

# Computer-Classroom Scheduling System Based on Cloud Technology

*Li-Chih Lu<sup>1</sup> & Tai-Wen Yue<sup>2</sup>*

*Computer Science and Information Engineering, Tatung University,*

*No. 40, Sec 3, Zhongshan N. Rd., Taipei City 104, Taiwan ROC*

*jojoman33@hotmail.com<sup>1</sup>*

*twyu@ttu.edu.tw<sup>2</sup>*

## ABSTRACT

Following the progress of technology, the price of computer facilities has largely decreased while its efficiency continues to increase. Moreover, as PC becomes an important tool at work and in teaching, the repeating software and hardware upgrade procedures also caused a complication in management due to the need of purchasing or upgrading the system. Therefore, how companies and schools manage and use computer resources effectively will be an important lesson that shall be taken into consideration. With an ideal infrastructure, we no longer need to set a computer or to install or remove the software applications separately for a particular user or demand. The development of the computer visualization technology has created new opportunity for centralizing the management of computer software and hardware facilities.

The progress of virtual machine and technology also created a prosperous development of cloud computing and service-oriented applications. Cloud computing not only makes our life more convenient, but also enables us to use our resources more flexibly and effectively. An effective management of the school's computer classrooms has always been an issue that people from all departments and computer center wish to solve. This research aims to improve the installation, management and use of schools' computer through cloud technology with an expectation that the management of the installed system will be facilitated, teachers will win a great convenience in planning the classes and students will be happy to use the system for a better learning.

The design of the cloud computer-classroom scheduling system is quite practical as it has applied the cloud computing concepts, basic features, infrastructure and service pattern in the management of school's computer classroom. It enables teachers to plan the use of computer resources according to the class requirement and students to have the most effective learning in a well planned environment. Moreover, the resources will be managed and used in the most effective way.

The system includes three interfaces – managers, teachers and students. Managers are responsible to establish the account permission database and to maintain the operation of virtual machines; teachers are responsible to select the SPEC of the computer classroom virtual machine, to demand the requisite software packages, and to arrange the class schedule and location; By well control of VM-switching, students, thus, can carry out their learning with individual virtual machine during the hours and in the location arranged by the teachers without creating conflicts or disturbances with computer resources used by other classes.

This research has adopted the CAFÉ CAKE [1] visualizing platform to fulfill the scheduling management system of the visualized computer classroom. This platform supports Windows and Linux operating system. Besides, it also supports the API functions for VM management. The cloud mainframe studied in this research is installed in the IN WIN server [2] and the scheduling application and management servers are installed in the HP Compaq Elite 8000 mainframe. The structure of the system is shown in Figure 1. Through the CAFÉ CAKE interface, the cloud mainframe can monitor or adjust the efficacy of server resources. This research has carried out the management with a centralized method and installed a monitor and control system of virtual mainframe to control the existing server environment. Through this management mechanism, it is possible to clearly understand the status of using server resources and the status of server's loading.

The framework of the cloud computer-classroom scheduling system includes the schedule application system and schedule control / registration system. To setup the schedule and VM requirement, the system administrator and teachers can access the system through the internet browser installed on desktop, tablet pc and other devices. As for the computer classroom, teachers of the class and students can, through the cloud computer classroom schedule / registration system, connect to the scheduling control program via

thin-client computers. This program will firstly check the hours of the scheduled class before verifying the teachers and students' account. Items to certify include the IP location, teachers or students' account information, schedule calendar and so on. The user will be able to connect to his or her virtual machine through RDP and VNC, two transmission protocols, after the verification. The activities of the virtual machine will be influenced by the hours regulated by the standardized schedule of the cloud computer classroom scheduling system. That is, all the virtual machines will be operated according to the instructions of the schedule system unless there is other exceptional setting. The structure of the Computer-Classroom Scheduling System Based on Cloud Technology is shown in Figure1.

