

Construction of Public Computer Room based on Desktop Cloud

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Abstract: *This paper analyzes the problems encountered in the construction and management of Public Computer Room and the existing experimental teaching demand of Public Computer Room as well as its application in Southwest Petroleum University, and puts forward the construction scheme of Public Computer Room oriented to industry-university integration based on Desktop Cloud. In view of the present management practice of public computer room in SWPU, this paper puts forward the teaching and experimental environment scheme by using the platform of OS-EASY Education Desktop Cloud. The actual construction, deployment and daily use of the scheme make it not only convenient for the administrator to centrally manage the terminal, but also greatly reduce the difficulty of operation and maintenance, so as to create a green cloud computing room of the new era.*

Keywords: integration of production and learning; OS-EASY education desktop cloud; construction scheme.

1. Introduction

Under the background of the deepening reform of education informatization in China, some universities are building public computer teaching rooms, using advanced virtualization technology and cloud computing to provide highly efficient and flexible teaching environment and experimental environment, promote the further integration of information technology and basic education, and improve the overall support ability and service level of the education platform ^[1]. The public computer teaching room based on desktop cloud is the development direction of education industry informatization and smart campus. In view of the development trend of information technology, cloud computing, virtualization and other technologies have been very mature, and the Ministry of education also strongly advocates the use of new technologies to improve education service level. This paper proposes to use the latest virtualization technology and cloud computing to build the desktop cloud public computer teaching room oriented to the integration of production and learning, to support the experimental teaching reform of colleges and universities with the help of industry-university cooperation, so as to serve the teaching, simplify the management of public computer room, and improve the management level and professional technology level.

2. The current situation of the construction of public computer teaching room

The Network and Information Center of Southwest Petroleum University (hereinafter referred to as the Network and Information Center) is the department responsible for the school's network and information work, and is an important support for the "Double First-Class" construction of the university. It is mainly responsible for the planning, design, construction, operation and maintenance, continuous improvement and user service of informatization infrastructure, data platform and information system, information teaching, providing safe, stable, reliable, efficient and easy-to-use information environment for teaching, scientific research and management, boosting the

improvement of school management and service level and decision-making support ability, and promoting the development of relevant disciplines and knowledge innovation ^[2].

The network information center manages 11 computer rooms, 218 multi-media classrooms, and more than 3300 sets of equipment. In recent three academic years, the rate of computer teaching experiment is 100%, and the proportion of comprehensive and designed experiments is more than 82%. The total workload of computer operation in each academic year is nearly 700000 computer hours, and the proportion of multimedia teaching courses is more than 94%. At present, the common computer room and multimedia classroom have the following problems:

- 1) The superintendents of the computer room and multi-media classroom lack professional knowledge in computer. At present, there are only 4 technicians and the rest are non-technical personnel.
- 2) The workload of computer room and multimedia management is heavy. The existing computer rooms and multimedia rooms in the center are managed by both regular staff and temporary workers. They not only provide multimedia equipment, computer use guidance and daily maintenance for teaching and student activities, but also arrange and adjust the use of the computer room according to the curriculum. Due to the fact that the multimedia classrooms are set in different teaching buildings which are far away from each other, and the shortage of personnel, some malfunction cannot be dealt with timely, which will cause troubles in teaching.
- 3) It is time-consuming and labor-consuming to register or activate software, deploy various kinds of graded examination system, world wide examination system, teaching software and national medical examination, etc.
- 4) The computers in traditional computer rooms are faced with security risks due to some users' lack of professional training and computer security awareness. They are very likely to be attacked by various computer viruses such as Trojan horse. Various improper operations lead to system failure, which affects teaching activity.

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With the problems of the shortage of management personnel, heavy daily maintenance tasks, poor stability of teaching environment, fast software updating, and long system recovery time getting increasingly prominent, It is an inevitable trend to build the public computer teaching laboratory of education desktop cloud by using the new generation of computer technology to replace the traditional PC, which is to meet the needs of the development of informatization work in SWPU, and improve its information technology.

3. Construction scheme of public computer teaching room based on desktop cloud

In order to adapt to the development of education industry, os easy E-vdi desktop cloud service emerges as the times require. Its characteristics are that the operating system and application software of traditional PC terminal are installed in the virtual machine of the background server. The server side completes all calculations. Teachers and students can access the virtual machine by using notebook computers or traditional PCs, so as to realize centralized management of desktop environment, zero maintenance of terminal and elastic allocation of hardware resources^[3].

