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*Research Article*

# University Educational Administration Management Platform Integrating Distributed Real-time Cloud Computing System

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The prosperity of the economy has made the society develop rapidly, and the traditional education management system can no longer meet the needs of the modern society. Under the background of college enrollment expansion, it has brought new challenges to school management and development. In recent years, the evolution and widespread adoption of virtualization, service-oriented architecture, autonomous, and utility computing have converged to give birth to a new paradigm: cloud computing. Cloud computing allows on-demand delivery of software, hardware, and data as a service. Cloud computing has the characteristics of massive processing and storage capacity, high efficiency, virtualization, and low cost. It has changed the traditional way of accessing software and hardware, providing users with convenient services and computing resources, which has achieved remarkable results in the related fields. Meanwhile, cloud computing plays an important role in education and teaching through its wide application in various fields. Based on this, this paper aims to study the application of distributed real-time cloud computing system in educational administration management in colleges and universities. This paper establishes a university educational administration management platform based on the cloud service computing system, and applies the management technology and distributed storage technology of the cloud computing platform. The system constructed in this paper significantly improves the utilization of CPU and memory. The research results of this paper showed that the response speed of the educational administration management system built through cloud computing has been significantly improved, with an average response time of 1.3s and an error of less than 0.4.

## 1. Introduction

With the unprecedented prosperity of information technology, a society that is closely connected through the Internet is quietly forming. Due to the rapid population growth and the gradual expansion of the university scale, the problems of educational administration such as the small number of students and counselors have become increasingly prominent. In this situation, it is necessary to further change the previous management mode and build a networked management platform, which is undoubtedly a challenging attempt. Today, cloud-based services are becoming more and more dynamic, and it is becoming increasingly difficult to develop an effective service provisioning strategy. With the implementation of the national education modernization strategy in recent years, the size of the school and the number of teachers and students have also expanded rapidly. How to improve the modernization level of information management in colleges and universities has become an urgent problem to be solved. To this end, colleges and universities have begun to use information technology and advanced computer network technology to improve operational efficiency and build information-based campuses. Universities can either buy business education management systems or organize their own development. All of them use an education management system to manage the daily operations of the school. The application of educational administration management system is of great significance to reduce the burden of educational administration personnel, improve the level of running schools, and strengthen the construction of school informatization.

Cloud computing is a network connection mode with pay-as-you-go, which can achieve different needs and purposes by configuring different computing resources. For example, connecting networks, servers, and storage can be quickly configured. This "pooled" model enables administrators to realize desired ideas and achieve the desired results. Doing so effectively reduces investment in time and management costs. And in the field of education, the characteristics and advantages of cloud computing can be well played. Using it not only makes the school's data storage reliable and secure, but also effectively promotes the data sharing. It allows students' PCs and even smartphones to quickly and easily access the cloud services through a Web front-end. Through its construction management platform, the school can significantly reduce the input cost of construction and improve the utilization and management of resources.

This paper tests the current system server of a university. According to the monitoring data provided by the school network center, the average memory usage of most servers is within 40%. It is also possible to further improve the memory resource usage. Based on the purpose of improving resource utilization, it is proposed to build an educational administration system based on cloud computing technology. The login test results show that the established educational administration system meets the login requirements of different roles. The average transaction response time of course selection was 1.3 seconds, and the standard error was 0.38. It can be seen that the current operating status of the system server can meet the access requirements of different network users, and the response time of system transaction processing is also satisfactory. Among the students, 75.9% thought the educational administration system is good, and no more than 8% thought that the system function is poor. It can be seen that the constructed management system satisfies a certain degree of functional requirements.

## 2. Related Work

With the advent of the Internet era, the traditional education method is more and more strongly impacted. In order to solve the impact, many researchers have launched the related research. Wang integrated the idea of cloud computing and designed a cloud application platform model based on the number of computer resources. This model significantly improves the computing function and storage capacity of the management application platform, and meets the individual needs of college physical education administrators. This improvement further enhances the quality of college physical education management and the quality and efficiency of network services. Users can make timely decisions in the shortest time [1]. The management of educational affairs information in colleges and universities is complex and diverse. In order to improve the efficiency of information management, Hui studied the software design of a large-scale university educational information management platform under the embedded Linux environment based on the linear programming model of the university educational information fusion model. The information fusion and scheduling algorithm loading module is loaded into the system control terminal and information processing center through the program in the cloud computing environment to achieve high cross-compilation and multimode control of educational information, combined with the design method of the embedded software development and management platform. The test results showed that the platform has strong educational information retrieval capabilities and real-time access capabilities in educational administration informatization, information fusion, and multimodal scheduling [2]. Shan proposed a teaching management system design method based on cloud computing, and improved the comprehensive information system of college teaching based on the teaching management system in colleges and universities. For the security of the system, virus intrusion and illegal intrusion are prevented through encryption technology, virtual private network technology, firewall, and other technologies. Experiments showed that the end user of the system can operate the project, which has absolute advantages compared with existing methods, and the system security is guaranteed [3]. Yang first expounded the influencing factors of the online mathematics teaching system in colleges and universities, and then analyzed the characteristics of cloud computing. Secondly, he proposed the design path and evaluation system of the online mathematics teaching system in colleges and universities from the two aspects of cloud computing-assisted teaching to enrich classroom teaching content and micro-lecture teaching to stimulate the students' learning motivation. An online mathematics teaching system for colleges and universities based on cloud computing has been established. In this way, students' learning efficiency and teachers' teaching quality can be improved [4]. By introducing Internet technology into student affairs management, Ye combined counselor management with concepts such as sharing, creativity, personality, and communication, which is reflected in the current popular Blog. On the one hand, this platform can efficiently manage adding information. On the other hand, it helps to realize instant communication between counselors. In addition, this attempt has obtained theory and design principles through questionnaire survey and feasibility study [5]. From the above-mentioned research cases, it is found that the current educational administration system only creates the foundation of Internet educational administration and Internet education, and has not conducted in-depth research and further development.

