Curriculum and Teaching Methodology (2022)
Clausius Scientific Press, Canada

DOI: 10.23977/curtm.2022.050812
ISSN 2616-2261 Vol. 5 Num. 8

Optimization Strategy of Online Teaching Management Mode Based on Cloud Computing

Zongtao Zhao[1,2,*]

[1]*School of Electronic and Information Engineering, Xi'an Siyuan University, Xi'an, Shaanxi, 710038, China*
[2]*University of Perpetual Help System DALTA, Philippines*
zzt0310@stu.xjtu.edu.cn
**Corresponding author*

Keywords: Cloud Computing Technology, Online Teaching, Management Mode, Optimization Strategy

Abstract: Cloud computing provides users with services through on-demand allocation, and hardware configuration is also virtual allocation, which reduces teaching costs. The virtualization of university teaching server can make the operating system no longer directly installed on the hardware, and improve the management efficiency of teaching management projects. This paper aims to study optimization strategies for cloud-based online teaching management functions. College teaching is the most basic and important content. Starting from the information teaching in the cloud computing environment, this paper proposes a teaching management method based on the online cloud based on the actual situation of colleges and universities, constructs a strategic optimization system, and puts forward the operation requirements, computer design and online learning of cloud colleges and universities. Requirements that must be met by the management system. After analysis, the overall design framework of the online learning management system is constructed, and the basic functions of each module in the online learning management system are finally realized. The quantified resources are fuzzed by the equal rate method, and the computing resource performance of the cloud platform service sub-nodes is collected regularly. The experimental results show that the FCRP algorithm in this paper has certain advantages in allocating cloud service sub-nodes.

1. Introduction

With the implementation of modern education policies, the continuous advancement of the task of building education informatization in colleges and universities, coupled with the continuous emergence of various emerging education models, the scale of students is also expanding. Having a high-performance online teaching management system is called various It is an important means for colleges and universities to improve their comprehensive management capabilities and core competitiveness [1-2]. Cloud computing not only has super computing power, but the ability of individual users to obtain services on the cloud computing platform is basically not affected by various factors such as network bandwidth, because most colleges and universities use local area

networks, which reduces the management burden of some colleges and universities and improves resource utilization rate [3-4].

Maintaining and updating a school's systems requires a lot of human and financial resources [5]. El-Attar NE recommends a cloud-based e-learning environment (PCLE) designed to improve e-learning services through the content quality of course materials to suit students' knowledge, experience and requirements. Additionally, the program focuses on deployment and reuse, interoperability, innovation and customization to overcome student silence effects and imply meaningful interaction and engagement. On the other hand, PCLE is built on a cloud computing environment and strives to overcome traditional web hosting challenges such as size, availability and cost [6]. Saleh We developed our strategic approach using 13 factors grouped into four (4) domains namely technical, organizational, environmental and personal. Identify the key factors influencing the adoption of cloud computing in universities. By better understanding the factors influencing cloud adoption in universities, relevant partners such as government agencies, university management and staff will be well prepared to ensure successful cloud adoption in Yemeni universities and ultimately help Yemeni improve cloud computing in Yemeni universities [7]. Therefore, cloud computing technology provides a solution to the current problems in online teaching management.

This paper builds the online teaching management in the cloud environment and realizes the management application. The purpose of this system platform is to improve the learning habits of learners, improve their autonomous learning ability, and improve the teaching methods of teachers. After analyzing the modules of user information management one by one, the system is implemented. And conduct open testing to summarize the implementation. Through the summary of the article, it is hoped that the online teaching management based on cloud computing can support managers to truly realize data management and improve their management mode.

2. Research on the Optimization Strategy of Online Teaching Management Mode Based on Cloud Computing

2.1 Feasibility of Cloud Computing Online Teaching Management

(1) Mobile learning

Using the cloud platform, learners can realize online learning anytime and anywhere, and can use the network to learn outdoors or after class to ensure their learning efficiency and time utilization [8-9]. The cloud platform is flexible enough to enable mobile terminal access. During the learner's mobile learning process, any mobile device can be connected to the cloud.

