Application and Implementation of Education Management System Based on Cloud Storage

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Abstract. This paper studies the research and design of education management system based on cloud storage. Cloud storage is a storage strategy that gathers a large number of different types of storage devices in the network through application software to work together and jointly provide data storage services through cluster applications, distributed file systems and other functions. In the research on massive data storage of university education management system, we deeply study cloud storage technology, compare various data layout algorithms, and propose an improved data layout algorithm combined with consistent hash algorithm, improved consistent hash algorithm and sieve algorithm, so as to improve data access efficiency and meet the requirements of dynamic scalability of storage space of cloud storage platform, At the same time, a local duplicate data deletion algorithm according to the characteristics of teaching data is proposed to reduce the data redundancy. Information construction in Colleges and universities is the key factor to realize modern education. In the process of information construction in Colleges and universities, due to the similarity of teaching data, there are a lot of duplicate data between the education management systems independently built by colleges and universities, resulting in a great waste of storage resources, and the teaching data is growing exponentially, which brings great storage pressure to the traditional data center.

Keywords: Cloud storage · Teaching data · Management system

1 Introduction

Education management is to use teaching management measures to guide teachers to achieve teaching objectives through administrative departments and administrative mechanisms. Management measures, objects and personnel constitute three elements of educational management, each of which plays its own role in management. In the actual implementation process, although the education management has achieved remarkable results, there are still many problems. Therefore, under the new situation, the education management of colleges and universities should establish correct objectives, formulate and improve management measures. This paper will discuss the current situation and mechanism innovation of efficient management under the new situation, in order to improve the level of educational management in Colleges and universities.

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The management concept and content are relatively old, which seriously affects its efficiency. At present, most colleges and universities in China follow the education management system in the period of planned economy. Although they have experienced many reforms, this education system has been deeply rooted, and the reform has not fundamentally changed it. Therefore, the management concept of colleges and universities in China is ten times old. The content of the existing rules and regulations is relatively old, which has been unable to play its due role, resulting in the low effect of management. Therefore, the politicization of the management mode has been inconsistent with modern higher education, the management concept of management staff has not changed with the reform of education, and there is a lack of educational thought of "people-oriented" and "student-oriented". The backward management concept and outdated content will directly lead to the low efficiency of teaching management, and then affect the teaching effect. The means of education management are relatively single, and the management system is relatively backward [1]. At present, China's colleges and universities still use the management method of experience teaching, so the means of education management is very single and the method is very old. They pay too much attention to the standardization and institutionalization of work, which can not meet the needs of social development. Moreover, at this stage, the means of educational management are lack of scientificity, and all the work is completed by manual management. It can be said that the educational management of colleges and universities in China has not kept pace with the progress of science and technology. The market competition in today's society requires the transformation of talents. The original education management system can no longer guarantee the cultivation of excellent and cutting-edge talents. Therefore, the education management model needs to be further reformed. In the process of reform, we should pay attention to people-oriented and the dominant position of students in the process of education. 1.3 the level of education management is low and lack of scientificity. At present, although China's colleges and universities have increased a lot of human, physical and financial resources in the work of educational management, they have not achieved corresponding results. With the continuous reform of education, the school running system is also constantly improving and perfecting, and the function of educational management is also changing, constantly tending to service and guidance. At this stage, in order to better realize educational management, we must cultivate more capable educational management groups to get out of the misunderstanding of "management for management" and further promote or even achieve the goal of "management for no management". However, the educational management of colleges and universities in China is lack of scientificity. Many management systems are only superficial forms and can not play any role, so that the educational management can not meet the requirements of the new era.

Innovate the educational management mode of colleges and universities. At present, the educational management mode of colleges and universities in China is relatively backward, which can not meet the requirements of talent training in today's society. With the continuous reform of education and teaching ethics, its management concept is also constantly improving. In order to make education management better serve the training of talents, we must draw lessons from successful and excellent management modes at home and abroad, extract the essence and remove the dross [2]. Only by constantly improving and improving in this way can we find the most suitable management mode for our colleges and universities and better cultivate talents who meet the needs of modernization. In the construction of management system, we must strengthen the management system and guiding function. Therefore, the reform of education management system should be weakened on the basis of retaining the original functions. The purpose of weakening is to better highlight that education management is to serve students. When guiding the innovative education concept, we should pay attention to the personalized development of students, implement the "people-oriented" student view, teach students according to their aptitude, and create a learning environment of independent learning, equality and freedom for students [3].

