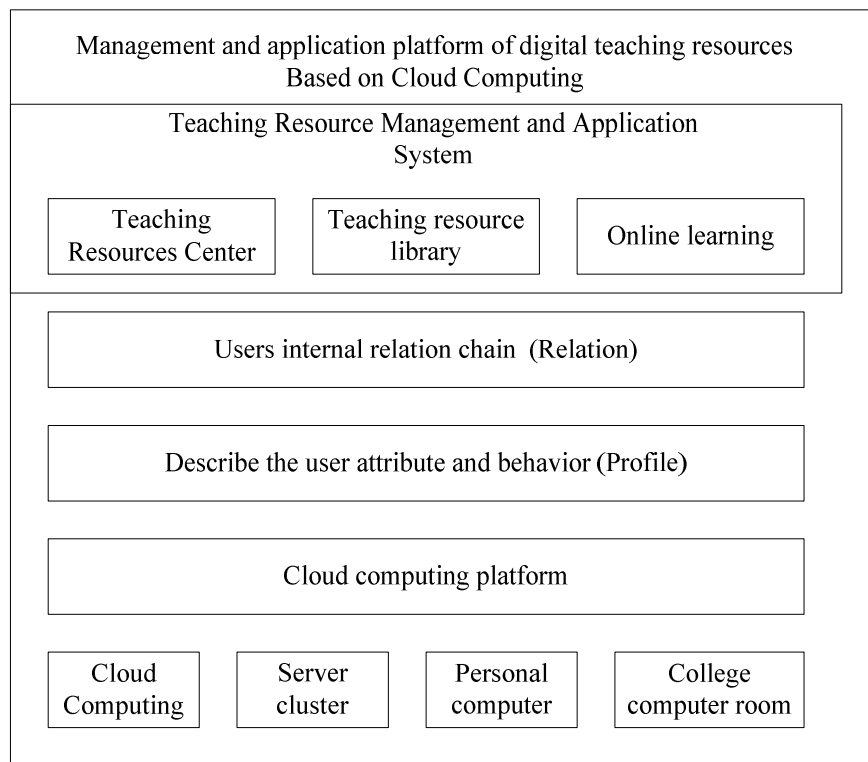
Figure 3 : The management and application platform of digital teaching resources Based on Cloud Computing

Data isolation methods on education platform

There are usually 3 isolation methods. The first is database isolation, which means independence between users. One account corresponds to one database, which is a complete isolation and ensure data security to the greatest extent. The only shortage is much money is needed. The second is data model isolation and database sharing. With only one database on the whole education platform, each account has an independent model. The isolation provided for each user is abstract logical isolation of data, not real physical isolation. A database can support many users which reduces system cost. With abstract isolation, a logical relation is relatively complicated, so there are some difficulties in management. The third is sharing of both data model and database. With only one database and one data model, identifier (user ID) should be added on the service table which needs to be isolated to ensure isolation. This is the highest level of database sharing with lowest system cost, but the isolation isn't complete. The shortage is it will increase the burden of developers with a great increase of codes about security and reliability, and data on platform is easy to lose. With a overall consideration of cost and security, this research choose the second which has a lower cost and adequate security, meeting the requirements of distance education in China. To verify the reasonability of this platform, platform VC + +6. 0 and database software SQL2008 is applied in this research.

The following is the design and implementation of each module on this platform. Application interface contains 3 parts including login interface, "community" management, cloud storage, cloud computing and platform control[7]. Users upload their own information by registering on the login interface. After logging in the system, users can make use of the resources on platform. Platform provides relevant resources to users according to their request. Users submit finished registration information and "community" will manage them. All resources on platform can be found in "community". The essence of "community" is a categorization in which users with similar requests are abstracted to tenants in the same "community". And they are given managers. In "community", users must comply with community management rules and make use of community resources, the resources on platform, according to a fixed process. Managers get requests of users according to their activity in "community" to recommend relevant resources to them. In the module of clouding computing, all learning resources are stored on cloud Server. With strong computing power, clouding computing can meet the demand of frequent access by many users. What's more, loud service module makes users spend less money on bandwidth, firewall and load balancers. Some big problems like network security, complex computing, and data integrity can also be resolved with the help of clouding computing. The module of clouding computing exchanges data on bottom layer with XML technology[7]. There is a interaction function with which teachers can answer questions for students directly on the platform in this research.

System management module can control all the resources on platform, including the monitor of other modules in the system and the activitiea of students and teachers, so all opertions and resouces on platform is transparent to this module. Module information is shown in Figure 4. This distance education system has following advantages through test. Firstly, the system has strong service capacities, storage capacities and the computing capacities of complex problems. This system shows the advantages of clouding computing to improve capacities of sharing and computing of distance education. Secondly, this system makes it possible to build a national distance education platform in China and distance education

centers in different regions can also build resources with a unified plan, which avoids resources waste and reduce education cost largely. Finally, the system can allocate learning resources flexibly according to different requests from users. Special learning systems can be custom-made in accordance with requests from users without changing code and independent deployment.
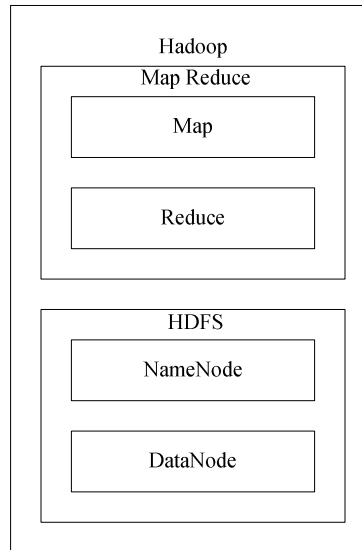

Figure 4 : Main Structure

CONCLUSION

This research put forward a superior resource sharing platform which can realize the informationization, networking and automation of education, through a further study of existing superior resource sharing platform. The platform can provide a strong technical support for a better and faster service, a rapid development and a major revolution in universities. Applying cloud computing to superior resource sharing platform, this research put forward a superior resource sharing platform based on cloud computing. This platform can integrate service information resources of education and improve service quality of universities. Public education information service platform based on cloud computing can be realized by analyzing and studying characteristics of cloud computing and superior resource sharing. Practices show that this platform made great progress compared with information service of traditional education in respects of informationization, networking, reducing of education cost and flexibility.

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