(2) Real-time interaction

Cloud computing supports learners to obtain a large amount of digital information resources, and some paid resources can reduce the expenditure on infrastructure construction. The continuous advancement of cloud computing technology can achieve centralized and systematic management of digital resources [10]. Cloud computing can encapsulate all digital resources into "cloud services", so that the required terminal resource consumption is reduced and cloud resources can be fully utilized. Learners can use mobile phones, tablets, and computers to watch online courses and information resources and other "cloud services" online at any time and anywhere.

(3) Learning effect

Individual learners have their own unique learning laws and methods. In order to rapidly improve their level and performance, learners need to understand and control their productive time periods. Cloud computing enables learners to arrange their learning time at will, which significantly improves their learning outcomes. Because any information resources are stored in the cloud platform, users are not limited by time or location [11-12].

2.2 Key Technologies of the Platform

Hadoop is a distributed system infrastructure and Google's open source implementation of cloud computing technology. Its strong scalability allows Google to have a strong competitiveness in system throughput. As an open source distributed framework, Hadoop can operate on a cluster composed of multiple computers [13-14]. There are many members in the Hadoop ecosystem, such as: Hive, HBase, HDFS, MapReduce, Pig, ZooKeeper, etc. Its core components are distributed file system (ie HDFS) and MapReduce programming computing framework model [15].

(1) HDFS, a distributed file system, is the basis for Hadoop to store and manage data.

(2) MapReduce is a distributed computing framework that mainly performs parallel operations on large-scale data sets.

(3) Yarn (resource management system), a new system of Hadoop 2.0, the main task is cluster resource management and scheduling, which enables multiple computing frameworks to run in a cluster [16].

(4) Pig, the main function is to retrieve data set information. Pig defines a SQL-like dataflow language, PigLatin.

(5) Hive, usually used for offline data processing. Is a distributed column-store database.

(6) Ambari, a web-based tool, is mainly used to install, deploy, monitor and manage Hadoop clusters. Because of its simple user interface, it enables users to easily query relevant information and effectively control the cluster [17].

2.3 Cloud Dynamic Resource Expansion Optimization Solution

This optimization implementation chooses the implementation scheme that combines dynamic and static load balancing, extracts the advantages of both, and achieves good results. Cloud dynamic resource expansion DRX policy steps are as follows:

Step 1: According to the concurrency of course selection in the test and practice, it is estimated that the number of virtual machines to be configured is 5. At the same time, it is necessary to set the load balancing dynamic and static combination scheduling strategy of the virtual machine cluster: the load balancer actively obtains and monitors each virtual machine. The current performance indicator status of the machine (indicators are CPU, memory, and number of connections), and configure the response indicator threshold. Once the monitoring alarm threshold exceeds the predetermined value, the virtual machine will be replicated and expanded through the H3C virtual management platform, and the load balancer will be matched., included in the monitoring list of the load balancer [18].

Step 2: With the progress of the course selection tasks, the number of students gradually increases, and the system access and performance index values also gradually increase.

Step 3: The load balancer allocates access requests to different virtual machines for processing through the load balancing algorithm.

Step 4: As the number of students continues to increase, the performance index of the virtual machine server of the course selection system begins to approach the predetermined threshold. When the threshold is reached, the H3C platform dynamically expands the service through the DRX dynamic expansion strategy scheme, and the load balancer will add the newly added virtual machine. The machine is included in the monitoring list, and processing tasks are allocated for subsequent access requests.

Step 5: As the course selection task progresses, the course selection begins to come to an end, the system performance begins to gradually decline from the peak period, fewer and fewer students are selected for the course, and the performance index of the virtual machine begins to decrease. When it reaches the predetermined recovery threshold, H3C The platform actively recycles the

corresponding virtual machine and synchronizes the load balancer balancing list so that subsequent requests will not be allocated to the virtual machine.

Step 6: Repeat Step 6 until the number of virtual machines is equal to the number of initialized virtual machines, at which point the entire DRX dynamic expansion process ends.

