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Original Paper

Teaching Practice and Exploration of Cloud Computing in Computer Application Technology Course

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Abstracts

This paper discusses the teaching practice and exploration of cloud computing in computer application technology courses. Firstly, it outlines the definition and characteristics of cloud computing and its application background in the field of education. Subsequently, the teaching mode innovation of cloud computing in computer application technology courses is analyzed in detail, including the optimization of course content, the innovation of teaching methods and the integration of teaching resources. Then, the application effect of cloud computing in teaching practice is demonstrated through specific teaching cases. Finally, the experience and lessons of cloud computing teaching practice are summarized, and the future development trend is prospected.

Keywords

Cloud computing, computer application technology, teaching practice, teaching mode innovation

1. Introduction

With the rapid development of information technology, cloud computing, as a revolutionary technology model, has penetrated into all walks of life and become a key force in promoting digital transformation. In the field of education, the application of cloud computing is also becoming more and more widespread, bringing new opportunities and challenges to the teaching of computer application technology courses. Cloud computing not only changes the traditional teaching methods, but also provides students with richer and more convenient learning resources and environments. Therefore, it is of great significance to explore the teaching practice of cloud computing in computer application technology courses.

2. Overview of Cloud Computing

2.1 Definition and Core Concept of Cloud Computing

Cloud computing is an Internet-based computing model that integrates computing resources (e.g., servers, storage, databases, networks, software, etc.) into a huge resource pool through virtualization technology and provides these resources to users on demand. Users do not need to purchase and maintain physical hardware, but only need to access the cloud computing platform through the network, according to the actual demand for dynamic access to the required resources, and pay according to the amount of use. The core concept of cloud computing lies in the virtualization and on-demand allocation of resources, which breaks the limitations of traditional IT resource deployment and use, making the use of computing resources more efficient, flexible and cost-effective.

Cloud computing abstracts physical resources into virtual resources through virtualization technology, achieving dynamic allocation and efficient use of resources. Users can adjust resource allocation at any time according to business needs without worrying about physical resource limitations and bottlenecks. This model of on-demand service and elastic expansion greatly reduces the IT cost of enterprises, improves resource utilization, and promotes business innovation and development.

2.2 Characterization of Cloud Computing

The cloud computing platform can support massive data processing and highly concurrent requests, and flexibly expand resources according to business needs. This elastic scalability enables enterprises to easily cope with the traffic pressure during peak business periods, while reducing daily operation and maintenance costs. The cloud computing platform realizes seamless resource expansion and load balancing through distributed computing and storage technologies, ensuring high availability and stability of services.

The cloud computing platform ensures the continuous and stable operation of services through multi-layer redundancy and fault-tolerance mechanisms. Even if part of the hardware or software fails, the cloud computing platform can quickly restore services and guarantee business continuity. In addition, the cloud computing platform also provides a data backup and recovery mechanism to ensure the security and integrity of user data.

Virtualization is one of the core technologies of cloud computing, which realizes dynamic allocation and efficient use of resources. Through virtualization, enterprises can run multiple virtual machines on the same physical server to improve the utilization of hardware resources. At the same time, virtualization also provides flexible resource scheduling and management capabilities, enabling enterprises to better respond to business changes and technology upgrades.

Cloud computing platforms provide on-demand service capabilities, allowing users to purchase and use cloud computing services based on actual demand. This pay-as-you-go model reduces costs and improves resource utilization. Both startups and large organizations can flexibly adjust resource allocation according to their business needs and achieve optimal economic benefits.

Cloud computing platforms provide a rich set of APIs and development tools that support a wide range

of programming languages and frameworks to meet the diverse needs of developers. This open ecosystem promotes innovation and accelerates the popularization of new technologies. At the same time, the cloud computing platform provides a wealth of third-party services and applications, enabling users to easily build and deploy their own business applications.