The emergence of cloud computing as a new technology has great potential for both enterprises and the market. It has quickly become a hot spot in the development of computer technology and has attracted the attention of researchers all over the world. Setiyawan proposed IT governance with CC as the core. Based on COBIT 5 directives, he proposed a data management model framework based on COBIT 5 directives and the main aspects of the governance process. He also offered data management based on the principles of data asset management [6]. Due to innovative trends in technology, cloud-based knowledge management is appealing to higher education institutions by changing educational approaches and goals. A literature review of Shukri's

exploration studied cloud-based knowledge management for higher education institutions [7]. Ali discussed the potential of information systems solutions that could advance institutional practice in UK higher education institutions from a multi-stakeholder perspective. Under the auspices of the soft systems approach (CATWOE), an assessment of an existing system adopted by UK universities called "MyPG", the high accessibility and flexibility of cloud applications increased the cost-effectiveness of adopting cloud services [8]. The above-mentioned researches on cloud computing and educational administration systems are mostly based on conceptual meanings, or start with the advantages of cloud computing in the system, lacking instructive significance for the articles and explanations of cases.

## 3. Academic Affairs Management System Based on Fusion Distributed Real-Time Cloud Computing System

*3.1. Status of Educational Administration System.* The domestic educational administration system started relatively late. At present, colleges and universities mainly construct their own educational administration systems through organizational strength or purchase commercialized educational administration systems [9]. The main comparison of these two methods is shown in Table 1.

*3.2. Advantages of Cloud Computing Model.* Compared with the existing model, the cloud-based computing model has obvious advantages. The details are shown in Table 2.

From the comparison in Table 2, it can be seen that the cloud computing platform is provided by the cloud server to provide the allocation of application resources. Customers can use the storage services and software resource services provided by the cloud platform without purchasing the server themselves [10, 11]. All other existing modes have to deploy their own servers separately, and the available resources are also very limited [12]. Compared with the large amount of resources provided by cloud platforms, the quantity scales are all very small [13, 14]. Therefore, using the cloud computing model can not only use massive resource services, but also greatly reduce the expenditure [15]. The cloud computing model also has other advantages. The application system runs in a virtualized environment, while other models must be in a physical machine environment. The advantage of using a virtual machine is that on a real physical machine, one or several virtual systems can be virtualized, and the operation of these systems is completely independent. The system in the virtual machine is isolated from the original system, and can run multiple operating systems. A system crash will not affect other systems, and the use of virtual machines also effectively improves system security [16, 17]. In addition, the cloud computing mode adopts a unified monitoring system, which can monitor all the application systems of the cloud server. There is no need to deploy a monitoring system for each application system. The cloud computing platform can also automatically complete the service upgrade, effectively reducing the workload of maintenance personnel [18, 19].

For higher vocational colleges, if they can use free or low-cost high-performance cloud computing platforms, they can reduce expenses. Using the mass storage services and software support services provided by the cloud platform, system development can be carried out quickly and the development cycle can be shortened. Based on the above reasons, it is a better choice to use the cloud computing platform to build the school's self-built educational administration system [20, 21].

*3.3. Cloud Computing.* Cloud computing is the product of the integration of traditional computer and network technologies such as distributed computing, parallel computing, virtualization, network storage, and load balancing. As far as cloud computing services are concerned, its service models can be divided into three types: infrastructure services, platform services, and software services. Among them, the content included in each layer of service mode is shown in Figure 1.

The value of cloud computing lies in high flexibility, scalability, and high-performance ratio. Compared to the traditional web application model, the most important feature of cloud computing is virtualization, which breaks the boundaries of time and space. Virtualization technology includes application virtualization and resource virtualization. As is well known, there is no spatial connection between the physical platform and the application deployment environment. Instead, data backup, migration, and expansion are completed through the virtual platform for corresponding terminal operations. VM allocation in cloud computing is a multi-objective clustering problem. In other words, multi-objective VM allocation can be considered a multi-dimensional clustering problem. The resources of each virtual node are e-dimensional term vectors, where each dimension represents a specific resource such as CPU, memory, or transmitted data, and other resources are also e-dimensional vectors. The goal is to place multiple virtual machines on multiple virtual nodes to minimize node count and load distribution, as shown in formulas (1)–(3):

$$W_{zx} = \min \sum_{i} e_i, \tag{1}$$

$$W_{Gz} = \min \frac{\sum_{e} F\varnothing}{e}, \tag{2}$$

$$e_i = \begin{cases} 0 \\ 1 \end{cases}. \tag{3}$$

Among them, $W_{ZX}$ is the number of occupied virtual nodes, that is, the balance load variance of the server $W_{GZ}$ cluster. When the virtual node is not used, it is 0. Otherwise it is 1. $F\varnothing$ is the j-dimensional variance, and $e$ is the total dimension.