In the past two years, cloud computing technology has developed rapidly. Its core idea 3 is to provide software, platform and it equipment resources in the form of services. The goal is to integrate a large number of cheap physical computing resources with low performance into a powerful computer system with high computing power, large storage capacity and powerful functions, so as to provide a unified service interface. Users can pay for software, platform or underlying hardware equipment according to their actual needs.

2 Related Work

2.1 University Education Management System Architecture Based on Cloud Storage

Cloud storage is a flexible concept. It is an extension and expansion of the concept of cloud computing. It refers to a technology that allocates storage resources in the network on demand. Similarly, it also refers to a technical idea of integrating storage resources through software to work together. This idea has absolute advantages for making full use of computing resources and storage resources. The cloud storage platform can process tens of millions or even billions of information in a few seconds to achieve the same powerful network service as the "supercomputer". The cloud storage model is shown in Fig. 1.

Compared with traditional storage, cloud storage has the following three advantages:

1. Storage management can be automated and intelligent. All storage resources are integrated, and customers see a single storage space.
2. It has the function of automatic allocation of storage space through virtualization, and can improve the efficiency of storage space re allocation.
3. Cloud storage can achieve scale effect and elastic expansion, reduce operating costs and avoid resource waste.

Compared with traditional storage, cloud storage has less transmission speed than traditional storage (this feature may change with the commercial use of 5g), but it is relatively more intelligent and can access video data more intelligently. Moreover, cloud storage also has advantages in cost and can achieve the purpose of storage through low-cost operation and maintenance [4].

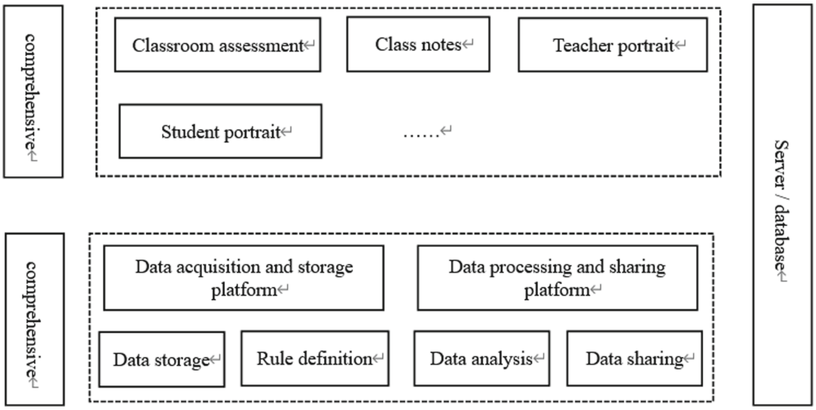

Fig. 1. Cloud storage model

The university management integrated query system based on cloud storage architecture is mainly based on the idea of cloud storage, combined with the basic architecture of cloud storage and the actual situation of the query system, to achieve the following system objectives:

(1) Distributed storage based on cloud computing does not use database, and files are stored with high compression ratio. Plan during system implementation use the idea of distributed storage to support the reuse and heterogeneity of pcserver, blade machine, minicomputer and other machines; Support management and processing of dynamic scaling and dynamic expansion, and realize application level disaster recovery at the same time. In this way, it can not only reduce investment, but also adopt data storage with high compression ratio to save storage space.
(2) Diversity of management support. The system will eventually support bill data storage and query.
(3) High speed query. The first construction goal of the system is to use the idea of search engine and memory index grouping mechanism to improve the system performance.
It is required to achieve high-speed concurrent query and provide quasi real-time query, so as to improve the real-time experience of users.
(4) Unified query platform. Through a unified and centralized data storage platform, it can meet the needs of comprehensive information storage, management and query of each subsystem in the boss system.

Provide a unified and centralized management platform for colleges and universities, with the goal of comprehensively supporting and meeting the needs of customers' management and comprehensive inquiry, and provide high-quality services [5].

The comprehensive query system of college education management based on cloud storage architecture includes all four layers of general cloud storage architecture model, namely storage layer, basic management layer, application interface layer and access layer.

The storage layer is the most basic part of the system. It specifically carries out unified read-write storage management for the storage devices in the system. At the same time, it is also responsible for the status monitoring and fault maintenance of hardware devices, and collecting the performance status information of the system during operation. At the same time, the file organization and management of the system is also the main work of this layer. The basic management layer is the most critical part of cloud storage. It realizes the collaborative work among many storage devices in the storage layer through the functions of cluster, distributed file system and resource scheduling, and enables multiple storage devices to provide services with the same service interface and provide stronger data access performance. The application interface layer is the most flexible part of the whole cloud storage system design. The cloud storage operation unit can develop multiple application service interfaces according to different service types, flexibly provide different application services, and provide more powerful system management, query and monitoring services for other personnel who use the university education management query interface for application development and design. The access layer will enable any college education management user to access the system through this layer. At the same time, the system also provides many different access methods, such as facilitating the call of different access methods.

