Design of Computer Network and Maintenance Experiment System Based on VR

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Abstract: In recent years, virtual technology has attracted widespread attention. As a new technology, it is a computer-based technology to develop, imitate real life, build a three-dimensional experimental space, so that people can better experiment. In this paper, a computer network and maintenance experiment system based on VR is designed. The system allows students to make remote appointments in a network environment, conduct network experiments, and teachers can remotely set up, control experiments, and communicate online with students. And can be seen from this research, now virtual reality technology has been applied to teaching, as a new type of teaching media has a very big impact on the teaching process, especially the distance education has a profound impact.

1. Introduction

The networking and maintenance training of computer network is a practical and practical technical basic course that must be mastered by information majors. Through the experimental training courses, students can not only deepen their understanding of the principles of computer network composition [1]. At the same time, you can master the assembly and maintenance technology of computer networks, and master the use of common tools and software [2]. The VR technology can realistically simulate the real environment of the user in the natural environment on the computer, and the VR technology is combined with the continuous development of computer network technology and computer graphics technology [3]. It breaks the traditional two-dimensional plane interaction mode based on the Web, and realizes the second generation Web technology (Multimedia + Virtual Reality + Internet) based on Web3D three-dimensional interactive mode. Using the technology of virtual reality, users can accurately depict what happens in the real environment on the computer, and can analyze their situation with the computer [4]. At the same time, the traditional registration experiment method can not well arrange all students to carry out experiments in an orderly and efficient manner. From this, we can see that experiments play a decisive role in natural science. Under this situation, it is an important task for us to quickly cultivate high-quality network design talents with knowledge innovation ability and advanced network management talents [5-6].

In recent years, information technology has developed rapidly, and the progress and popularization of computer network technology are particularly noticeable. Because in the highly developed era of modern science and technology, the performance and accuracy of experimental equipment are increasingly demanding, but some experimental equipment is often more expensive, not all scientific research institutions can easily purchase [7]. If each scientific research institution has such resources separately, it is often inefficient to use them, resulting in the idleness and waste of resources. From the hardware level, we can further cultivate students' practical ability to analyze and solve problems independently [8]. Using this technology to establish a VR-based Network Virtual Laboratory for students to conduct various experiments in a virtual and real experimental environment on the Internet has become the direction and trend of educational reform and development under the new model of distance education [9]. It makes a lot of sense to create a network virtual lab. It doesn't need to be as much as a normal lab. The cost of hardware support is

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very small, and resource sharing is better. With the popularity of the network, the objective conditions for conducting experiments in the dormitory using personal computers have matured, so it is very important to increase the remote experiment function in the functional transformation of the laboratory system [10]. The level of experimentation, the perfection of experimental methods and facilities are important aspects to ensure and improve the quality of teaching, and also an important aspect of cultivating students' comprehensive quality.

2. Design Implementation

2.1. Service-Terminal

The application server application server is responsible for real-time acceptance of various information flows sent by the teacher console and the student terminal, and forwarding data, storing files, and performing various operational controls. As a very important part of the virtual experiment system, it contains the hardware design part of the computer and its installation demonstration process, and even the later maintenance. We should prepare this part of the funds in the early stage. After logging in to the system, the system administrator can post information, view the course selection, enter optional experiments, manage student information and teacher information, add, modify, and maintain data for the pre-test papers. According to the login module, the user's legitimacy, identity and time of access are determined, and different functions are given according to different identities. According to the logout module, the logoff time of the user is determined. Complete the input and modification of user's basic information. User's basic information includes student's school number, name, class, major, user name and password. When students send out request commands, the module sets up experiment mode according to the experiment category in the information base and enters the corresponding virtual experiment environment.

A large number of key applications are running on the Internet. IP address embezzlement and private DHCP servers often occur on the Internet, which destroy the normal operation of the network. Every network gradually changes from free to charging appropriate usage fees. At present, there are three main authentication methods: PPPOE (Point-to-Point Protocol over Ethernet), Web/Portal and 802.1x. The technical characteristics of the three authentication methods are compared as shown in Table 1.