Table 1: Comparison of commercial educational administration system and self-built educational administration system.

| Project | Commercial educational administration system | Self-built educational administration system |
|---|---|---|
| Advanced | More advanced | Ordinary |
| Applicability | Ordinary | Higher |
| Development costs | Higher | Lower |
| Maintenance cost | Ordinary | Higher |
| Extensibility | Ordinary | Strong |
| Source code | Cannot be modified | Can be modified |

Table 2: Comparison of cloud computing mode and self-built server.

| Project | Cloud computing | Self-built server |
|---|---|---|
| Application resource allocation | Allocate virtual resources to applications from a unified resource pool | Purchase servers and deploy individually for each application |
| Operating environment | Virtualized environment | Physical machine |
| App extension | Add application resources from the resource pool | Purchase a server for the application |
| Application monitoring | The application adopts unified monitoring | Each application requires a monitoring system |
| Deploy and upgrade | Application is done automatically by self-service | Admin action |
| Resource utilization | Higher | Lower |
| Input costs | Lower | Higher |
| Maintenance management cost | Lower | Higher |
| Safety | Cloud service provider maintenance, high security | Affected by administrator technology, poor security |

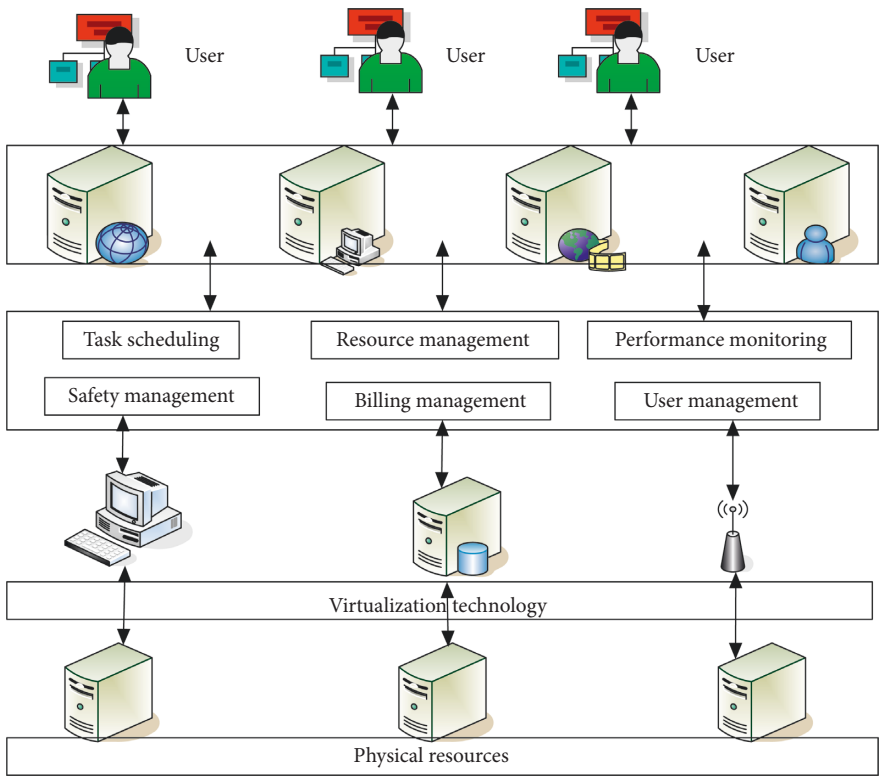


Figure 1: Cloud computing system.

$$F\varnothing = \frac{\sum_{\mathrm{j}} (\mathrm{Q}_{\mathrm{in}} - \overline{\mathrm{Q}}_i)}{\mathrm{j}}. \tag{4}$$

In formula (4), $j$ represents the number of virtual nodes. $\overline{Q}_i$ is the average value of the $i$th dimension performance feature in the node; $Q_{\mathrm{in}}$ is the $\underline{i}$th dimension energy of node $n$.

$$\sum_j UR_j^{\mathrm{CPU}} \times K_{n\longrightarrow j} \le Q_n^{\mathrm{CPU}},$$
$$K_{n\longrightarrow j} = \begin{cases} 0 \\ 1 \end{cases}. \tag{5}$$

That is, $K_{n\longrightarrow j}$ is 0 when the virtual machine $j$ is not allocated to the virtual node, and 1 otherwise.

$$\sum_j UR_{jn}^{\mathrm{RAM}} \times K_n \le Q_n^{\mathrm{RAM}}, \tag{6}$$

$$\sum_j UR_j^{\mathrm{CS}} \times K_n \le Q_n^{\mathrm{CS}}. \tag{7}$$

In formulas (6) and (7), $UR_j^{\mathrm{CPU}}$, $UR_j^{\mathrm{RAM}}$, and $UR_j^{\mathrm{CS}}$ represent the CPU, memory, and transmission data resources of node $j$. $Q_n^{\mathrm{CPU}}$, $Q_n^{\mathrm{RAM}}$, and $Q_n^{\mathrm{CS}}$ are the CPU, memory, and transmission data resources of the $n$th virtual node.

The application system $Q$ is deployed on multiple virtual machines. In the service level agreement SA of system $Q$, the indicators of the application system $Q$ will all satisfy Hr virtual machines UR, which are specifically expressed as formula :(8)

$$\sum_{Hr} UR_{jQ} \ge SA_Q. \tag{8}$$

The above is the calculation method for dynamic resource scheduling of cloud computing. The role of the resource scheduling method is to effectively observe its performance in resource monitoring. When overloaded, the overloaded resources can be shared by redeploying the UR.

