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Teaching Tamil and Managing Tamil Schools Using Open Source Computing

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Abstract

Teaching and managing Tamil schools in Malaysia are going through a enormous development and synchronization with setting up and commissioning of sustainable Computer Learning, Teaching and ICT Skill Development Laboratories successfully. To-date there are over 25 computer labs commissioned over a period of two years using open source computing advancement in Malaysian Tamil schools. With the use of open source computing, cost effective solutions for ICT labs were now made available to schools in Malaysia, providing infrastructures needed for teaching and managing educational systems. The key to this achievement were laid upon the innovation of our research and development team. After a painstaking 3 years of hard work, dedication and a lot of financial difficulties, we were able to implement a reliable and cost effective solutions using open source computing. This pioneering work brings integration to Student Management, Classroom Management, Teacher Management and School Management. The implemented school computer lab infrastructure consist of 41 thin clients connected to a server which delivers the required computing speed enabling the students to access wide spectrum of knowledge freely giving equal opportunity in education. Furthermore, a school management application were proposed using open source school ERP (Educational Resource Planning). Managing the educational system were simplified to upgrade the level of school's teaching and management to be comparable with private educational institutions. This open sourced ERP proven to be the cost effective and affordable in term of development implementations and maintenance. This paper will address in detail, how the server based open source computing along with the integrated open source school ERP for schools in Malaysia implemented and how it is gearing up students with sound computing knowledge.

Keywords: Thin Client, Open Source, Server Based Computing, Free-ware, ERP For Schools.

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 in Malaysian Tamil schools. The system will adopt server based open source computing technology linked with centralized server to implement school and classroom management.

The proposed system will have secure integration with other key educational systems (student records, module registration, examination scheduling, conducting trial exams and distribution of

teaching materials), which will be delivered via network services and a centralized server technology meeting the following requirements:

1. System is required to be online and can be accessed from anywhere and anytime.
 - ▲ The system should have a user-friendly interface which is easy to use.
 - ▲ Provide security functions to avoid any unauthorized access.
 - ▲ Able to have user friendly database search engine.
 - ▲ Able to update the particulars of individual or organization involved.

Built using the latest open source technology '*ruby on rails*' which works on a web based platform, this school management system automates school's diverse operations, with the objective of :-

2. Systematic User Management
3. Integrated Student Management
4. Incorporated Exam Management
5. Control over Attendance Management
6. Allow for Timetable Management
7. Uploading school news management
8. Other miscellaneous settings

Apart from that, NexusEdu ERP also brings teaching and educational management to a whole new level where all the information (data) is managed by full suite of integrated ERP application as shown in Figure 1.