2.3 Background and Significance of the Application of Cloud Computing in the Field of Education

With the continuous promotion of education informatization, the application of cloud computing in the field of education is becoming more and more widespread. Cloud computing provides richer and more convenient teaching resources and environment for education, making teaching no longer limited by time and place. Through the cloud computing platform, teachers can access teaching resources anytime, anywhere, for online lectures and counseling; students can access learning materials anytime, anywhere, for independent and collaborative learning.

The application of cloud computing in education also brings the possibility of personalized learning. Through the analysis of students' learning behavior and interest preferences, cloud computing platforms can provide students with personalized learning paths and resource recommendations to improve teaching effectiveness and learning experience. In addition, cloud computing can also support large-scale online tests and assessments, providing more comprehensive and accurate data support for education administrators.

The application of cloud computing in the field of education has a broad prospect and great potential. It can not only promote the in-depth development of education informatization, but also promote the innovation and change of the education teaching mode, and provide strong support for the cultivation of high-quality talents with innovative spirit and practical ability.

3. Teaching Mode Innovation of Cloud Computing in Computer Application Technology Courses

3.1 Optimization of Course Content

Introducing the cutting-edge technology of cloud computing, the cutting-edge technology and development trend of cloud computing should be introduced in the computer application technology course in a timely manner to ensure that students can keep up with the pace of technological development. By introducing the application cases of cloud computing in the fields of big data processing, artificial intelligence, Internet of Things, etc., it can stimulate students' interest and curiosity in learning and make them more actively involved in learning.

Integrating related course content, cloud computing involves knowledge and technology in several fields, such as virtualization technology, network technology, storage technology and so on. In order to form a complete knowledge system, these related course contents should be integrated and optimized. For example, when teaching virtualization technology, it can be combined with the application scenarios of cloud computing to explain, so that students can better understand the role of virtualization technology in cloud computing; when teaching network technology, it can be introduced to the content of cloud computing network architecture and security management, so as to enhance students'

awareness of network security.

3.2 Innovation of Teaching Methods

Adopt case teaching, case teaching method is an effective teaching method, which attracts students' attention by creating certain scenarios, events or problems, so that students consciously and actively participate in learning. In the computer application technology course, cloud computing-related cases can be used for teaching, such as the introduction of cloud computing in e-commerce, finance and other fields of application cases. By analyzing these cases, students can more deeply understand and master the relevant knowledge and technology of cloud computing.

Implementation of project-driven teaching, project-driven teaching is a project-centered teaching method, which emphasizes that students learn and master knowledge in practice. In the computer application technology course, some project tasks related to cloud computing can be designed, such as developing an online learning platform based on cloud computing, realizing a data storage and backup system in a cloud computing environment. By completing these project tasks, students can experience firsthand the application scenarios and realization methods of cloud computing, and improve their practical ability and innovation ability.

Utilizing online teaching resources, cloud computing provides rich resources and environment for online teaching. In computer application technology courses, online teaching resources provided by the cloud computing platform can be utilized for teaching, such as online courses, teaching videos, teaching cases and so on. These resources can not only help students better understand and master the knowledge of the course, but also improve students' learning interest and enthusiasm. Through online learning, students can access learning resources anytime and anywhere to achieve independent learning and personalized learning.

3.3 Integration of Teaching Resources

Constructing a cloud computing experimental platform, the cloud computing experimental platform is one of the important resources for the teaching of computer application technology courses. By building a cloud computing experimental platform, students can personally carry out cloud computing experiments and practical operations, and gain an in-depth understanding of the working principle and realization method of cloud computing. For example, a cloud computing experimental platform based on OpenStack can be constructed to provide experimental functions such as virtual machine creation, network configuration, and storage management. Through experimental operations, students can more intuitively understand the technical details and realization process of cloud computing.