In order to better encode the virtual machine, the virtual machine $j$ is sampled $i$ times through a period of time S, and the calculation amount of CPU, memory, etc., is calculated by adopting points. Then, it is encoded.

$$H_c^j(S) = \sum_{s=1}^{i} \left[ e_c^j(S) \times e_v^j(S) \times e_c^j \times e_{rm} \right]. \tag{9}$$

Among them, $e_c^j(S)$, $e_v^j(S)$, and $e_c^j$ represent the frequency, usage rate, and number of cores of the CPU of the virtual machine $j$ at time S, respectively. $e_{rm}$ is the number of floating-point operations per cycle.

$$H_b^j(S) = \sum_{s=1}^{i} \left[ B_r^j(S) + B_m^j(S) \right]. \tag{10}$$

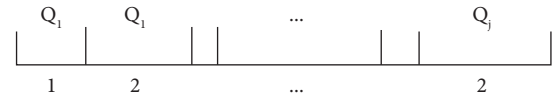


Figure 2: Schematic diagram of the distribution of probabilities.

Among them, $B_r^j(S)$ indicates the amount of data read from the disk of the virtual machine at time $s$, and $B_m^j(S)$ indicates the amount of data written to the disk at time S.

$$H_z^j(S) = \frac{1}{2} \sum_{s=1}^{i} \left[ Z_r^j(S) + Z_w^j(S) \right]. \tag{11}$$

Among them, $Z_r^j(S)$ represents the amount of data received per second at time S, and $Z_m^j(S)$ represents the amount of data sent per second at time S.

The computing probability of the physical machine resources occupied by the computing requirements of the three types of resources in the virtual machine is normalized, and the probability calculation is as formula (12):

$$Q_j = \frac{\delta_j}{\sum_{s=1}^{G} \delta_j}. \tag{12}$$

Among them, $Q_j$ is the probability of the three types of resources. $\delta_j$ is the computation amount of the three types of resources, and $G$ is the number of physical machines where the virtual machine $j$ is located.

The proportion of the probabilities of various resources in the virtual machine in the current integration set of various resources of the physical machine is normalized, and the value is between [0, 1]. The probability distribution is shown in Figure 2.

Supposing that K, F, and $R$ represent the encoding of three types of resources by virtual machine $j$, after normalization, the distribution probability of various resources of virtual machine $j$ is used as the encoding of virtual machine.

The constraints are as formulas (13)–(15):

$$K_j \in [0, 9], \quad K_j \in M^*, \tag{13}$$

$$F_j \in [0, 9], \quad F_j \in M^*, \tag{14}$$

$$R_j \in [0, 9], \quad R_j \in M^*. \tag{15}$$

The smaller the node distribution value load is, the better the performance will be.

$$F_{\mathrm{itness}} = \min \sum_n e_n,$$
$$F_{\mathrm{itness}} = \min \frac{\sum_b F\varnothing_j}{b}. \tag{16}$$

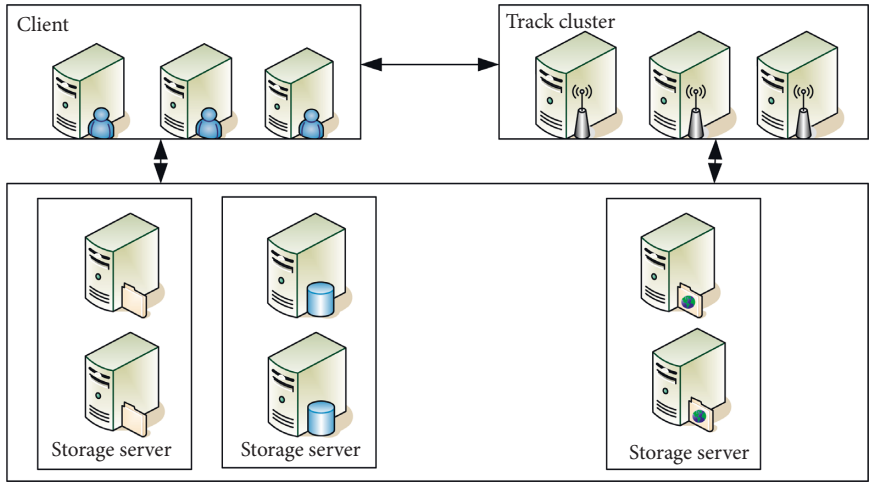


Figure 3: Distributed storage system.

*3.4. Distributed Resource Management and Cloud Computing Platform Management Technology.* The platform management of the cloud computing system can call a large number of virtual server resources more efficiently to facilitate the integration of these applications. The key issues of cloud computing platform management are as follows: It is more convenient to deploy new user services. It can recover system failures in time. It can use intelligent technology to quickly realize large-scale operation of the system.

As shown in Figure 3, distributed storage technology is the main technology used by cloud computing to store data, so cloud computing also introduces distributed resource management platform technology. When many nodes perform tasks at the same time, the state of each node needs to be consistent. Meanwhile, when a node has a problem, the system can take effective measures to ensure the smooth completion of the task. Distributed resource management system is a technology produced in such a situation. Distributed resource management can ensure that the overall completion of the task is not affected by a node.