Table 1 Comparison of PPPOE, Web/Portal and 802.1x authentication technologies

Authentication method	Web/Portal	PPPOE	802. 1x
Standard Degree	Manufacturer Private	RFC2516	IEEE
Packaging overhead	Small	More	Small
Access Control Mode	Device Port	User	User
IP address	Pre-authentication allocation	Post-certification allocation	Post-certification allocation

2.2. Client

Teachers and students complete the experiment control, communication and cooperation through the client browser. In addition, we can build a multimedia three-dimensional model and a virtual reality model language sharing virtual world on the Internet. With this new model language, we can realize real-time communication on the Internet, and also build a three-dimensional virtual world. If users want to log on to several network devices remotely for experiment, Telnet can go to the corresponding port of the server running the gateway control system. For teachers, you can calculate the monthly class hours. For students, you can check out late, early leave and absenteeism to achieve the name function. In recent years, with the progress of society and the development of science and technology, the development of data compression technology has also entered the practical stage from the basic theoretical research stage. Under the promotion of multimedia boom, a variety of image compression coding techniques and speech coding techniques have been

produced. Hierarchical sub-rights are used to manage the system to ensure data security. Its functions are: fill in the experimental report, check in the student, etc., and can be generated in the webpage using JSP technology.

3. System Development and Operating Environment System

3.1. Virtual reality technology (VR)

Virtual reality technology has the characteristics of strong substitution and strong interaction. The most critical technology in virtual reality technology is virtual reality, which is also the key to the realization of this system. The operation process is roughly as follows: the remote user first connects to the gateway control server through the network, and indirectly connects to the access server via the gateway control server program. The reverse Telnet function is used to connect to the routers and switches in the lab to exchange data with the control server program on the gateway. In order to achieve a higher utilization rate of the experimental instrument, the experimental center divides each experiment into multiple different selection times and different experimental stations. Broadband Integrated Services Digital Network (B-ISDN) and its ATM are an important research and development achievement. Complete user role assignment, modification and permission settings. The roles can be divided into students, data managers and system administrators. In the process of building a three-dimensional model, the following two steps are needed.

Figure 2 shows the network architecture for maintaining the experimental system. Field experiment system is the starting point of this system. It completes the real-time monitoring of the experimental process and the collection, storage and processing of experimental information. After processing, experimental information can be transformed into a form of long-distance network transmission.

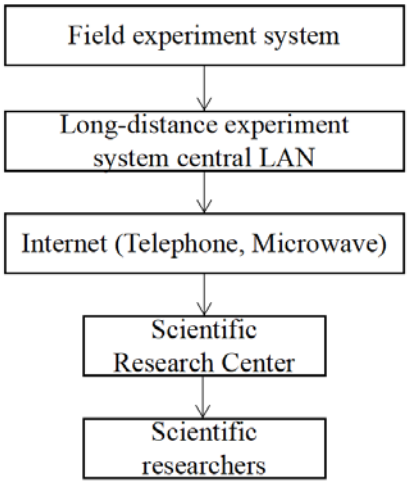

Fig.1. Maintaining the network architecture of the experimental system

3.2. Dynamic website database technology

The development of the entire system is currently considered to be the most suitable for developing dynamic websites, and this technology is very cost-effective compared to other technologies. Add, modify, delete, update and other data such as computer network component definition and design data, CAD drawing files, engineering analysis and verification data, manufacturing plans and specifications, product manuals, product notes and multimedia files. This completes the control of the laboratory equipment, configures the equipment, and achieves the purpose of remote experiments. Students can choose specific courses according to different experimental categories, levels and laboratories. The system marks the selected experimental courses and can not be re-selected. So this specification defines what application developers can use, and network software vendors can implement a set of library function calls and related semantics. Enter the name or model of the component to view all relevant data and information of the

component. And it can realize fuzzy query, facilitate material management, and easy to query and retrieve all materials.

4. Conclusions

The establishment of computer network and maintenance experiment system based on virtual technology not only reduces the experiment cost, but also saves the research project development research cost. Moreover, it has played the role of the existing experimental equipment, breaking through the limitations of the traditional teaching mode limited by time and place, and achieving a high sharing of information and experimental resources. With the continuous development of VR technology combined with artificial intelligence, neural network and other technologies, it will make its various functions more perfect. The remote experiment system has the advantages of saving funds, arranging experiments in an orderly way, improving the utilization rate of equipment, protecting experimental equipment and prolonging the experimental period. It will be widely used in practical teaching in the future. In addition to computer network experiment teaching, most of its functions can also be applied to other computer courses experiment teaching, which has a certain degree of universality. This paper only puts forward the general idea and some technical problems of the remote experiment system, hoping to arouse the attention and research of the researchers who are interested in this aspect. It can be widely popularized and applied, and play an important role in promoting the development of science and technology in China.

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