Data server node: this type of server node includes functional modules such as data storage management, data writing, data extraction, data copy replication, heart-beat detection, status report, etc.; The data storage management module is used for the management of the file system of the data server. The data writing module receives the writing request from the outside and cooperates with the index management module to write the data [6]. The data extraction module receives the external request and reads the relevant consumption information for feedback. The heartbeat detection is used to send the heartbeat information to the central control server, Indicates that the data server is still alive and can provide services. If the heartbeat signal is not sent to the central control server within the set threshold time, it will be recorded that the data server has been down. Status reports are used in conjunction with heartbeat detection.

2.2 System Technology

Ajax technology is the abbreviation of asynchronous JavaScript and XML. It is a web development technology for creating interactive web applications. It was first proposed by James Garrett. The Ajax method is a collection of all technologies that can be used in the browser through JavaScript scripts.

Ajax technology is not a new technology, but a combination of four existing different technologies. Ajax actually follows the request/sever network response mode. Therefore, the basic process of this framework is: object initialization $\rightarrow$ send related requests - > server data reception $\rightarrow$ server data return $\rightarrow$ client data reception $\rightarrow$ modify the page content of the client. But this process is asynchronous.

(1) Capture events for a page

When the data or content of the page in the browser is changed and the user clicks the submit button, the corresponding event will be triggered. For example, < ASP: button id = “btnok” runat = “server” text = “submit” onclick = “btnok_click”

> < / ASP: button >, when the mouse clicks, the corresponding btnok will be triggered_ Click event.

(2) XMLHttpRequest to initialize

After capturing the user's event, if communication with the server is involved, we need to instantiate XMLHttpRequest [7]. At this time, we need to note that different browser types or versions have different ways to instantiate them. For example, we should fully consider the implementation of various types of ActiveX controls in the form of Mozilla browser. Therefore, we should fully consider the implementation of various types of ActiveX controls in the form of Mozilla browser.

(3) Send request to server

After instantiating the relevant XMLHttpRequest, we need to specify the corresponding response processing function, that is, the callback function after the server responds, so that we can send an HTTP application request to the server.

(4) Receive the return information from the server

After sending the request to the server, we need to check the status of the XMLHttpRequest object through the corresponding processing function. When the status shows that all the information returned by the server has been accepted, we also need to judge whether the corresponding returned status code is correct, so as to judge whether the returned data is correct.

(5) Update the current page status.

Through the received data, XMLHttpRequest will be processed in the following two ways: some unstructured data information will be used as strings, and some structured data information will be used as XML documents.

3 Research and Design of Education Management System Based on Cloud Storage

This paper studies the design of education management system. Due to the limitations of higher education teaching means, the traditional teaching mode can not better meet the deeper learning requirements of students. The scientific application of employment oriented teaching mode can well mobilize the learning enthusiasm of college students, give scientific play to their subjective initiative, and promote the realization of College Students' knowledge, ability and quality objectives. According to the training objectives of higher education, scientifically evaluate the comprehensive quality of students, so that most students can have healthy psychology and good morality, and become talents needed by the country and society. Cloud storage is a network online storage mode, that is, data is stored on multiple virtual servers usually hosted by a third party rather than exclusive servers. Hosting companies operate large data centers. People who need data storage and hosting meet the needs of data storage by purchasing or renting storage space from them. According to the needs of customers, data center operators prepare storage virtualization resources at the back end and provide them in the form of storage pool, so that customers can use this storage resource pool to store files or objects by themselves [8]. In fact, these resources may be distributed on many server hosts. At the same time, we should make college students have a strong interest in the learning knowledge and research methods of this major, so as to cultivate their innovative thinking and realize college students' vision and pursuit of a better life. The task of education management in Colleges and universities is arduous. We need to fully mobilize human resources inside and outside the school. We should make concerted efforts to carry out education management, always adhere to the management principle of "scientific education, full education and comprehensive education", create a people-oriented education atmosphere, and build the connotation of leadership style, teachers' teaching style and students' study style, The development and construction of various forms of campus culture can promote the healthy development of college students, and the rich and colorful class culture and dormitory culture can improve the aesthetic taste of college students and enrich the cultural connotation of college students.

