2017 2nd International Conference on Education, Management and Systems Engineering (EMSE 2017)
ISBN: 978-1-60595-466-0

Virtual Simulation Clouds Laboratory for the MOOC Experimental Teaching Platform

Zhi-huan ZHANG, Long-hua MA* and Chao HU

Ningbo Institute of Technology, Zhejiang University, Ningbo 315100, China

*Corresponding author

Keywords: The experimental model, The virtual simulation, MOOC experimental teaching sharing platform.

Abstract. Massive Open Online Course (MOOC) is a new type of teaching model. It is difficult for such an online learning model, which is different from the traditional classroom and laboratory, how to carry out practical education to cultivate students practical ability. The author fully analyzes the problems and shortcomings in MOOC teaching in colleges and universities, and puts forward the reform of experimental teaching method and the establishment of a new MOOC virtual simulation experiment teaching platform. Students through the "MOOC experimental cloud" personalized desktop and application virtualization platform for virtual simulation experiments; at the same time can expand the practice areas, the development of virtual simulation experiments. Teachers can experiment with the MOOC experimental cloud platform for typical demonstration and experimental teaching broadcast, to improve the experimental teaching ability, enrich the experimental teaching content, reduce the experimental cost and risk.

Introduction

As a new type of online teaching mode, the massive open online course has entered into people's field of vision, which has a great impact on the traditional higher education[1].

This new online education approach makes the world's large-scale sharing of quality education resources and make personalized learning possible. This is not only the innovation of educational technology, but also bring the education concept, education system, teaching methods, personnel training process and other aspects of profound changes. Many colleges and universities, especially some elite schools have implemented large-scale open online courses to meet the requirements of higher education development[2]. But for such an online learning model, different from the traditional classroom and laboratory model, how to carry out practical education to cultivate students hands-on practical ability to become a lot of experts and scholars to think about the problem.

With the rapid development of network technology, virtualization and cloud computing technology has been gradually applied to the construction of campus information for the information MOOC teaching provides a new solution for teachers and students have a better user experience. To solve some problems in traditional professional colleges in the room, such as the purchase of PC hardware investment cost is high, the use of application software, the old equipment room in installation and deployment, upgrade, patch management, maintenance workload, and a large number of different uses, different versions of the software running indifferent environments can cause compatibility problems and so on, virtualization technology has brought the recipe for solving these problems. In view of this, in the limited experimental equipment based on Citrix technology in Desktop Deployment and application virtualization and specific examples are given based on the introduction of PVS software and hardware provide uniform management of diskless workstation , realize mobile learning and experiment of teachers and students, provide reference for the application and desktop virtualization.

The development of MOOC depicts a new educational blueprint for us: experimental teachers in front of the computer, the laboratory in the clouds, students in the mobile phone or tablet, the traditional classroom gradually become learning "club".

Desktop and Application Virtualization Technology

Desktop cloud is a form of cloud computing, desktop cloud through the desktop terminal equipment to access the cloud application or the entire virtual desktop. Simply put, the university's desktop cloud platform and the teachers and students through the notebook, desktop, tablet PC, PAD and other equipment anytime, anywhere through the campus network access to the server's own virtual desktop or virtual applications. The difference between desktop and application virtualization is that the former is pushed to the thin client as a user's desktop operating system such as "Window7", which is an application software such as "engineering control foundation" virtual simulation[6-7].

VMware, Citrix and Microsoft are the mainstream virtualization products on the X86 platform, with VMware dominating server virtualization, and Citrix dominates desktop and application virtualization. Virtual Desktop Technology Citrix XenDesktop Delivers Windows desktops directly and more reliably through the data center at a lower cost[8-9]. Virtual application technology Citrix XenApp supports end-to-end Windows application delivery systems for client and server application virtualization[3-5] ; Virtual Receiver Citrix Receiver helps IT departments effectively control the user's experience to ensure comprehensive data, application and desktop support.

The thin client can even be PC the old version of the hardware[10-14], using Web login, remote access protocols rely on low bandwidth efficient transmission, only the keyboard and mouse, screen instruction information, a central server after authentication and deployment environment put onto the thin client and desktop applications, like the use of thin client user convenience the local computer. The network administrator can complete the deployment and unified management of the user's desktops in a short time through the remote access method. It can be seen that the desktop cloud platform has a good advantage in terms of management efficiency, reduced overall cost, access flexibility, data access and so on[15-16].

