

Design and Practice of Cloud Desktop in Public Computer Room of Colleges and Universities

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Abstract: *The public computer room is one of the important educational environment facilities for practical teaching in colleges and universities. Aiming at the problems existing in the traditional computer room, a design scheme based on cloud desktop is proposed. The plan puts forward design requirements in terms of environment, operation and maintenance, use, safety, management, etc., combined with the practice of Southwest Petroleum University, it is found that the difficulty of operation and maintenance of management personnel is reduced, the environment of the teaching system is safe and stable and continuous operation, and the experience of students is improved. Further promote the development of education informatization.*

Keywords: public computer room, cloud desktop, VDI

1. Introduction

With the rapid development of computer technology and network technology, it has led to continuous innovation and deepening reform of the informatization construction of the education industry. Among them, computer rooms and laboratories, as important basic platforms for experimental teaching, have become the key construction parts of school education informatization. It not only undertakes the teaching and experiment tasks of different colleges and different majors in the school, but also provides a computer environment for various examinations and trainings. As the scale of the computer room continues to expand, the number of computers is increasing. Facing the increasing number of various teaching software, fast updating, strong practicality, difficult network behavior control, network virus proliferation and other problems, the shortage of computer room management personnel, maintenance Problems such as heavy tasks, long recovery time, and poor stability of the teaching environment have become increasingly prominent. How to use the new generation of information technology to build a system that is easy to manage and maintain, and can meet the needs of diverse teaching environments, has become a safe and reliable modern computer room. The need for the implementation and construction of school informatization.

2. Problems in the traditional public computer room

2.1 Heavy workload of computer room operation and maintenance

Thousands of computers in a public computer room are generally managed by several administrators. Daily maintenance of the computer is necessary to ensure that it can be used for normal teaching, and some problems related to the teacher's computer and computer must be solved in time during the class. The workload is huge, and it is often impossible to meet the multiple concurrency in a short time. The situation arises.^[1]

At the same time, after a semester of use, the computer system in the computer room has more or less operational problems. Therefore, before the beginning of the new semester, a

large-scale system reinstallation is generally required, which is a huge workload. Traditional management methods require a step-by-step transmission system for each computer room, which is time-consuming and labor-intensive. After the system is installed, most of the current public computer rooms in the school install all the software needed for teaching into a system environment. Sometimes there are hundreds of kinds of software, which causes the system to take too long to boot up, and it runs slowly and easily. Conflicts, crashes, troublesome upgrades and maintenance, if the software has unresolvable conflicts, then the two softwares must be installed in different computer rooms. If there is a poisoning or system problem during the update process and IT staff does not find it, it will cause the updated system to have problems affecting all courses, and the complete mirroring must be re-distributed.

2.2 The teaching environment is very different

The public computer room needs to be based on the teaching, training, examination and free access of students in various disciplines. Students of different grades, classes, and disciplines will get different desktop environments when using the same computer room, which needs to meet multiple teaching modes. The multi-system, multi-environment or even individualized needs of the system, do not cause the expensive computer room to be idle due to the delay of system maintenance and upgrades, the inability to provide the required environment, or the worry of affecting the subsequent teaching.

2.3 Student behavior is difficult to control, and desktop security risks are high

Due to the large number of students in the computer room, different operating habits, and strong destructiveness, the probability of being invaded by viruses and Trojan horses is very high. Various operations often cause system security failures and affect teaching use; at the same time, some desktop management platforms require servers to be online Support, once the server is disconnected, the terminal system cannot be used, causing a teaching accident.

3. Cloud Desktop Architecture

3.1 VDI architecture

VDI (Virtual Desktop Infrastructure) is to install and run a virtualization management program on a physical server to realize the virtualization of server hardware resources, and then virtualize virtual machines for different users on this basis. This architecture concentrates management and operations on the server side, which requires high server performance and network quality, while the client side is lightweight.^{[2][3]}

3.2 IDV architecture

IDV (Intelligent Desktop Virtualization) is a desktop virtualization technology with centralized management on the server side and distributed computing on the client side. It makes full use of client resources to run virtual desktops, thereby reducing the burden on the server side, but requires the client to require The same configuration is supported.^{[2][3]}

3.3 VOI architecture

VOI (virtual operating-system infrastructure) is an improved diskless workstation solution. Its working principle is: the fat client terminal adopts the network boot mode and directly loads the operating system image stored on the server (also called disk Mirroring) to the local hardware of the terminal to run. It has almost the same experience as a traditional computer. It does not require high server performance, but it requires the client to have better data and image processing capabilities.^{[2][3][4][5][6]}

4. Cloud desktop solution design for public computer room

4.1 Centralized management platform

The desktop virtualization platform adopts the B/S architecture and a single and simple full graphical management interface. Users can access the platform through IE, Firefox and other browsers on any networked PC. Servers, users, instances, and scenarios can be implemented on the platform. Comprehensive centralized management of, terminals, storage, etc.

The centralized deployment mode of the desktop virtualization platform deploys the virtual desktop environment in the data center, and the terminal only performs display and operation processing. Students can access their own virtual desktop environment through the network using the thin client, which is very convenient and flexible; The software and hardware of the data center in the local area network are managed, which simplifies the management and maintenance.