As a core component of cloud computing, cloud storage undertakes the task of data storage and information collection at the bottom of data. It is the foundation of the whole cloud platform and cloud services. Compared with traditional storage devices, its definition can not be simply understood as a single hardware device. This device can also be understood as a system. This system is generally composed of hardware environments such as server, storage, network and related software.

The concept of cloud storage is similar to cloud computing. It refers to a system in which a large number of different types of storage devices in the network work together through application software through the functions of cluster application, grid technology or distributed file system, so as to jointly provide data storage and business access functions, ensure the security of data and save storage space. In short, cloud storage is an emerging solution to put storage resources on the cloud for people to access. Users can connect to the cloud through any networked device at any time and anywhere to access data conveniently.

Storage layer: it is the foundation of cloud storage university education management system [9]. The university education management system of cloud storage relies on the storage layer to interconnect different storage devices to form a service-oriented distributed storage system. Above the physical storage device is a unified storage device management layer, which realizes the functions of logical virtualization management, status monitoring and maintenance of physical storage devices.

Management and scheduling layer: it is the core of cloud storage university education management system. The main function is to deploy distributed file system or establish and organize storage resource objects on the storage resources provided by the storage layer, segment the user data, and store the segmented data to specific storage resources in the form of multiple copies or redundant erasure codes according to the set protection strategy. At the same time, in this layer, read-write load balancing scheduling, business scheduling and data reconstruction and recovery after the failure of nodes or storage resources will be carried out among nodes, so as to always provide high-performance and highly available access services. However, in the specific implementation, the function of this layer may also be moved up, located between the access interface layer and the application service layer, or even directly embedded into the application service layer, which is closely combined with business applications to form a college education management system with business dedicated cloud storage.

Access interface layer: This is a freely extensible structure layer oriented to user requirements. In general, various interfaces can be opened and various services can be provided according to specific conditions and needs.

User access layer: On any machine connected to the Internet, as long as the user is authorized, he can enter the cloud stored college education management system platform system through this layer, carry out the allowable authorization operation on the cloud stored college education management system, and enjoy various services brought by the cloud stored college education management system.

With the deepening of educational modernization, the amount of data in educational management system shows an exponential growth, which brings severe challenges to the traditional data center. The most direct way to store massive data is to increase the number of storage devices in the data center. However, simply relying on the addition of storage devices to solve the storage problems caused by the explosive growth of data will greatly increase the storage cost of colleges and universities. Moreover, due to the poor dynamic scalability of traditional systems, the large increase of storage devices will bring great challenges to the maintenance and upgrading of relevant systems. Facing the explosive growth of data, how to realize the efficient storage of this part of data is an urgent problem to be solved in Colleges and universities [10]. Through the analysis and research of various data layout algorithms in cloud storage technology, an improved data layout algorithm is proposed to meet the requirements of fairness and adaptability at the same time; In addition, according to the characteristics of college teaching data, a local duplicate data deletion algorithm based on the characteristics of teaching data is proposed to minimize the data redundancy and reduce the pressure of network bandwidth, so as to reduce the storage pressure of massive data on the traditional data center and the complexity of system upgrading and maintenance in the future.

The introduction of large virtual nodes solves the unsolved fairness requirements of consistent hash algorithm. In addition, because the consistent hash algorithm is adopted in the set, it can well meet the requirements of self adaptability. Moreover, because the storage nodes are classified according to the weight, the allocation of intervals and large virtual nodes are for the classified set, the number of intervals and virtual nodes is greatly reduced, which effectively avoids the problems of excessive storage overhead caused by the introduction of a large number of virtual nodes in the improved consistent hash algorithm.

4 System Implementation

Although students' awareness of autonomy has been improved when they enter colleges and universities from middle school, with the increasingly fierce employment competition, college students' desire for self-expression and self promotion ability have become the demand for college students' professional ability and quality in the future. Excellent student cadres in school are the priority indicators of many employers. The self-education, self-management, self-service and other activities that college students participate in during their stay in school are of great significance to train their management ability, improve their teamwork ability, enhance their strong will and cultivate their noble ideological quality. Therefore, we should give scientific play to the functions of student organizations such as the Communist Youth League, student unions and classes, and establish a practical model of students' self-education and self-management.