"MOOC Experimental Cloud" Desktop and Application Virtualization Platform

“MOOC Experimental Cloud” desktop cloud platform is based on XenServer, server-based desktop and application virtualization, desktop cloud platform architecture shown in Figure 1, including thin client network access, such as computer / mobile phone / tablet, server resources Pool, that is, virtual desktop and application APP, network storage, etc[8-9].

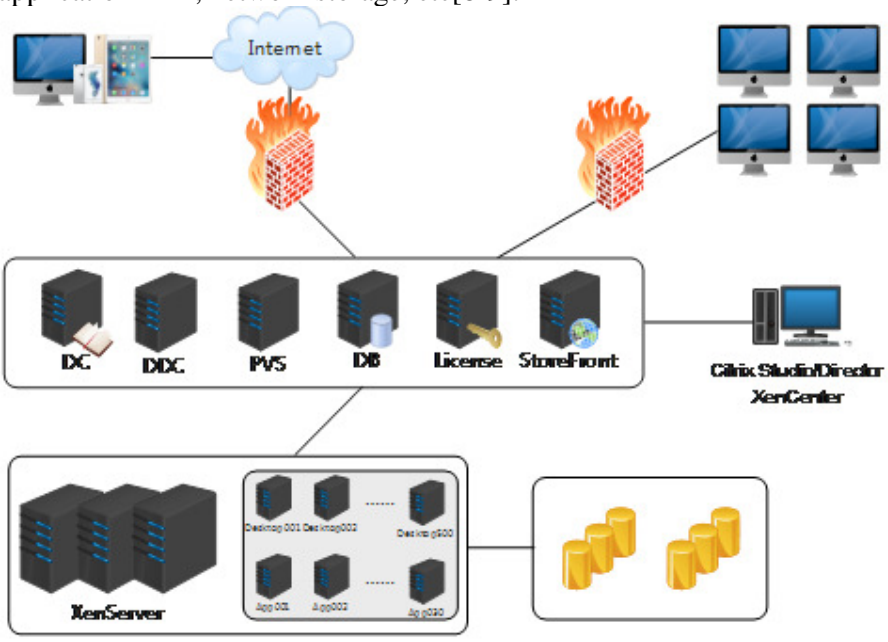

Figure 1. MOOC cloud lab desktop platform.

Among them, XenServer will be a number of logical servers virtual into a server, can provide virtual machine drift, dynamic resource pool scheduling, improve data center reliability and other core functions; DC provides a single domain environment identity management; core components DDC is responsible for virtual machine Management program to communicate desktops and applications to manage user access and management of desktop and server reboot cycles through policies; PVS allows real-time provisioning or reconfiguration of computers from a single shared disk image, managing the target device as a collection of devices , Allowing the client to remove the hard disk can still boot from the network card to start the remote virtual disk operating system; DB (SQL Server) store all the configuration information; License can provide software product authorization and authentication; StoreFront provides user authentication portal website and manage the user's access to the desktop and application storage via Receiver.

XenCenter enables network administrators to connect to XenServer and manage and maintain virtual machines remotely; Studio makes it easy for network administrators to connect to DDC to complete desktop environments and create and assign desktops to users.

Virtual desktop and application configuration information, see Table 1, a small room, the student user has a campus network users can access the Windows7 mobile visitors; exclusive desktop, Win2012 shared APP desktop application, CAD2016, MATLAB, LabVIEW, and other commonly used software, and engineering control virtual simulation experiment.

Table 1. Configuration information for virtual desktops and applications.

User	Number	Access resources	vCPU	RAM	Personal vDisk	Number of blade servers
Campus network mobile visitors (teachers and students)	20	Windows7 exclusive desktop	2vCPU	2G	40G	2
Small computer room (student)	30	Windows7 exclusive desktop	1vCPU	2G	10G	2
Campus network mobile visitors (teachers and students)	50	Win2012 shared desktop APP applications，CAD2016,MATLAB, LabVIEW and other commonly used software, "engineering control foundation" virtual simulation experiment	4vCPU	16G	/	2

The teachers and students through the existing campus network room, thin client terminal mobile phone or PAD mobile terminal, or external network VPN login, the first login to be installed online Citrix Receiver plug-in, enter a specific account and password can be anytime, anywhere Into the Citrix data center, access to their relatively independent personalized desktop and application environment.