## 4. Experiment of Building an Educational Administration System Based on Cloud Computing System

In order to explore the more accurate data that can be obtained, this paper takes a college as the source of the data, and starts to improve the resource utilization rate of the server through a certain analysis of the current application of the educational system in the college. Based on this, this paper uses SQL Server 2008 enterprise edition, which has high-performance and scalable database technology, which is very advantageous for system construction, to build an efficient, trustworthy, and intelligent data platform to complete the design and implementation of a cloud-based educational administration system. Then, the corresponding system test is carried out to prove the practicability of the established educational administration system platform.

*4.1. Data Center Server Operation.* Traditional data center servers are designed to meet peak performance and no downtime. Traditional data center servers are designed for peak performance without downtime. The server is designed for peak performance, so system resource utilization is always low, except during peak hours of work. Typically an operating system is installed on a server and runs one or two application systems. In most cases, system resource utilization is low.

Figure 4 shows the CPU utilization of the server at this institution. According to the monitoring data provided by the school network center, except for the database server, the average CPU usage of most of the other servers is less than 15%. Figure 4 shows the memory utilization of the server at this institution. According to the monitoring data provided by the school network center, the average memory usage of most servers is within 40%. It is also possible to further improve memory resource usage.

## 5. Functional Requirements of Educational Administration System

Through careful analysis and research of school administrators, teachers, and students, the educational administration system needs to include many key functions. Generally speaking, the educational administration system should be able to manage teacher information, student information, educational administration information, and so on. Among them, student information management should be able to realize the sub-services such as students' online course selection, online viewing of grades and credits, and modification of students' personal data. Teacher information management needs to realize the business of confirming students' course selection, reviewing students' course scores, and modifying teachers' personal information. The educational affairs management module has the largest authority, which needs to realize teacher information management, student information management, and class

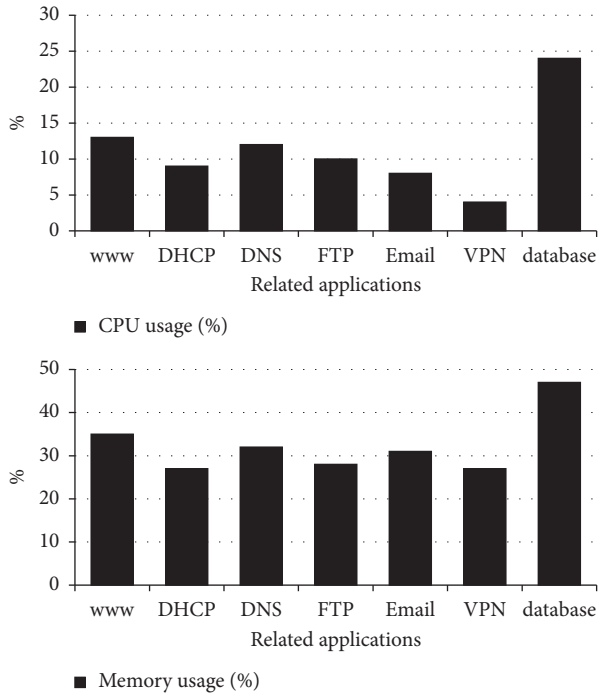


Figure 4: CPU and memory utilization of university servers.

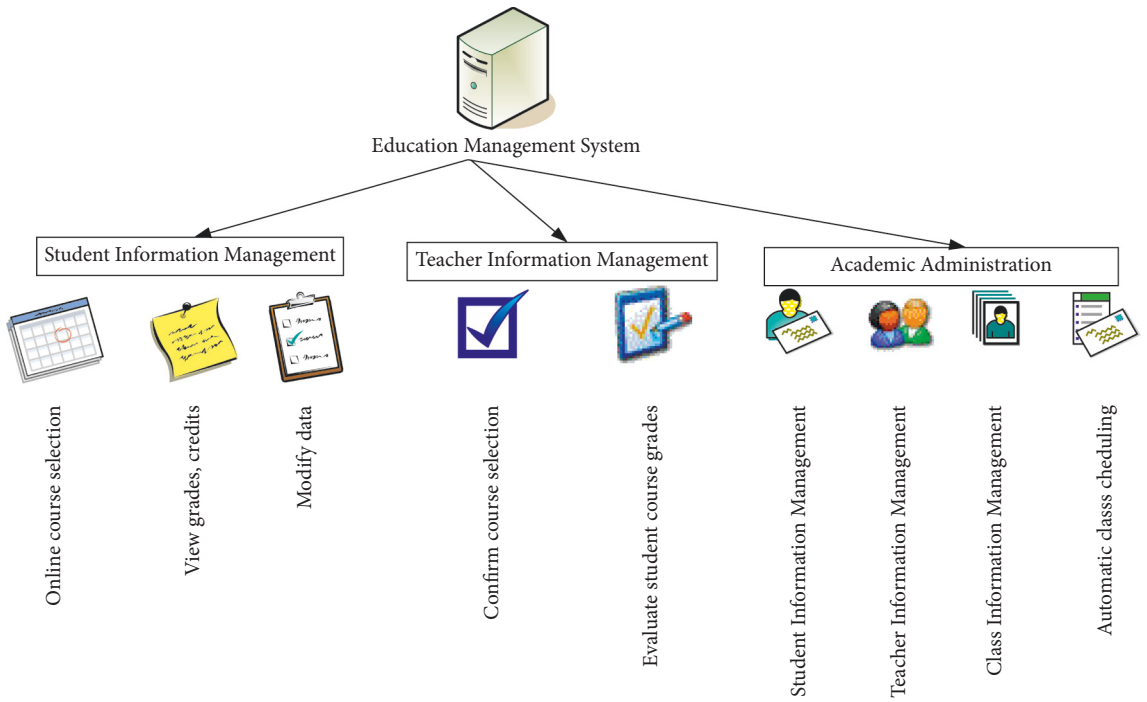


Figure 5: Functions of educational administration management system.

information management. At the same time, it also realizes the function of automatic class scheduling. The functional composition of the specific educational administration management system is shown in Figure 5.

