Electronic Student Academic System (E-SAS) For Secondary School

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Abstract

Nowadays computers are used to manage daily works. School management uses computer to process academic assessments. For example, teachers store students mark and grades in computer software such as Microsoft Office. However computers are merely used to store students assessments and there are no systematic place for analyzing and turning that data into information and knowledge. Therefore, Electronic Student Academic System (E-SAS) is developed to facilitate teachers and administration staffs in managing students' profile and academic assessments. Two types of assessments are included in E-SAS which are mid-term test and final year test. E-SAS which follows Rational Unified Process is implemented using Hypertext Pre-Processor (PHP) and MySQL software. As a result, users find that E-SAS is capable of displaying and searching student information. It also can calculate and produce assessments reports for each type of tests.

1. Introduction

The concept of smart school was introduced by Malaysian Ministry of Education as an effort to support critical and creative teaching and learning [1]. One of the components of Smart School concept is management and administration. This component emphasizes on using technology which is another component in the Smart School concept to manage school resources more efficiently and effectively. Based on this concept, principal should use computerized system to manage resources such as students' profile and subjects' assessments.

Many schools have their own system to manage students profile and assessments. Common practice is by recording the student information in a record book. Students' information is obtained from the registration form completed by the parents when they registered their children for the first time. This practice has some weaknesses such as longer time to search the student profile because need to search every record in the logbook, the possibility of misplacement of record book and vulnerability of student record to be accessed by unauthorized person.

In the secondary school, several assessments are prepared to evaluate student performance. Types of assessments are monthly test, mid term test and end of year test. At the end of each test, the class teacher records student's marks and grades in the record book and basic computer software such as Microsoft Excel. After that, the class teacher need to determine student's ranking in class based on their test performances. However, it takes time to do these tasks because they need to formulate their own calculation for class ranking. These tasks will be much easier if all calculation for class ranking can be automatically done when the teacher enter test marks. Therefore, this situation had motivated us to develop an electronic Student Academic System (E-SAS) in order to manage student information and assessments. This system allows school administration (principal and clerk) to manage student profile and class teacher to manage two assessments which are mid term and end of year tests.

This paper is organized as follows: In Section 2, we present the concepts behind E-SAS, which includes the concept of smart school, academic system and data management. Section 3 discusses the methodology in developing E-SAS. Section 4 presents the outputs and results of E-SAS. In Section 5, we finally conclude this paper.

2. Concepts of the System
This section presents the concepts behind E-SAS.

Smart School
The smart school concept is one of the seven flagship application that are part of Malaysia's Multimedia Super Corridor (MSC) project [2]. The purpose of smart school is to develop skilled workers for the Information Age and to fulfill the goals of the National Philosophy of Education. It is means that the teaching and learning practices and school management must be systematically reinvented.

One of the components of Smart School is a smart school management. This component has several

characteristics and one of its characteristic is student affairs. Student affairs deal with student profiles, performance, evaluations, test administration, counselling, health, insurance and others [2]. The result of having a smart school management is a comprehensive student records system for the storage, retrieval and reporting of all student data. Therefore, E-SAS is developed to provide a systematic student profile and academic assessment for secondary school.

Academic System

Malaysian school uses written based assessment to evaluate student academic performance. There are two categories of written assessments which are school level assessment and national level assessment. National level assessments for secondary school are Penilaian Menengah Rendah (PMR) and Sijil Pelajaran Malaysia (SPM)[3]. While school level assessments for secondary school are consist of monthly, mid year and end of year tests [4]. The results from these tests determine the ranking of students in class [4].

The class teacher is responsible to manage students' assessments result. Subjects' marks are recorded in a record book and class ranking is derived from the total and average marks of all subjects. This process is carried out manually using basic computer software such as Microsoft Excel.

Data Management

Organizations today operate in a highly global, fast-paced and competitive environment. One of the key resources they need to perform their tasks effectively and efficiently is data management. Data management is a terminology that usually use for referring to the system, which provide the interface that able to hide specifically physical file operation, hence they can fully concentrate to the data logical. Database system is a software system class that relate with Database Management System and file management system [5]. We can consider a database as a collection of related data and the Database Management System (DBMS) as the software that manages and controls access to the database. The database approach overcomes most of the problems in manual system and file-based system [5, 6, 7]. It is intended to meet the informational needs of all users at all department or operational level as well as users at the strategic level.

3. Methodology

E-SAS adopts rational unified process (RUP) for its software process model. RUP is structured in two dimensions which are phases and disciplines. This section discusses the disciplines that took place in each phase during the development of E-SAS.

These disciplines consist of analysis activity, design activity and development activity.