3. Investigation and Research on the Optimization Strategy of Online Teaching Management Mode Based on Cloud Computing

3.1 Online Teaching Management System

This system adopts VMware virtualization technology to realize the equipment virtualization of physical server. Users can install multiple operating systems on one computer with VMvare, and these systems can be used together without interaction and without data loss. Therefore, it is usually used as a tool for software development, software testing and virus testing. VMware software can support many versions of the system, such as: Linux, Windows.

3.2 Cloud Computing Design of Online Teaching Management

The system uses the client to first log in to the application through the browser and send a service request to the server. Once the application has received the required user service, it will provide the user service to the ActionServlet for processing. Then complete the processing and collection of data collected by all application servers, and return the collected results to ActionServlet for work. This page displays the user's results through the browser. An application can access user requests from multiple servers and then concatenate them back to the user.

3.3 The Main Idea of FCRP Algorithm

In the public cloud computing platform environment, the college builds public cloud service sub-nodes on the virtualization platform. In order to realize the fuzzification of the cloud computing service sub-base resources, this paper adopts the method of fuzzing the quantified resources using the equal percentage method to collect the computing resource performance of the cloud platform service sub-nodes regularly. The calculation formula of the index fuzzing processing can be described as:

$$performance = 1 - (\sum_{i=3}^{i=h} I_i * W_i + C * Wc + M * Wm) \quad (1)$$

Among them, Wc represents the unused utilization of CPU, Wm represents the unused utilization of memory, and the "trapezoidal fuzzy" method identifies the performance of cloud computing service nodes as:

$$FS = \{LL, L, M, H, HH\} \quad (2)$$

Among them, LL stands for ultra-low, L for low, M for mid-range, H for high-end, and HH for super-high.

4. Analysis and Research on the Optimization Strategy of online Teaching Management Mode Based on Cloud Computing

4.1 Function Module

The main function of the online teaching management system based on cloud computing is teaching management, and there are some auxiliary functions in the system. The functional module design of the online teaching management system is shown in Figure 1:

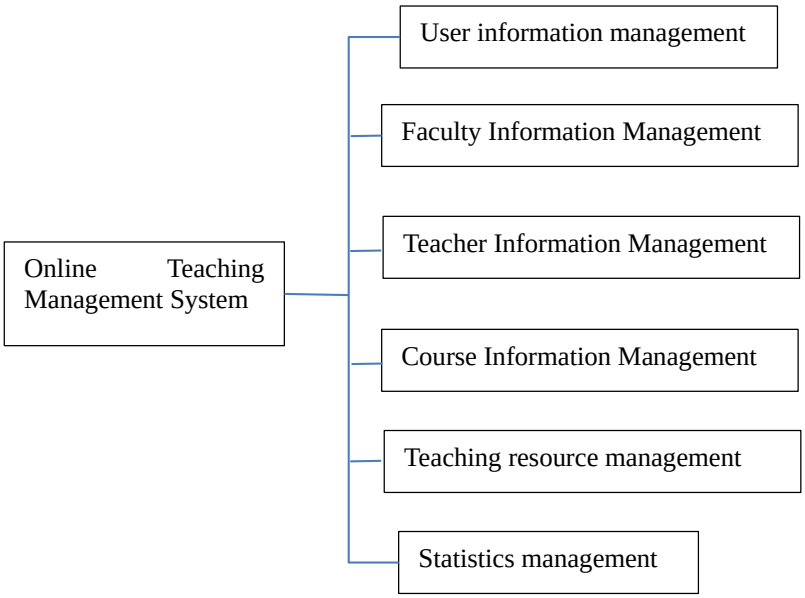

Figure 1: Functional block diagram of the system

According to the actual needs of training resource management, after careful analysis, the main functions of the teaching resource management system include user information, department information, training information, course information, education information and statistical information. Through these services, the system can easily manage teaching resources and simplify training.

4.2 Algorithm Efficiency Comparison

The main purpose of the task dispatching algorithm of traditional virtualization platform is to balance the load of virtualization resources of the platform on the basis of taking into account the processing efficiency. The CRP algorithm mainly allocates system resources by weighting according to the customer level.

