Thin Client and Server Based Computing to Provide Integrated School and Class Room Management System in Malaysian Tamil Schools

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ABSTRACT

Most of the educational institutions now have extensive information and communications technology (ICT) in place. The cost of supporting, upgrading and replacing this equipment to provide a robust infrastructure for teaching and learning is increasingly onerous. This brings into question whether alternative network architectures, such as Thin Client computing could provide the required level of functionality with lower long- term costs and/or other benefit.

This paper addresses the use of thin client technology to provide optimum and cost effective solution for IT infrastructures which have the ability to integrate class room management application and school network management application with reliable and stable solution at minimum maintenance cost. The proposed thin client technology will be able to provide effective and secured centralized server based solution of schools with class room management systems integrated.

KEYWORD : Thin Client, school and class room management, server based computing

1 INTRODUCTION

This paper addresses the key area of institutional concern for the education sector, that of delivering effective and efficient school and class room management system in a flexible, secure, and accessible way to students in Malaysian Tamil schools. The system will adopt the thin client technology linked with centralized server to implement school and classroom management.

The proposed system will have secure integration with other key educational systems (e.g student records, module registration, and examination scheduling conducting trial exams and distribution of teaching materials), which will be delivered via network services and centralized server technology.

Thin client technology offers major advantages over conventional PC-based class room systems in terms of scalability, economy and sustainability. It can also offer additional flexibility in the range of school-teaching material and multimedia content that can be delivered without needing elaborate installation procedures or additional software to control the security, access and database.

2 INTEGRATION OF THE SYSTEM

The system integration of Thin client based School and Class room management system with open source technology consists of:

i) **School management System** software designed to automate a school's diverse operations from classes, exam to school events, calender and to create powerful online community, by bringing parents, teachers, and students on the common interactive platform.

ii) **Local Centralized Server Based Technology** that consists of storage Server well equipped with database using Linux Edubuntu server platform.

iii) **LAN/WAN network system** which allows thin client terminals to access the centralized server remotely via PXE LAN booting technology. This allows freedom for user to access their desktop from any thin client terminals within the network coverage.

iv) **Class room management System** provides teachers with ability to instruct, monitor and interact with the students either individually, as predefined group or to the overall class.

v) **Thin Client Server** provides solutions for central deployment, configuration and management of thin clients and users connections.

vi) **Thin Client Terminals** that consists of motherboard, display devices, keyboard and mouse, without any preinstalled operating system and hard disk.
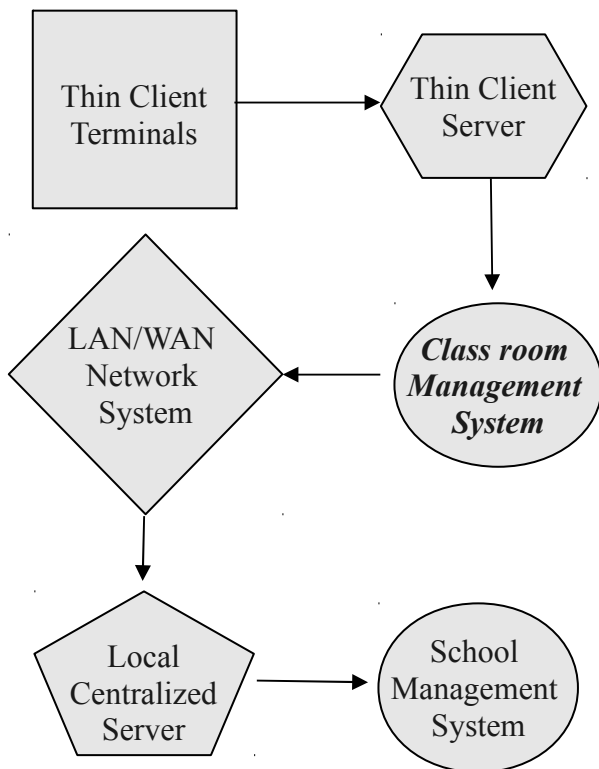
Figure 1 show the process flow of the system

Figure 1: System Integration of class room and school management system

2.1 School Management System

The school Management System has something for everyone related directly or indirectly with the school and teaching environment. Some of the key advantages to schools and educational institutions are:
- Easy performance monitoring of individual teaching modules.
- Automated and quick report generation along with process turn around time.
- Centralized data repository for trouble-free data access.
- Authenticated profile dependent access to data.