This research has used the virtualized platform installed by CAFÉ CAKE on IN WIN server. We have installed a number of virtual machines on the CAFÉ CAKE server and all the machines will be turned on and off at the same moment for experiment. The purpose is to actually test and record down the time difference of turning on and off the machine. To maximize the performance of the server, the result will be used to understand how many virtual machines can be supported by each one virtual machine server and such information will be used as a reference for the leading time needed for VM-switching between class changes.

This research has replaced the ordinary computer classroom with a cloud computer classroom. Together with a schedule arranged by the virtual machine, not only the management of the computer classroom has become simpler and more convenient, but also the resources will be used more effectively. Through the interface of single website, the managers, teachers and students will be able to complete their jobs and fulfill their need as an alternative way to solve problems often seen on the management of current computer classroom.

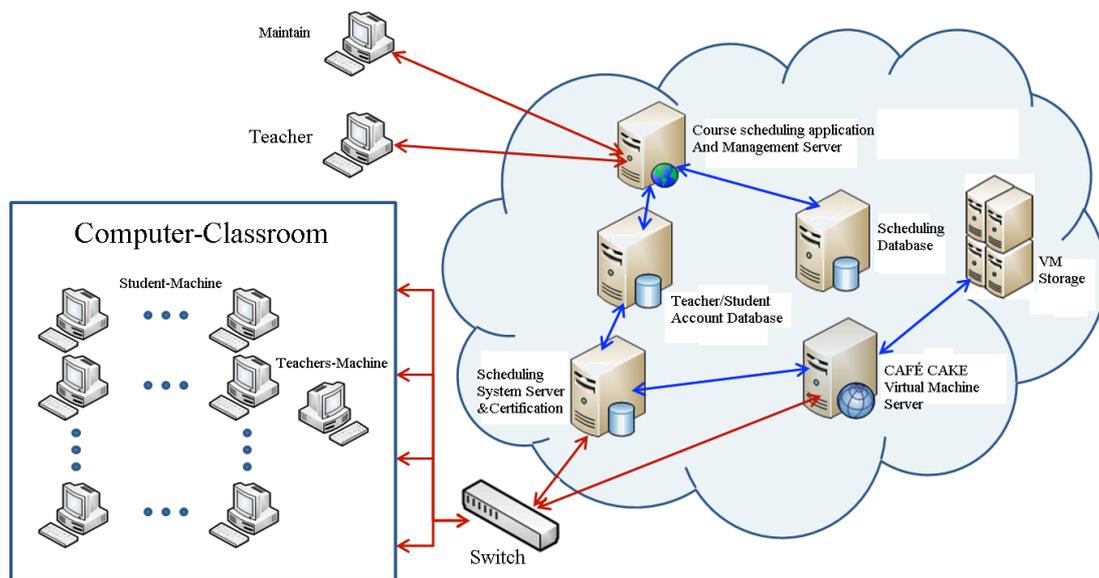


Figure 1. The structure of the Computer-Classroom Scheduling System Based on Cloud Technology

#### References

- [1] CAFÉ CAKE [http://www.iii.org.tw/Upload/file/2012\\_FY101/PDF/3\\_CAFE%20%E4%BC%81%E6%A5%AD%E9%9B%B2%E7%AB%AF%E7%B3%BB%E7%B5%B1%E8%88%87%E6%87%89%E7%94%A8.pdf](http://www.iii.org.tw/Upload/file/2012_FY101/PDF/3_CAFE%20%E4%BC%81%E6%A5%AD%E9%9B%B2%E7%AB%AF%E7%B3%BB%E7%B5%B1%E8%88%87%E6%87%89%E7%94%A8.pdf).
- [2] IN WIN server [http://www.in-win.com.tw/Server/zh/goods.php?act=view&id=IW-RS104-02S#product\\_tab](http://www.in-win.com.tw/Server/zh/goods.php?act=view&id=IW-RS104-02S#product_tab).

Key Words: Cloud computing, computer classroom management system, visualization technology, virtual machine.