Integrating industry enterprise resources, cloud computing technology has a wide range of application scenarios and practical experience in industry enterprises. In the computer application technology course, the resources of industry enterprises can be integrated for teaching practice and innovation exploration. For example, we can cooperate with cloud computing service providers to carry out practical teaching activities, so that students can experience the deployment and management process of cloud computing services; invite experts from industry enterprises to give lectures and training, so

that students can understand the latest application and development trend of cloud computing in the industry; organize internships and visits for students to enterprises, so that students can have a more in-depth understanding of the actual application of cloud computing in the industry and enterprises and practical experience.

4. Teaching Practice Cases of Cloud Computing in Computer Application Technology Courses

4.1 Case 1: Development of Online Learning Platform Based on Cloud Computing

With the rise and development of online education, the development of an online learning platform based on cloud computing has important practical significance and application value. The platform can provide students with rich learning resources and convenient learning methods; provide teachers with efficient teaching tools and management means; and provide schools with a comprehensive teaching management and evaluation system.

This project aims to develop an online learning platform based on cloud computing, which realizes the functions of course management, online learning, homework submission, and test evaluation.

Through research and analysis of user requirements, the functional requirements and performance requirements of the platform are determined. According to the results of requirements analysis, design the system architecture and database structure of the platform. Adopt microservice architecture for system design and divide the platform into several independent service modules, such as user management module, course management module, learning management module, etc. Choose a suitable technology stack for development. Spring Boot framework is used for back-end development; MySQL database is used for data storage; Vue.js framework is used for front-end development; Docker container technology is used for deployment and management. According to the results of system design and technology selection, the development and realization of the platform is carried out. Including the development of back-end services, front-end page development, database design and realization. Conduct functional testing and performance optimization of the completed platform. Test the stability and response speed of the platform by simulating user access and operation; improve the performance and scalability of the platform by optimizing the code and database structure. Deploy the completed platform to the cloud computing platform for online operation. Docker container technology is used for deployment and management; Kubernetes clusters are used for container orchestration and scheduling; cloud services provided by cloud computing service providers such as Aliyun are used for resource management and expansion.

This project successfully develops a cloud computing-based online learning platform, which realizes the functions of course management, online learning, homework submission, and exam evaluation. The platform is characterized by user-friendliness, stable performance and high scalability, providing strong support and guarantee for online education.

5. Experience and Lessons Learned from Cloud Computing Teaching Practice

5.1 Lessons Learned

Focus on the timeliness and cutting-edge of course content in cloud computing teaching practice. Timely introduction of cutting-edge technologies and development trends of cloud computing, so that students can understand the latest developments and application scenarios of cloud computing. This can not only stimulate students' learning interest and curiosity, but also improve their practical ability and innovation ability.

Diversified teaching methods and means should be adopted in the teaching practice of cloud computing. Combine case teaching, project-driven teaching, online teaching and other methods for teaching practice and innovation exploration. This can not only improve students' learning interest and enthusiasm, but also improve their practical ability and teamwork ability.

The integration and utilization of teaching resources should be strengthened in cloud computing teaching practice. Constructing cloud computing experimental platforms, integrating industry enterprise resources and other ways to carry out teaching practice and innovation exploration. This can not only provide students with richer and more convenient learning resources and environment, but also improve their practical ability and innovation ability.

5.2 Lesson Reflection

Avoiding over-reliance on cloud computing platforms should be avoided in cloud computing teaching practice. Although cloud computing platforms provide rich learning resources and environments, over-reliance may lead to insufficient understanding and mastery of cloud computing technology by students. Therefore, in teaching practice, attention should be paid to cultivating students' independent learning ability and innovation ability, so that they can flexibly utilize cloud computing technology to solve practical problems.

Attention should be paid to data security and privacy protection in cloud computing teaching practice. Cloud computing platform involves a large amount of user data and information exchange, which may lead to problems such as data leakage and privacy violation if not handled properly. Therefore, education and training on data security and privacy protection should be emphasized in teaching practice to improve students' security awareness and prevention ability.