In this experiment, the number of concurrent users is selected as: 30, 60, 90 and 120 time nodes to compare the experimental results of the two algorithms, as shown in Table 1.

Table 1: Comparison Results

concurrent users	FRCP	RCP
30	34	43
60	48	55
90	64	72
120	78	90

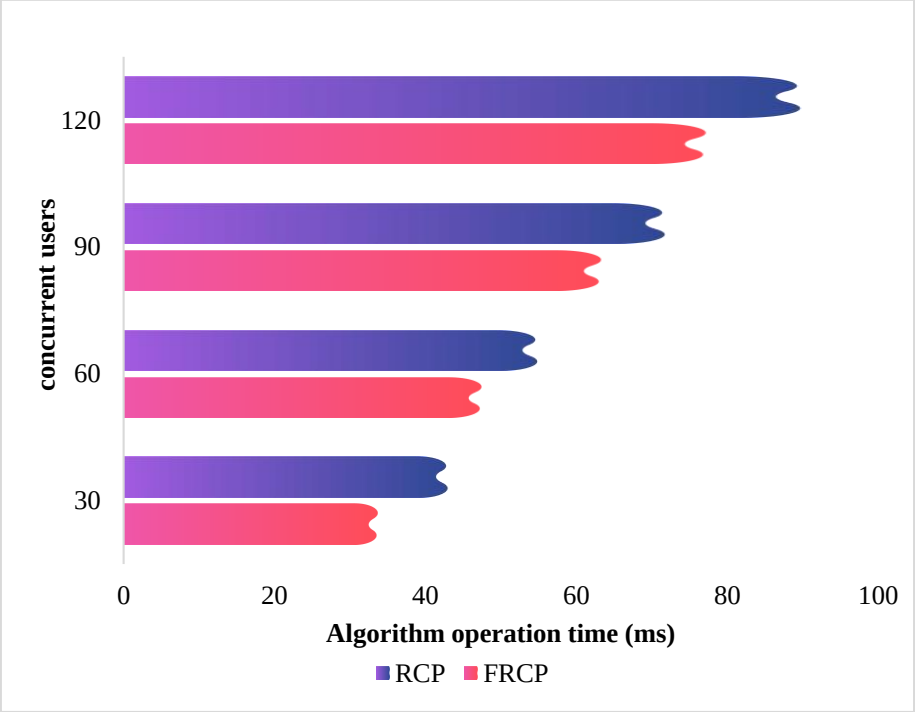

Figure 2: Comparison of running time between FRCP and RCP algorithms

As can be seen from Figure 2, the independent variable is the number of concurrent users, and the dependent variable is the algorithm running time (ms). FRCP has less computing time than the RCP algorithm. Compared with the RCP algorithm, the FRCP algorithm has a higher running time than the RCP algorithm certain advantages.

The independent variable is the number of concurrent users, and the dependent variable is the number of nodes allocated. The FRCP and RCP algorithms can allocate more cloud service sub-nodes at the same time node. The FRCP and RCP algorithms have a certain number of cloud service sub-node allocations. Advantage.

5. Conclusions

With the development of cloud computing technology, changes and challenges are increasingly taking place in the traditional data infrastructure. In the education informatization construction plan, how to effectively use cloud computing technology to transform the original system structure in the data, improve the operation efficiency and management level of the data, and reduce the cost of operation and maintenance has become the key point of every university IT operation and maintenance personnel. Under the consideration of limited cost control and the reduction of interruptions to existing business operations and the smooth migration of application services and data, this paper integrates the most popular and perfect cloud computing solutions. Taking the data in online education management as an example, it describes the entire process. The main process and key difficulties of applying roundabout. Although the system meets the expected requirements and can be applied in practice, it still has certain shortcomings. The original intention of cloud computing itself includes allowing users to self-manage computing and storage resources required, including resource application and modular deployment, withdrawal and settlement of fees. Due to the project scale, funding and time constraints, the self-service management platform has not been deployed. If the system is to be truly in-depth, it needs to be transformed and promoted in the future.