The construction of digital campus has achieved initial results in major colleges and universities. The use of network, multimedia and other high-tech means for auxiliary teaching or online teaching has been gradually carried out. Analyzing the current daily teaching process of major colleges and universities, we can find that although the campus network has been built, the actual utilization rate of each teaching system is not high, and the auxiliary function for daily teaching work is not complete. For example, there are two common teaching activities, teaching courseware sharing between teachers and students and online submission of students' classroom homework. At present, there are mainly three ways: one is to copy teachers' teaching courseware through USB flash disk, that is, students use USB flash disk to copy teachers' teaching courseware in spare time such as recess; The second is to share teaching resources by sending e-mail by teachers, that is, teachers uniformly set and publish a shared mailbox, and student users in a specific class use password to share teaching resources and submit classroom homework by logging in to this shared mailbox; The third is to use FTP server.

College teaching data are mostly stored in the local education management system in the form of electronic data. In this storage mode, once the education management system suffers a disaster, it will paralyze the school teaching system and affect the normal progress of education and teaching activities.

In view of the above problems, through the research and summary of university resource sharing methods, this paper puts forward the sharing strategy based on university resource space and role; Secondly, through the research and analysis of the current backup strategies of the existing education management system, a resource level backup strategy based on the characteristics of teaching data is proposed [11]. Combined with the distribution characteristics of the underlying equipment, a data redundancy strategy is proposed to further improve the security of education data.

The public resource sharing area provides a shared pool for all users in Colleges and universities, and allocates a large storage space in the actual cloud storage space to store public resources for all users in Colleges and universities. The storage area is open to all teachers and students in the school. All roles are automatically bound to the space and assigned corresponding permissions.

The class resource sharing area is oriented to the class groups in the actual teaching process. It allocates storage space for all classes in the school to store the data shared within each class. Each space is only open to the internal members of the class. Users are automatically bound to the corresponding class resource sharing area according to the actual class division of the school, and only have the relevant permissions of their class resource sharing area.

The course resource sharing area is oriented to the course classes in the actual teaching process. Storage space is allocated for all courses to store the data shared by each course class. Each space is only open to the students who choose the course and the teachers who set up the course. All student users are automatically bound to the corresponding course resource sharing area according to the opening course selection results, and only have the relevant permissions of the resource sharing area.

External interface: the system provides storage, reading and deletion interfaces for developers at the upper layer. Developers can call the interface provided by the platform to complete the storage, reading, modification and deletion of data. The main implementation interfaces include:

1. Performput (string nativepath) / / storage interface. The parameter is the local storage path; 2. Performget (string nativepath, string remoteobjectname) / / read interface. The parameters are the data storage path and the ID of the read data;

3. Performmodify (string objectname) / / modify the data interface. The parameter is the ID of the modified data;

4. Performdelete (string objectname) / / delete the data interface. The parameter is the ID of the deleted data.

Back end storage device group: the back-end storage device group is composed of a large number of cheap PCs with different performance and a large capacity server[12]. The improved data layout algorithm is proposed to connect all storage nodes into a ring to form a large virtual storage pool to provide unified storage services. As shown in Fig. 2 below, some codes of data storage development are shown.

```
>> function [C,L,L1,l]=lagran1(X,Y)
m=length(X);L=ones(m,m);
for k=1:m
    V=1;
    for i=1:m
    if k~=i
        V=conv(V,poly(X(i)))/(X(k)-X(i));
    end
end
L1(k,:)=V;l(k,:)=poly2sym(V)
end
C=Y*L1;L=Y*l;x=[0.4,0.5,0.6,0.7,0.8];
y=[ -0.756291,-0.443147,-0.150826,0.133325,0.416856];
[c,L,L1,l]=lagran1(x,y)
```

Fig. 2. Data storage development part code

5 Conclusion

This paper studies the research and design of education management system based on cloud storage. The teaching content management module is mainly designed to improve the flexibility of the system. The administrator can change the teaching content of the system by adding, deleting and modifying the teaching content. Research and propose solutions to the problem of massive data storage. The cloud storage technology and data deduplication technology are deeply studied respectively to better meet the performance requirements of fairness and adaptability in the data layout algorithm at the same time. The improved data layout algorithm avoids the disadvantage of the lack of fairness consideration of the consistent hash algorithm, solves the problem of poor adaptability of sieve algorithm, effectively reduces the number of virtual nodes introduced in the improved consistent hash algorithm, and reduces the storage overhead and algorithm complexity. According to the characteristics of teaching data in Colleges and universities, a local duplicate data deletion algorithm is proposed to greatly reduce the redundancy of teaching data and storage overhead.

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