*5.1. Construction of System Cloud Service Mode.* In order to meet the functional requirements of the modern informatization of the educational administration system, it is necessary to build the cloud service model of the system. To

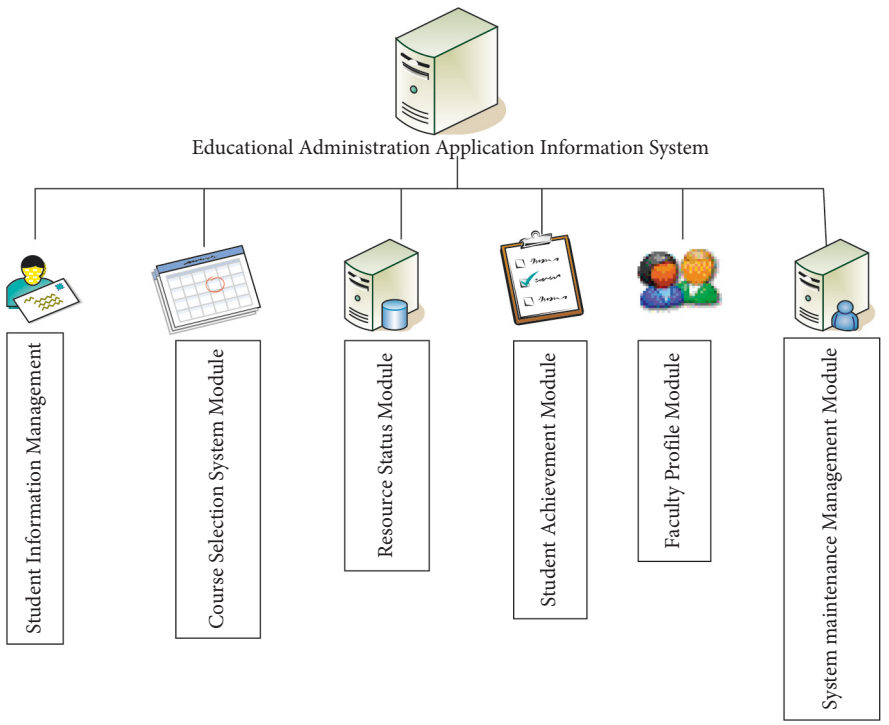


Figure 6: Schematic diagram of educational information system.

Table 3: System login test.

| Username | Password | Identity | Test results |
|---|---|---|---|
| Correct | Correct | Teacher | The teacher page is normal, and the permission is granted. |
| Correct | Correct | Student | The student page is normal, and the permission is granted. |
| Correct | Correct | Administrator | The admin page is normal, and permissions are granted. |
| Correct | Mistake | Teacher | Prompt error message |
| Null | Correct | Student | Prompt user cannot be empty |

Table 4: Course selection lottery processing.

| Course title | Course nature | Limited number of people | The actual number | Result |
|---|---|---|---|---|
| Etiquette | Public election | 10 | 6 | 6 people selected |
| Animation design | Special selection | 8 | 12 | 8 people are selected, 5 people are senior, 3 people are junior |
| Yoga | Public election | 5 | 5 | 5 people selected |
| Tea ceremony | Public election | 6 | 6 | 6 people selected |

build the cloud service mode of this system is to innovate an information management system based on a networked multi-layer architecture.

Through the advanced technology of cloud computing, the unified management of platforms, resources, applications, and users has been realized. "Digitalization of campus teaching and research", "digitalization of campus educational affairs," and "digitalization of campus comprehensive management" are also realized. From the environment, resources to teaching, learning, management applications, etc., it forms a digital campus based on cloud services. In the process of building the application system of the cloud service model, using the network to connect and integrate the business function modules in the entire educational administration system is the most critical technical link. In the process of building the application system of the cloud service model, using the network to connect and integrate the business function modules in the entire educational administration system is the most critical technical link. Therefore, it is necessary to synthesize and analyze the functional design of the user-oriented system sub-modules.

According to the demand analysis, the user-oriented system sub-modules should mainly include six subsystems composed of six sub-modules: basic student information query, course selection system query, resource status query, student score query, teacher file management, and system

use and maintenance. Thus, the overall design and implementation of the system are completed. Figure 6 shows the main modules of the establishment of the educational administration system.

## 6. Test of Educational System

*6.1. System Function Test.* In order to better compare the login page, this article uses the test results under the wrong username and password as a comparison. The detailed results are shown in Table 3.

The login test results shown in Table 3 show that the established educational administration system meets the login requirements of different roles.