Using centralized management and centralized computing, the calculating is done in the terminal but by storing and calculating data through the network. The public computer teaching room of SWPU is located in the Sixue Building. There are 9 computer rooms, 3 on each floor and 70 computers in each room. These public computer teaching rooms serves basic courses of the whole university and the major courses of some colleges. Some of the scenarios are listed below:

- 1) They are used for the teaching of Computer Foundation, CAD drawing, Photoshop and other courses. Different courses may require different operating systems. For example, foreign students need to use English operating system in class, so the operating system must be switched to English before class.
- 2) They are used for Computer Rank Examination. A special operating system and professional software is needed according to the requirements of the examination. The computer room needs to be equipped with a server to manage the examination machine. The server is equipped with encryption lock for important operations such as starting and ending the examination. This mode of server in the computer room requires the use of traditional computers or workstations.
- 3) They are used for ATA, ATS and other recruitment examinations. ATA examination needs a relatively pure operating system, equipped with test drive software, and the computer room needs to be equipped with a server to manage the examination machine in the computer room, and the data of the examination machine will be stored in the server. Therefore, the pure cloud desktop computer room environment needs to be equipped with a traditional computer or workstation to form a network structure in the computer room where the server is connected to the terminal through the switch.

After eliminating the traditional desktop computers that have reached the retirement age, Southwest Petroleum University has built seven cloud desktop computer rooms. The construction and deployment of cloud desktop are introduced as follows:

- 1) UPS configuration. The server end of cloud desktop is powered by UPS machine room. The ups room is deployed on the first floor of Sixue Building, and the server room is deployed on the third floor of Sixue Building. The power line between the server room and UPS is within 10 meters.
- 2) Server configuration. The storage and computing of VDI cloud desktop depends on the server side, so it is necessary to configure multiple high-performance servers. Dell r630 server is used for the cloud desktop server on the third floor, and nf5280m5 server of Inspur is used for the cloud desktop server on the fourth floor.
- 3) Cloud desktop construction equipment composition. The important equipment used in the whole cloud desktop environment are main and standby control server, node server, storage server, storage switch, network switch in server room, network switch in terminal room, terminal, etc.

The deployment of various parts of cloud desktop equipment under VDI architecture in public teaching computer room.

1) Server side deployment

The calculation and storage of VDI are carried out on the server side. At present, there are 6 cloud desktop computer rooms in the network information center of Southwest Petroleum University, with 70 terminals in each room. The server adopts 15 high-performance servers, including two main and standby control servers. In case of failure, the main and standby control server can complete the senseless switching, which avoids failure of terminals after the main control server is down, which may cause teaching accidents. In addition to servers, the cloud desktop architecture of the three computer rooms on the third floor also has storage servers, which are used to store the virtual system of teaching desktop. The storage servers and node servers are connected through storage switches. The three computer rooms on the fourth floor were built after the cloud desktop upgrade of ooyi company. The node server and terminal are connected directly through the network. In use, the response speed of the latter is apparently faster.

2) Network line deployment

The VDI server is directly connected to the core switch. The core switch is connected to the switch in the computer room through optical fiber, and the computer room switch is connected to the terminal through 6 categories of cables. During the deployment process, attention should be paid to reducing the number of routers or switches between the VDI server and the terminal, and using shorter lines to achieve faster transmission speed and good user experience. Considering that there are 70 terminals in the computer room, each room needs about three switches, which are connected by stacking.

3) Computer room terminal deployment

The terminal of the computer room adopts the ooyi cloud

terminal, which is small in size, and needs to be equipped with a monitor, a keyboard and a mouse with a USB interface. The resolution of the display does not need to be unified. The cloud desktop technology can automatically match the resolution of the display.

4) Deployment of service platform, system and software

The service platform is accessed through web pages. The service platform centralizes the management of terminals, including viewing server resources, increasing or decreasing terminals, deploying operating systems and software, remote monitoring terminals, batch shutdown, etc.

The operating system and software of cloud desktop can be directly deployed on the service platform, which greatly facilitates the management and maintenance of computer room. Cloud desktop allows multiple operating systems to be deployed on the service platform. It takes about 15 minutes to create a template. The template corresponds to the operating system of the terminal. In the application scenario mentioned above, before the class for foreign students, the operators only need to activate the English operating system template on the service platform by turning off the rest of the operating system to switch to the English operating system. The operation can be done quickly in the office. The service platform also provides a timetable. By moving different operating system templates into the timetable, setting the class time, the service platform can automatically complete the switching of different operating systems.

4. Conclusion

Cloud desktop technology is widely used in public computer laboratories, which can not only complete the deployment of the multiple terminals system and software in the office with lower cost but greater convenience and efficiency, but also reasonably allocate resources. Most of the time, the resources are evenly distributed to all terminals, but under specific circumstances, the server concentrates a large number of resources to a terminal for complex calculation. Users do not need to be limited to specific places and devices, and they don't have to carry their own hardware computers, as long as there is network, they can find their own proprietary desktop through the cloud desktop platform.

However, some problems still exist. On the one hand, cloud desktop depend highly on network. If the server room is far away from the terminal, the operation response speed may be slow, and external devices may fail to be identified; On the other hand, differential deployment is not easily completed. These problems will be solved in later work.

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Author Profile



Ji Kan received the master degree in Computer software and theory from Southwest Petroleum University in 2012, and have been working in the Network and Information Center of Southwest Petroleum University since my graduation in 2012.