Acknowledgements

This work was supported by. Construction and Practice of Talent Training Mode for Innovative Experimental Class of Information Specialty under the background of New Engineering

References

[1] Khoo H S, Teo W L. A Transformative Learning Approach to Teaching Management Skills in Medical Education[J]. Academic Medicine, 2018, 93(4):516-517.
[2] Latief S, Hendrayani S, Samsuddin S. Teachers Teaching Management During Belajar dari Rumah (BDR) Policy In Higher Education: A Piece of Teacher Sharing Ways[J]. International Journal on Advanced Science Education and Religion, 2021, 4(1):9-18.
[3] Kaitharath T J. Teaching management in the global context– Strategies beyond the syllabus[J]. Journal of Management Research and Analysis, 2019, 6(3):137-141.
[4] ES Zárate, Martelo R J, Franco D. Technological memory as a teaching management tool for the development of social promotion projects in universities[J]. International Journal of Engineering and Technology, 2018, 10(1):7-14.
[5] Langat L, Mwangi W, Otieno C. Using Multimedia in Teaching Agricultural Machinery Subject through Cloud Computing: A Case Study of Sot Technical Training Institute –Bomet County, Kenya[J]. International Journal of Computer Applications, 2018, 179(52):13-19.
[6] El-Attar N E, El-Ela N A, Awad W A. Integrated Learning Approaches Based on Cloud Computing for Personalizing e-Learning Environment[J]. International Journal of Web-Based Learning and Teaching Technologies, 2019, 14(2):67-87.
[7] Saleh A, Drus S M, Shariff S S M. Cloud Computing Adoption among Higher Education Institutions in Yemen: An Integrated Conceptual Framework[J]. International Journal of Engineering & Technology, 2018, 7(4):429-434.
[8] Ali M B. Multiple Perspective of Cloud Computing Adoption Determinants in Higher Education a Systematic Review[J]. International Journal of Cloud Applications and Computing, 2019, 9(3):89-109.
[9] Raeth P G. Accessing Quality Open-Access Literature to Enable Teaching, Learning, and Industry[J]. International Journal of ICT Research and Development in Africa, 2018, 7(2):1-16.
[10] Rezk H, Ahmed E, Maha D. E-management Educational System based on Mobile Cloud Computing[J]. International Journal of Computer Applications, 2019, 181(50):15-20.
[11] Ezenwoke A, Omosebi O, Ezenwoke O A. A Bibliometric Investigation of Cloud Computing and Education Research[J]. Asian Journal of Scientific Research, 2019, 12(2):194-201.
[12] Mhouti A E, Erradi M. Harnessing Cloud Computing Services for E-Learning Systems in Higher Education: Impact and Effects[J]. International journal of information and communication technology education: an official publication of the Information Resources Management Association, 2019, 15(2):18-30.
[13] Halimah H, Helmie J, Susulawati N. Integrating ORAI Application in Teaching English at Senior High School[J]. IJET (Indonesian Journal of English Teaching), 2018, 7(2):110-117.
[14] Alimjon D, Syed H H. METHODS OF USING CLOUD TECHNOLOGIES IN ISLAMIC EDUCATION INSTITUTIONS[J]. SSRN Electronic Journal, 2020, 7(5):89-99.
[15] Janardhana P, Reddy K, Singaravelu G. Augmented Reality (AR): The New Trend in Transforming Teaching and Learning in Education[J]. The International journal of analytical and experimental modal analysis, 2020, 12(4):620-626.
[16] Islam A. Perceptions and use of cloud in academic activities: a study of a public university in Bangladesh[J]. Oclc Systems & Services, 2019, 35(2):66-79.
[17] Rahman M, Jaafar J, Kadir M, et al. Cloud Based Gamification Model Canvas for School Information Management[J]. International Journal of Engineering & Technology, 2018, 7(2):28-31.
[18] Bramantoro A, Alzahrani A A, Bahaddad A A, et al. Cloud-based learning service platform for multilingual smart class[J]. International Journal of ADVANCED AND APPLIED SCIENCES, 2020, 7(7):83-91.