*6.2. Students' Course Selection Test.* The high-efficiency and high-quality course selection system not only simplifies the course selection procedure of students, but also reduces the workload of the staff of the academic affairs office. It is an indispensable and important link in the comprehensive management system of educational affairs. Course selection is the core module of the comprehensive management system of educational affairs, and the improvement of the efficiency of course selection directly affects the efficiency of the educational affairs system. In the course selection module test, a complete course selection workflow is carried out according to the course selection process to check whether there are any problems. The first step is to set the course selection time, course selection course, course selection category, and limited number of students on the management end of the integrated educational management system platform. The second step is to log in to the system with student accounts of different grades and classes to select courses. Course selection courses include compulsory courses, specialized courses, and elective courses. It is tested whether students can choose courses and whether the courses selected are correct. The third step is to process the course selection at the end of the course selection, according to the method of drawing lots, and check whether the system can process according to the rules set by the system. The fourth step is to check whether the student's class schedule and the teacher's class list are updated after the course selection process. After the course selection is over, the course is selected for lottery processing. The test results are shown in Table 4.

As shown in Table 4, if the number of electives is less than the limit, all electors will be selected. When the number of electors is equal to the number of electors, all electors will be selected. It can be clearly seen that the test results basically achieve the expected results. However, there are fewer senior students and more junior students. The lottery process needs to be adjusted to give priority to senior students to win the lottery and junior students to reduce the lottery rate. The system needs to be further optimized.

*6.3. Compatibility Test.* Generally speaking, compatibility refers to the ability to handle multiple aspects simultaneously. In computer terms, compatibility refers to the degree to which multiple pieces of hardware, multiple pieces of software, or software and hardware work together. Compatibility testing can be divided into three categories: hardware compatibility testing, software compatibility testing, and data compatibility testing. The main purpose of the compatibility test is to ensure the compatibility with third-party software, ensure the "harmonious operation" of the system, and ensure that the tested project can run successfully in various network environments.

Table 5: Version compatibility testing of operating systems.

| Serial number | OS version | Test results |
|---|---|---|
| 1. | SQL server 6.0 | Running well |
| 2. | SQL server 6.5 | Running well |
| 3. | SQL server 7.0 | Running well |
| 4. | SQL server 2000 | Running well |
| 5. | SQL server 2005 | Running well |

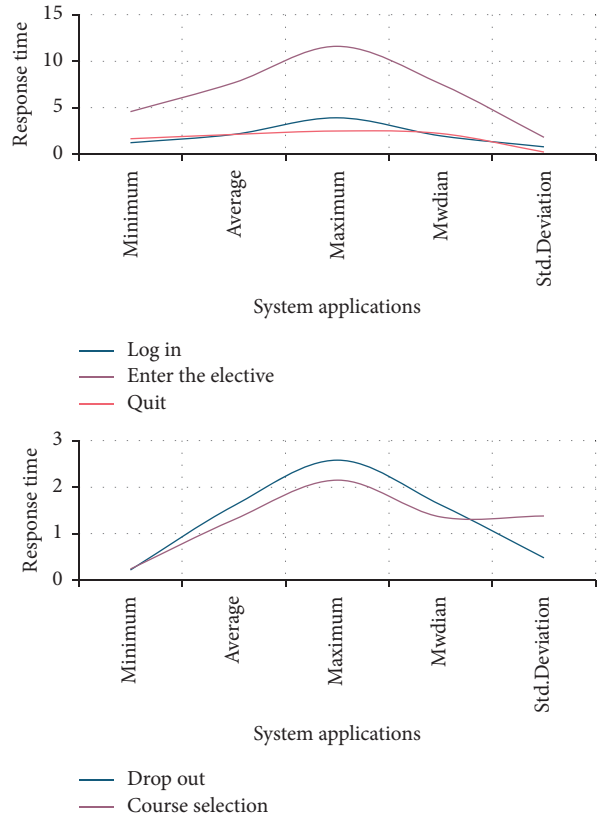


Figure 7: Response time for data transfer.

According to the test results in Table 5, the SQL Server 2008 version and other versions of the system in this paper can run well in data processing and system functions.

*6.4. Server Load Stress Test.* Load stress test is a method to detect the performance indicators of the system during operation. In the process of testing, the number of transactions connected to the system server is continuously increased, so as to observe whether the abnormal situation of data processing occurs in the hardware resources of the system server under the operation of high-load data volume.

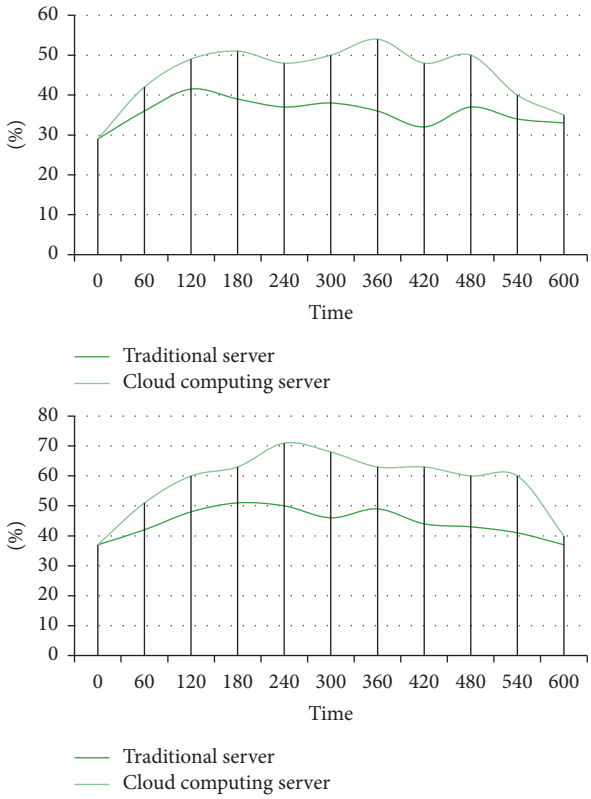


Figure 8: CPU utilization and memory utilization of the educational system.