Analysis activity

Over the last decade, project management information systems have become comprehensive systems that support the entire life cycle of projects, project programs, and project portfolios [8]. Requirements definition or system analysis is the first real stage of software development. The purpose of requirements determination is to provide a narrative definition of functional and non-functional requirements that the clients expected in the implemented and deployed system [9].

E-SAS applies three fact-finding techniques in gathering functional requirements. These techniques are interviews, sampling of existing documentation, forms and files, and observation of work environment. The requirements are then analyzed and designed using Unified Modelling Language (UML). Two outputs are designed in this stage which are use case and sequence diagrams. Use case
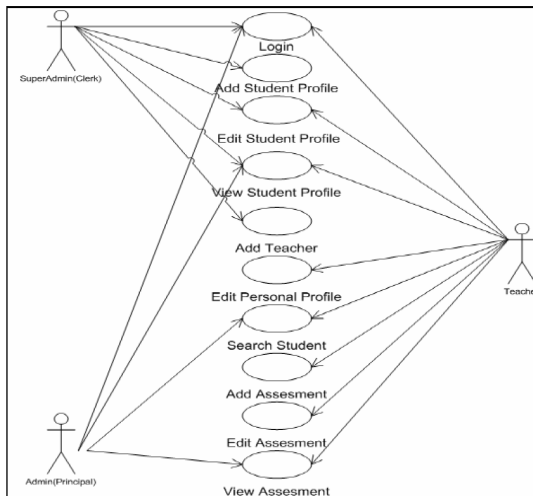

diagram contains use cases and actors. Use cases represent system functionality and actors represent the people or system that provides from the system [4]. Fig 2 shows the use case diagram for E-SAS. .

Fig 1. Use Case diagram for E-SAS

Three actors are involved in E-SAS and they are admin, super admin and teacher. Admin is the administrator of this system. The actor of admin is the person that responsible to handle activity about academic system at school. This actor can access the login module and view student profile. Super admin is a clerk at school. This actor responsible to add, edit and view student profile. The teacher actor means the teacher of the school. This actor is responsible to edit, view and search student profile. They are also responsible for student assessments modules.

The sequence diagrams for E-SAS are shown in Fig 2 and Fig 3 respectively. The sequence diagram in Fig 2 shows interaction for super admin to add student profile. Super admin is responsible to enter information of the students. The interaction that occurs is as follows: First, super admin must select add student profile menu that display at main page. Then he can key in student info into student profile form and click the 'save' button to submit it into the database. After that, student profile will be saved in database.
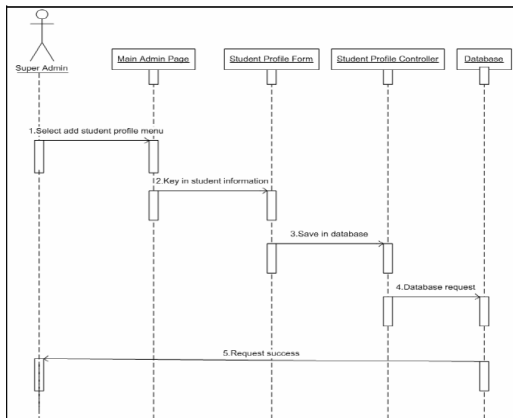

Fig 2. Sequence diagram for Add Student Profile

The sequence diagram in Fig 3 shows the interaction which occurs when teacher uses the assessment module. Teacher can add student's mark for mid-year test and final-year test. To add student marks, teacher needs to choose type of assessment. After that, the teacher can key in marks on the student mark form and clicks the 'save' button to store data to database.

Fig 3. Sequence diagram for Add Assessment

Design activity
The design phase is consists of architectural structure for software programs, databases, the user interface and the operating environment. Our next discussion will cover these aspects.

The interfaces of E-SAS is created using Macromedia DreamWeaver 8. Besides, the design of interfaces follows the Graphical User Interface (GUI) guidelines. The purpose is to provide user with easy to use system. A system must be able to eliminate excessive data entry by enabling the user to select on valid values, rather than requiring them to input text. There are three types of interface in E-SAS which are interface for super admin, admin and teacher. These interfaces differ in their functionality. Fig 4 shows the interface for super admin. The super admin interface allows the school clerk to add teacher profile and also to add, edit and view student profile.
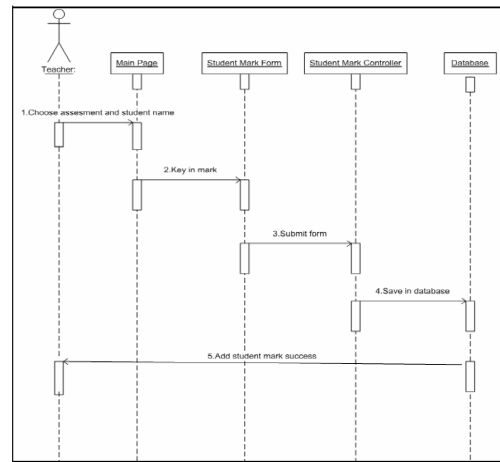

Fig 4 Interface for super admin (school clerk)

The interface for admin is shown in Fig 5. This interface is dedicated for the school principal. It allows the principal to view students' profile, search students by class and view students assessment result.