- User friendly interface requiring minimal learning and IT skills.
- Design for simplified scalability.
- Elimination of people dependent processes.
- Minimal data redundancy.

Some of the advantages to parents are:

- Frequent interaction with teachers.
- Reliable update on child's attendance, progress report and fee payment.
- Tracking of homework assigned by teachers to their child.
- Prior information about school events and holidays.
- Regular and prompt availability of school updates such as articles, discussions forums, image gallery and messaging system.

2.2 Class Room Management System

Advantages to teaching mechanism:

- Automated student attendance.
- Computerized management of marks and grades.
- Timetable creation in advance.
- Homework assignment to students and approval.
- Efficient and effective interaction with parents.
- Access to forum common to students and parents.
- Access to own and students attendance.
- Power on, power off, Reboot and Login to class room computers remotely.
- Broadcast messages to groups or all network users in seconds.

Some key benefits are:

- Enhanced interaction with teachers, parents and peers.
- On line submission of homework.
- Access to their attendance, timetable, marks, grades and examination schedule.
- Liberty to publish articles and views, and participate in discussion forums.
- Freedom to browse through library

books catalogue and identify the book(s) to be issued.

- Prior information about school events and holidays.

2.3 Thin Client System

- Thin client is a general term for a device that relies on a server to operate.
- Thin client has display device, keyboard with mouse and basic processing power in order to interact with the server.
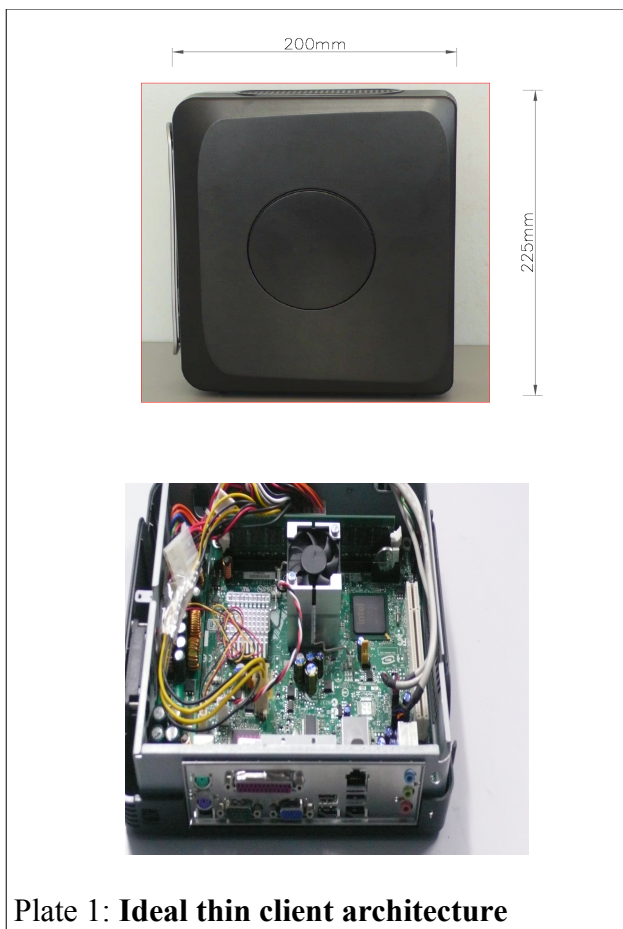- An ideal thin client device contains no hard drives and CD or DVD-ROM

Plate 1: **Ideal thin client architecture**

3 ADVANTAGES OF THE TECHNOLOGY

By using thin client technology rather than standalone PCs, it is possible to deliver a wide range of computer based educational and examination materials while restricting other resources that are usually accessible to the students if conventional PC system is to be used. With conventional PC based technology, it is difficult to prevent access to the Internet, chat services, mobile devices such as USB drive, documents previously stored by other students etc., which could allow simple cutting and pasting of answers into the assessment or exam sheets by students with thin client technology in place. It is simple for an administrator to disable USB port on thin client terminals for the duration of the assessment or examination time, thus further limiting the ability for student's accessing disallowed information to assist them in the assessment or examination.