Strengthening communication and exchange between teachers and students should be strengthened in cloud computing teaching practice. Timely understanding of students' learning situation and feedback, adjusting the teaching plan and teaching methods; encouraging students to actively participate in classroom discussions and practical activities to improve their learning interest and enthusiasm. By strengthening the communication and exchange between teachers and students, a good teacher-student relationship and teaching atmosphere can be established, and the teaching effect and learning experience can be improved.

6.The Future Development Trend of Cloud Computing in Computer Application Technology Courses

6.1 The Continuous Development and Improvement of Cloud Computing Technology

With the continuous evolution of cloud computing technology, its application in computer application technology courses will usher in new opportunities. In the future, cloud computing technology will pay more attention to the efficient use of resources and security guarantees. Cloud computing service providers will continue to optimize their underlying architecture to improve the efficiency of resource use and reduce operating costs, while strengthening the research and development of security technologies to ensure the security and privacy protection of user data.

Cloud computing platforms will provide richer APIs and development tool support, enabling developers to build and deploy applications more conveniently. Intelligent resource management and scheduling functions will also become an important feature of the cloud computing platform. Through machine learning and artificial intelligence technologies, the cloud computing platform can automatically optimize resource allocation and improve the overall performance and stability of the system.

These technological advances will provide more convenient, efficient and secure learning resources and environment for the teaching of computer application technology courses. Students can access the latest technical documents, development tools and learning resources through the cloud computing platform to improve their learning efficiency and practical ability.

6.2 Innovation and Expansion of Online Education Mode

The continuous innovation and expansion of online education mode provides a broader space for the application of cloud computing in computer application technology courses. In the future, online education will pay more attention to personalized learning and intelligent assessment. Through big data and artificial intelligence technology, online education platforms are able to analyze students' learning behavior and performance and provide personalized learning paths and resource recommendations for each student.

Online education platforms will provide richer online learning resources and interactive methods. Students can learn through video tutorials, online experiments, virtual simulations and other ways to improve the learning experience and effect. The cloud computing platform will serve as an important support for online education, providing high-performance computing and storage resources to ensure the stability and reliability of online education.

These innovations and developments will provide more diverse and personalized learning paths and resource recommendations for the teaching of computer application technology courses. Students can choose suitable learning paths and resources according to their interests and needs, and improve their learning effect and innovation ability.

6.3 Development Trend of Interdisciplinary Integration and Cross-innovation

With the increasingly obvious development trend of interdisciplinary integration and cross-innovation, the application of cloud computing in computer application technology courses will be more diversified and comprehensive. In the future, cloud computing will be deeply integrated and innovatively explored with technologies in other fields, such as the combined application with big data, artificial intelligence, Internet of Things and other fields.

In the combined application of cloud computing and big data, students can process and analyze large-scale data sets through the cloud computing platform to improve the efficiency and accuracy of data processing. In the combined application of Cloud Computing and Artificial Intelligence, students can use the Cloud Computing platform to build and train machine learning models to realize intelligent applications and services. In the combined application of cloud computing and Internet of Things (IoT), students can use the cloud computing platform to realize remote monitoring and management of devices, and improve the reliability and safety of IoT systems.

These interdisciplinary integration and cross-innovation will provide a broader innovation space and development opportunities for the teaching of computer application technology courses. Students can cultivate interdisciplinary thinking and abilities by learning knowledge and technologies from different fields, laying a solid foundation for their future career development.

7. Conclusion

As a revolutionary technology model, the application of cloud computing in computer application technology courses is of great significance. Teaching practice and innovative exploration through optimizing course content, innovating teaching methods and integrating teaching resources can improve teaching effect and learning experience; cultivate students' practical ability and innovation ability; and promote the reform and development of computer application technology courses. In the future, with the continuous development and improvement of cloud computing technology as well as the continuous innovation and expansion of online education mode and other trends, the prospects of the application of cloud computing in computer application technology courses will be broader and better.

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