Logical Model of Proposed System

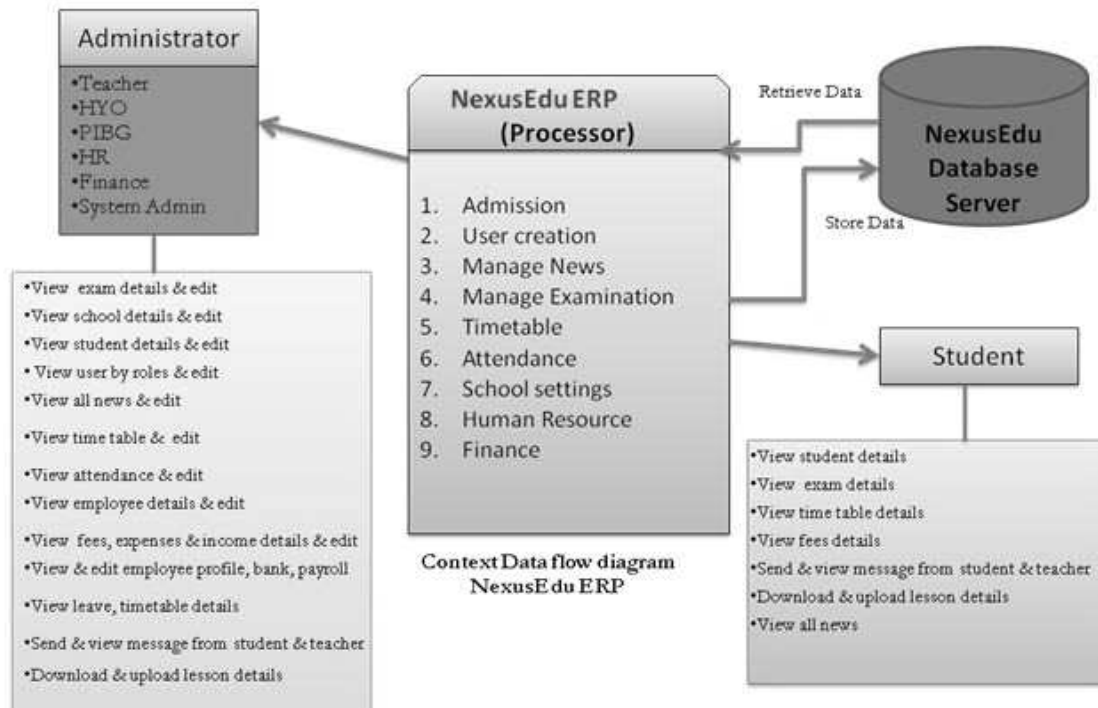


Figure 1 Data Flow Diagram for NexusEdu ERP

2. Requirement for System Integration

The integration of School Management System and teaching via Open Source Computing platform is achievable through:

- a) *School Management System* - application that is designed to automate a school's diverse operations from classes scheduling, examination schedule to school events and calendar in order to create a powerful online community, with parents, teachers and students on the common interactive platform.
- b) *Open Source File/Application Server* - that integrates data storage functionality as well as structured database modules.
- c) *LAN (Local Area Network)* that physically connects disk-less Thin Clients to the LTSP Server via DHCP (Dynamic Host Configuration Protocol) in the PXE (Pre-boot execution Environment).
- d) *WAN (Wide Area Network)* that acts as a super highway to access valuable information and Data Centre.
- e) *Thin Client* that is made up of a fully functional computer desktop set minus the hard disk as data is stored on the LTSP server.

Figure 2 shows the integrated network architecture of the ERP.

3. School Management System

The school management system integrates the following management functions on to a software to improve the efficiency of school management.

- User management

Manages the authentication and authorization for different users. For example, students can't access certain management system for security and privacy issues. This management facility provides security, integrity and privacy to the data managed under the ERP system.

- Student management

Students' information are centralized under the database for easy administration purposes. Student data can be extracted from this database for other management purposes.