Conclusion

The use of existing network equipment to build a "MOOC experimental cloud" desktop and application virtualization platform, to teachers and students to bring a new user experience, to facilitate teachers and students to safe, efficient and flexible office and learning. Desktop and application virtualization technology to help reduce the cost of information technology enterprises and universities to enhance the efficiency of desktop management and operation of the network management, fine-grained security access control and protection of internal network access data security, will promote the MOOC experimental work environment from the ordinary PC to mobile terminal. And provide reference for the construction of higher education information construction and MOOC experimental teaching demonstration center.

Acknowledgement

Project supported by the Zhejiang provincial educational technology research and development program (JB075) and the research project of Ningbo Education Science Planning (2016YGH035) .

This research was financially supported by the National Nature Science Foundation under Grant (No. 61633019).

This work was supported by National Natural Science Foundation of China (61273332) and Ningbo Sc. & Tech. (Innovation Team) plan project (2014B82015).

References

[1] Wang, M. & Wang, Y., A Study on Computer Teaching Based on Computational Thinking, International Journal of Emerging Technologies in Learning, vol. 11,no.12,(2016)72-74.

[2] Spector, J.M., Remarks on MOOCS and Mini-MOOCS, Educational Technology Research and Development, vol. 62, no. 3, (2014)385-392.

[3] Gráinne Conole, Designing Effective MOOCs, Educational Media International, vol. 52, no. 4 , (2015)239-252.

[4] Jon Baggaley, MOOCS: Digesting the Facts, Distance Education, vol. 35, no. 2, (2014)159-163.

[5] Kursat Cagiltay; Sezin Esfer, Best Practices Analysis of MOOCs, E-Learn: World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education, vol 14,(2016)138-144.

[6] Yong Chen, Investigating MOOCs through blog mining, The International Review of Research in Open and Distributed Learning, vol. 15, no. 2 ,Apr 01, 2014.

[7] Wayne Pricer, At Issue: MOOCs, an Annotated Webliography, Community College Enterprise, vol. 19, no. 1, (2013) 55-60.

[8] Stephen Marshall, Exploring the Ethical Implications of MOOCs, Distance Education, vol. 35, no. 2, (2014) 250-262.

[9] Cameron Barnes, MOOCs: The Challenges for Academic Librarians, Australian Academic & Research Libraries, vol. 44, no. 3, (2013) 163-175.

[10] Fiona M. Hollands; Devayani Tirthali, Resource Requirements and Costs of Developing and Delivering MOOCs, International Review of Research in Open and Distance Learning, vol. 15, no. 5 , (2014) 113-133 .

[11] Hoi K. Suen, Peer Assessment for Massive Open Online Courses (MOOCs),International Review of Research in Open and Distance Learning, vol. 15, no. 3, (2014)312-327.

[12] Elizabeth L. Burd; Shamus P. Smith, Sorel Reisman. Exploring Business Models for MOOCS in Higher Education, Innovative Higher Education, vol. 40, no. 1, (2015)37-49.

[13] George Veletsianos; Amy Collier; Emily Schneider, Digging deeper into learners' experiences in MOOCs: Participation in social networks outside of MOOCs, notetaking and contexts surrounding content consumption,British Journal of Educational Technology, vol. 46, no. 3, (2015)570-587,May 01.

[14] Nan Li; Himanshu Verma; Afroditi Skevi; Guillaume Zufferey; Jan Blom; Pierre Dillenbourg, Watching MOOCs Together: Investigating Co-Located MOOC Study Groups,Distance Education, vol. 35, no. 2, (2014)217-233.

[15] Thomas Reeves; Curtis Bonk, MOOCs: Redirecting the Quest for Quality Higher Education for All, International Journal on E-Learning, vol. 14, no. 3, (2015)385-399.

[16] Paul Diver; Ignacio Martinez, MOOCs as a Massive Research Laboratory: Opportunities and Challenges, Distance Education, vol. 36, no. 1, (2015)5-25.