Another major attraction of the thin client technology for assessment purpose is that it is very resilient, given the fact that they have no software or moving parts. Therefore there are unlikely to be an issue when the assessment are not been delivered due to faulty desktop devices. This causes unnecessary pressure on the affected student and the additional works involved to the invigilator.

The issue of ensuring that PC's have the appropriate software available also affects PC's which are located in teaching spaces. Traditionally such PC's are left switched off when not in use which means that any automated software updates tend to fail or, worse, try to start when a teacher turns the PC on for a class. This can lead to anti-virus software not being updated, operating system vulnerability not being patched etc. the start up time of a PC system also causes difficulties, when a lecturer arrives in a class room, there will be about 8~10 minutes start up time for the PC and to get the necessary software up and running; if any updated needed to be done this could delay the start of the class. Using thin client technology there is no need for the software updates and no need to worry about viruses. The user will always get the appropriate version of all the software via central server. The new upload of teaching material will be ready for teaching immediately as the student or teacher starts the class. Figure 2, shows the flow between teachers-students-parents-school in the school and class room management system.
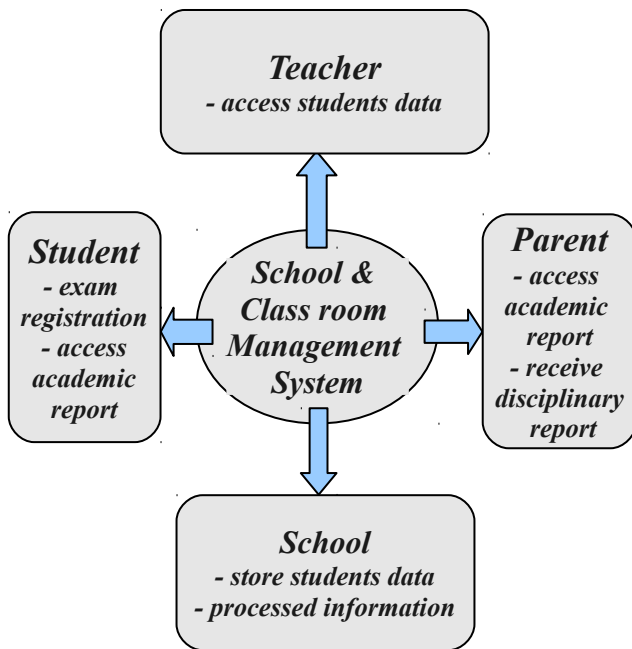
Figure 2 : Data Flow between teachers-students-parent-school in the school & class room management system

4 Conclusion

The school and class room management system with thin client technology have not been fully integrated in the learning process in Malaysia. In last decade, the complexity of existing desktop machines, the capital investment needed for wide area network (WAN) access and lack of educational resources and multimedia content have prevented the potential of thin client based solution become reality.

Recently the convergence of community, business and government organizations in favor of client technology, have started to produce changes in education system. With the use of thin client technology, the teaching system will now can look forward into a new age of centrally manageable teaching technology, with equal access to information will be given to all students regardless of their background and geographical location. Rural students will be given full access to information and knowledge with tremendous reduction in communication time and infrastructure cost, knowledge can be shared with anybody from any part of the world for free.

Coupling the centralized server with thin clients and the power of cloud computing, Tamil schools in Malaysia, soon will become the community information hub. The students who benefited with this technology will one day become knowledge based skill workers which will directly uplift the living standard of Malaysian Indian.