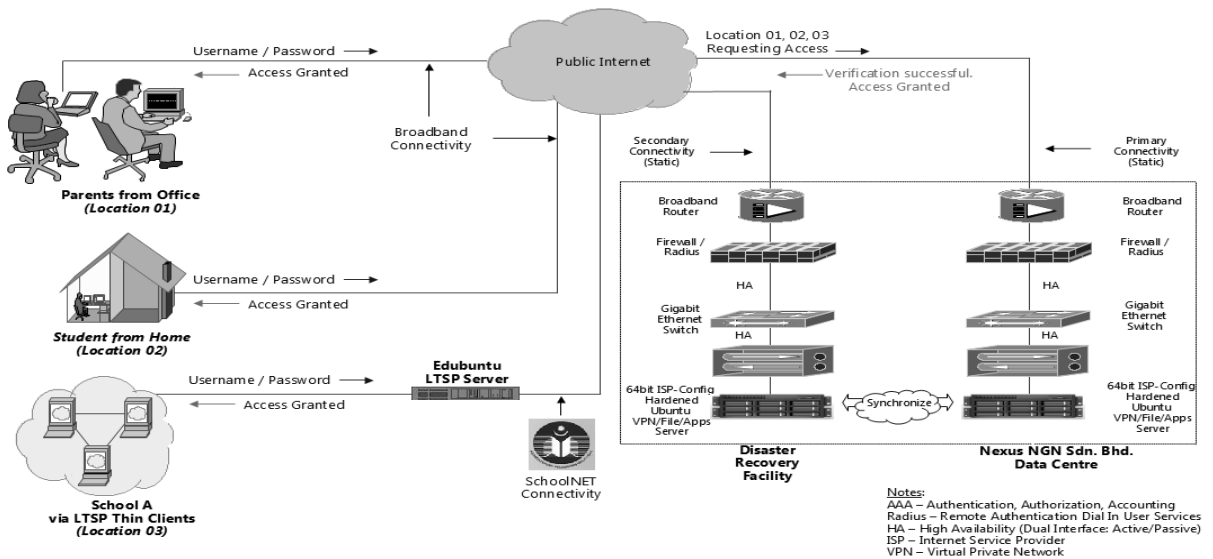


Figure 2 – Integrated network architecture of the ERP

- Exam management

Administrators can schedule examinations, set grading systems, generate examination reports while students and parents will be able to view examination schedules and reports. This would assist to monitor a student's overall progress and performances. Other than that, this also eliminates/lessens the need of written progress books and manual update works.

- Attendance management

This system benefits teachers and administrators to record and generate daily, weekly and monthly attendance reports. Students can view their records and parents would be able to monitor their children attendance.

- Timetable management

Provides the flexibility to create timetable of subjects, classes and view them. We can also change weekday and weekend settings.

- News management

Students, employers, and administrators will be able to communicate with each other, with the integrated news management system. News regarding holidays, examinations and special events can be spread to all the parties involved within seconds with this system.

- Human Resource Management

Human resource of the school (example: teachers, administration staffs) can be managed efficiently with this system. Employee details, payslip, and attendance could be managed and released using this system.

- Finance Management

Fees, assets, donations and payslips can be issued and monitored using this system. This would simplify financial dealings and accounts matters of the school.

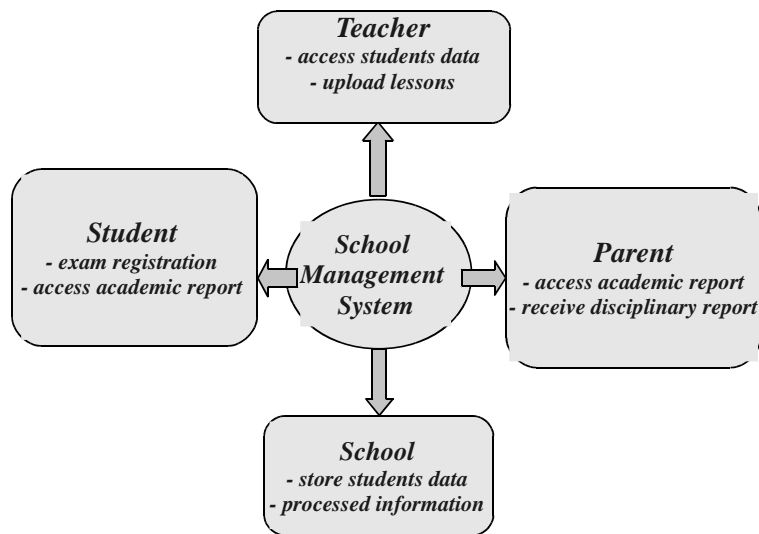


Figure 3 – Integration of School Management System

3.1 TEACHING MADE SIMPLE

This is an extra feature included in the school management system where the online learning is implemented. Teachers would be able to upload the teaching materials and post a message to students. Students would be able to download, view or print the lessons exercises prior to the actual lesson hour. This would enable the students to access their educational material anytime and anywhere. Teaching would be made simple and effective through the usage of this online learning tool where interactive materials such as animations, videos and audios could be uploaded for the students to view and learn on their own.

This system also benefits the teachers where the whole syllabus could be loaded into the system and released phase by phase to the students according to the lesson plan. This reduces the teachers work load and makes them productive and effective in teaching and guiding the students. Information sharing between schools is made possible through the existence of centralized server. Schools can share resources to create and use standardized materials and examinations through this system.