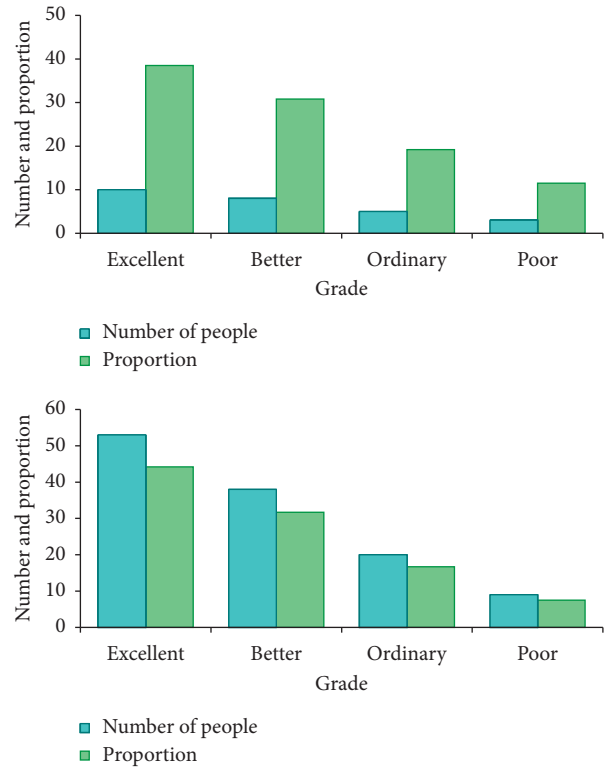


Figure 9: Sampling survey results.

This is a comprehensive consideration of the system platform architecture, server configuration, and network bandwidth. At the same time, this test is used to confirm the maximum number of users and the concurrent number of applications that the system platform can carry. The method of load stress test is used to effectively check the problems such as abnormal access and data congestion that may occur in the current stage of the school's comprehensive management system for educational affairs when it is put into use. In order to solve the problems that arise, maintenance and updates are carried out in time.

The first step is to install the test tool LoadRunner V12.50. LoadRunner is a powerful and commonly used stress testing software. It can predict system behavior and optimize performance. The disadvantage is that the installation is more complicated and it is difficult to get started. LoadRunner is to test the entire enterprise application architecture. It can help development and testers to confirm and find problems faster by simulating the operation behavior of actual users and implementing real-time performance monitoring.

The second step is to simulate the online course selection scenario. The number of online people is set to be 20,000. The average transaction response time of course selection is 1.3 seconds, and the standard error is 0.38 as shown in Figure 7.

It can be seen from the test in Figure 7 that the running state of the current system server can meet the access requirements of different network users, and the response time of system transaction processing is also satisfactory. More comprehensive system testing work is required in the future.

*6.5. Utilization Analysis of the System.* As shown in Figure 8, the cloud computing management platform uses virtualization technology to integrate computing, network, storage, and other resources into the host pool, breaking the traditional construction model of "one server, one application system". The distributed resource scheduling function utilized can effectively improve the resource utilization rate. The monitoring information from the school network center shows that the utilization rate of CPU resources has increased from 30–40% to 50–60%, and the utilization rate of memory resources has increased from less than 40% to about 60%. The CPU usage of the management system was within acceptable limits, and there was no denial of service even with high concurrent accesses. This indicates that the performance of the system is significantly better than in the past.

*6.6. Investigation of Application Results.* The total number of teachers in the sample data was 28 and the number of students was 120. The evaluation of the use of the system was divided into 4 levels, that is, excellent, better, average, and poor.

Figure 9 shows the evaluation results of teachers and students using the educational administration system. Among them, the majority of teachers believe that the educational administration system is better, accounting for

69.3%. The number of people who believe that this function is poor accounts for no more than 12%. Among the students, 75.9% think that the educational administration system is good, and no more than 8% think the system function is poor. It can be seen that most students think that the educational administration system constructed in this paper can meet the functional requirements of the application.

## 7. Conclusions

The problem of insufficient teaching resources brought about by the expansion of college enrollment has become a shortcoming that restricts the development of colleges and universities. The cloud platform for college teaching management built with cloud computing technology can well solve this shortcoming. It pools and manages the educational resources of the whole school by establishing a shared resource pool. Teachers and students can access through the web front-end network to quickly obtain more teaching resources, which not only improves the utilization rate of idle resources, but also reduces the cost of information infrastructure construction, so as to effectively solve the problem of low utilization rate of teaching resources and information infrastructure resources in colleges and universities. The results of the system test further prove that the system in this paper can effectively improve the utilization of CPU and memory, which has certain compatibility and fast response speed. It shows better functional requirements in practical applications.

## Data Availability

The data used to support the findings of this study are available from the author upon request.

## Conflicts of Interest

The author declares that there are no conflicts of interest regarding the publication of this paper.

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