4.2 Rapid deployment of teaching environment

The desktop virtualization platform provides the function of quick mirroring template and the function of saving virtual desktops as templates, which can facilitate the creation of

various teaching environment templates. After the templates are created, batch desktop environment distribution can be realized to achieve the purpose of rapid deployment of the teaching environment. The installation and configuration changes of teaching application software can be centrally operated on the server side through the management console, which greatly simplifies the configuration and deployment of the teaching office environment.

4.3 Quickly switch the teaching environment

Through, the client of the desktop virtualization platform can switch different teaching environments and change different operating systems at any time to meet various teaching and experimental needs. Through the channel management function to quickly build a multi-system environment in three seconds, a desktop operating system can create up to 256 system environments, without occupying additional hard disk space, and without installing multiple operating systems to achieve multiple uses, and better adapt to different professions and classes Of students get on the computer to meet the needs of temporary system environment construction such as rapid deployment of computer rank examinations.

4.4 Comprehensive network management

The virtual desktop system has comprehensive network management functions, which can limit the network bandwidth of each virtual desktop to avoid the problem of a desktop occupying most of the bandwidth and causing other desktops to access teaching resources slowly. At the same time, the administrator can also follow the actual situation. For teaching needs, flexibly restrict access to internal and external networks, disconnect access to external networks when necessary, and limit the URLs that the device can access to avoid resource abuse. In addition, it can also prevent ARP attacks that have the greatest impact on the network. Behavior, escort the smooth flow of the network.

4.5 Flexible and safe teaching environment

The desktop virtualization platform has a built-in cluster function. It is a distributed virtualization platform. Each server in the platform is called a computing node. When the scale of teaching and office use expands, you can easily add new ones to the platform. Compute nodes can be expanded horizontally to expand the computing power of the entire desktop virtual platform. When a server fails, the entire virtual machine can be migrated to another physical server to restart in real time, ensuring the continuity and stability of terminal teaching service access, reducing application downtime, and ensuring teaching continuity. To achieve dynamic migration, 2 or more servers are required.

4.6 Unified Control of Desktop Behavior

The system provides a wealth of remote management functions to facilitate the management and maintenance of the computer room administrator. Supports terminal equipment use control, program use control, flow restriction, network use control, screen monitoring, student computer behavior query, etc., to standardize student computer behavior.

Provides a strict and complete management function for students' on-board operation. The management teacher controls the Internet access of students by setting up the network access whitelist and process whitelist through settings, and prohibits them from using software that has nothing to do with teaching.

These effective behavior control functions make students have to concentrate on the classroom without having the opportunity to play games and chat. They can also ensure the security of the computer room network and prevent the spread of viruses. In this way, students can concentrate on listening in class, and teachers can teach more easily.

5. Practice of Cloud Desktop Solution in Public Computer Room

Based on the comparison of three cloud desktop architectures and design solutions, Southwest Petroleum University comprehensively considers the requirements of construction costs, operation and maintenance costs, security, behavior control and other requirements, adopts thin client solutions and VDI architecture to create a distributed desktop cloud system for the school. Realize the functions of unified deployment, remote update, and centralized maintenance of the public computer room environment, and use the cloud desktop to complete the public computer room covering the entire school.

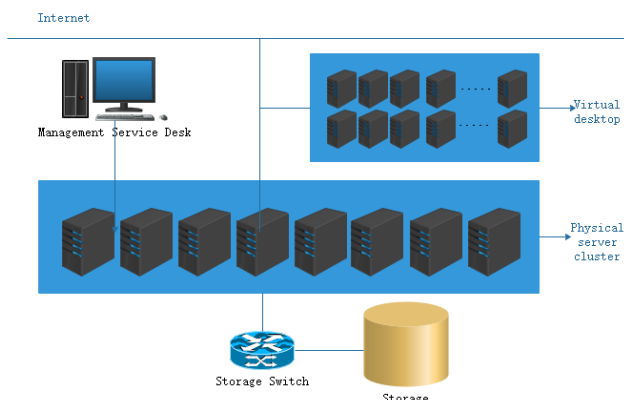


Figure 1: VDI architecture

It adopts 8 servers to form a server group, and is equipped with 210 cloud terminals at the same time, meeting the use of 3 computer rooms. The specific hardware configuration list is as follows:

Table 1: Hardware configuration

Device name	Detailed parameters
Server	CPU:Two 8-core CPUs Memory: 64GB DDR4; Hard disk:480G SSD
Cloud terminal	X86 architecture, frequency above 1.7G, with display chip
Storage array	Storage controller: configure two storage controllers; Host interface: support 8Gb/s FC host interface and 1Gb ISCSI interface; Hard disk: 12T (contain Two 480G SSD)



Figure 2: Actual machine room scene

6. Conclusion

Through the practice of the cloud desktop public computer room of Southwest Petroleum University in recent years, it has effectively reduced the difficulty of management and maintenance for management personnel, improved the response speed of terminal maintenance, ensured the safe and stable and continuous operation of the teaching system environment, improved student experience, and promoted the development of education informatization .

In the next step, the school will build a virtual simulation computer room and will further explore the VOI and IDV architectures that require higher computing performance and image processing performance for the terminal.

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Author Profile



Chen Xiaojun received the master degree in Computer software and theory from Southwest Petroleum University in 2007, and have been working in the Network and Information Center of Southwest Petroleum University since my graduation in 2007.