4. Advantages and System Security of the School ERP

This system benefits all parties in various of ways. The benefits for the school management are as follows:

- 1) Easy performance monitoring of individual teaching modules.
- 2) Automated and quick report generation along with process turnaround time.
- 3) Centralized data repository for trouble-free data access.
- 4) Authenticated profile dependent access to data.
- 5) User friendly interface requiring minimal learning and IT skills.
- 6) Design for simplified scalability.
- 7) Elimination of people dependent processes.
- 8) Minimal data redundancy.

4.1 Advantages to parents are:

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

4.2 Security

This ERP system integrates the information security elements, confidentiality, integrity and availability (CIA) for the security and privacy. Confidentiality is where the system prevents disclosure of information to unauthorized individuals or systems. The open source ERP system also provides integrity where data cannot be modified by everyone and undetectably. Apart from that, the system also promises availability where the data is available to authorized users anywhere and anytime. Authorized users can access and view the data through the web based platform which serves as a user interface to the user.

5. ADVANTAGES OF OPEN SOURCE COMPUTING SYSTEM

The thin client system in Tamil school computer labs are capable of providing affordable server-based open source computing solutions. The main advantages of using this system in schools are to increase reliability and consistency of technology. Through a password-accessible account, students, teachers, and administrators can store and can access saved documents and personal settings. As all files and programs are stored centrally, users can access their work from any computers on the network.

Eg. when a teacher or student "logs in", the server provides them with their "desktop configuration". Users can even access their "desktop" from home or other remote locations. The other advantages of open source computing thin client system can be listed as below:

- Less Administration – Central management of users, patches, software, data, and backups.
- Higher Security – Elimination of viruses, Trojans or other vulnerabilities on the user desktops.
- Hardware Independence – Support of virtually all client devices and computer hardware, with low system requirements (eg - Pentium 3 with 512MB RAM).
- Easy Access – Teacher and students can access their documents and applications from any computers in the local area network.
- Reduction in TCO – Total Cost of Ownership reduction by up to 50%

Benefits for school in using open source computing thin client system:

- Lowers cost of technology over time
- Secure data and equipment
- Less downtime and greater efficiency
- Reduces administrator staffing costs

- Lessen the risk of data theft
- Disaster recovery: Data is more Secure
- Reduced time for technical Support
- Lower power consumption: save electricity
- Zero licensing management
- Minimum Maintenance
- Highly trained individuals are not required

5. Advantages of Thin Client Technology

By using thin client technology rather than standalone computers, 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 computer system is to be used. With conventional computer 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 without 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 computers have the appropriate software available also affects computers which are located in teaching spaces. Traditionally such computers 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 computers 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 computers system also causes difficulties, when a lecturer arrives in a class room, there will be about 5~10 minutes start up time for the conventional computers 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.

5.1 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 – Shows an image of ideal thin client.

Plate 2 shows image of computer labs before and after with students using refurbish machines operating as thin client.



Plate 2: SJK (T) Bukit Raja, Klang before and after setting up computer laboratory

6. Conclusion

The awareness of benefits and advantages of thin client and server based computing technology have resulted in the growth of Tamil schools implementing this technology in Malaysia, with the supports from governmental and non-governmental bodies. With the use of thin client technology and school management system, the teaching system will now 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. Through implementation of this system, Tamil schools in Malaysia will soon become community information hub where resources can be maintained and shared for the uplifting of the Malaysians. The students benefited from this technology will become independent learners and one day become knowledge based skilled leaders.

With the open source applications and thin client technology it was possible to decrease the cost of installation and the cost of maintaining the computer lab. With servers installed at each and every schools, the setting up of centralized school management system is possible. Currently we have successfully implemented server base teaching with thin clients for about 25 over Tamil schools in Malaysia. Currently we are working and developing further improvement into open source by performing R & D into the implementation of Open Source base ERP for schools to manage the 25 schools systematically using centralized server. Most importantly design system are required to be scalable, sustainable, maintenance free and most importantly able to eliminate the digital gap between poor and rich students and build the digital bridge between urban and rural students.

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