Fig 5. Interface for admin (school principal)

The teacher interface is shown in Fig 6. By using this interface, teacher can view and edit personal profile, edit, view and search student profile and access the assessment section.

Database management system helps organizations to organize or structure their data in a logical way. In designing the relational database, there are three major database models, which are; the conceptual database, the logical database and the physical database. The emphasis of logical database model is on 'logic', which is a readable method and useful for representing the knowledge [10]. This database design is most frequently used because it establishes a simple data form for each relation and for many-to-many relationships [10]. One of the aspects in database design is data dictionary. Data dictionary is

Fig 6. Interface for class teacher

a set of metadata that contains definitions and representations of data elements in a database. In other word, a data dictionary contains a list of all files in the database, the number of records in each file, and the names and types of each field. Most database management systems keep the data dictionary hidden from users to prevent them from accidentally destroying its contents. There are five tables in E-SAS which are login, admin, mark_main, student_profile, teacher, and subject. The data dictionary for student profile table in E-SAS is shown in Table 1.

Field Name	Data Type	Length	Description	Constraint
sp_name	Varchar	100	Student name	
sp_birth_number	Varchar	30	Student birth certificate	PK
sp_place_birth	Varchar	100	Student place of birth	
sp_date1	Varchar	30	Student year of birth	
sp_date2	Varchar	30	Student month of birth	
sp_date3	Varchar	30	Student date of birth	
sp_nationality	Varchar	20	Student nationality	
sp_race	Varchar	20	Student race	
sp_gender	Varchar	10	Student gender	
sp_address	Varchar	100	Student address	
sp_class	Varchar	20	Student class	
sp_code	Int	10	Student postcode	
sp_school	Varchar	100	Student previous school	
sp_name2	Varchar	100	Parent/guardian name	
sp_ic	Varchar	100	Parent/guardian ic	
sp_nationality2	Varchar	30	Parent/guardian nationality	
sp_occupation	Varchar	50	Parent/guardian occupation	
sp_office	Varchar	100	Parent/guardian office address	
sp_phone	Varchar	100	Parent/guardian phone number	
sp_email	Varchar	50	Parent/guardian email	

Table 1: Data dictionary for student profile table

Development activity
Development phase begins after analysis activity finished. During this phase, the coding process is started. Apart from that, the hardware and software requirements for E-SAS need to be considered. Our next discussion will cover on hardware and software requirement.

There are several software and hardware that selected to complete the development of the project. The software and hardware specification are showed in Table 3 and Table 4 respectively.

Table 3: Software Specification for E-SAS

Table 4: Hardware Specification for E-SAS

Software Name	Description
Microsoft Windows XP Professional	Operating system that will be used for system development
Microsoft Office 2003	Make Documentation
Microsoft Project 2003	Make Gantt Chart
Rational Rose	Modeling and designing
Norton Antivirus 2005	To protect and remove virus
Macromedia Dreamweaver 8	Interface design & coding
PHP Dev	Software development that used to develop system
MySQL	Database
Apache Server	Platform

4. System Output and Result
This section presents the output and result from the

No	Hardware Name	Specification
1	Laptop	Processor - Intel® Pentium ® M Processor 1500 MHz 238 MHz, 248 MB of RAM Hard Disk - 40Gb
2	Printer	PIXMA iP1700
3	Pendrive	i.Drive 512MB

implementation of E-SAS. E-SAS has three types of users which are school principal, clerk and class teacher. The system is capable of:
(i) Adding student profile and academic information for future reference and enhancement.

(ii) Updating and searching student information including personal information and student result.

(iii) Providing the security of information about student profile and academic result that are kept in database.

(iv) Adding student marks and calculating total marks of all subjects.

(v) Arranging the ranking of student in class.

Fig 7 shows the interface to add new student profile into the computerized system. This function is managed by the school clerk (super admin). The clerk will key in all information about student into E-SAS and click the 'submit' button. With a click of the button, the student information is added to the database. Fig 8 shows the interface to search for student academic profile from the database. The principal and class teacher must key in the name of student before using the search function. The search result will display the name of student and their profile. Fig 9 shows the interface to add student mark. This function is accessed by class teacher and he must choose the type of test before key in the result. After key in the result, teacher must click the 'save' button to update the information in the database. Fig 10 shows the interface to view class ranking. This function is accessed by class teacher after he has entered all student marks. This interface also enables the class teacher to print out the report of student marks and their class ranking.
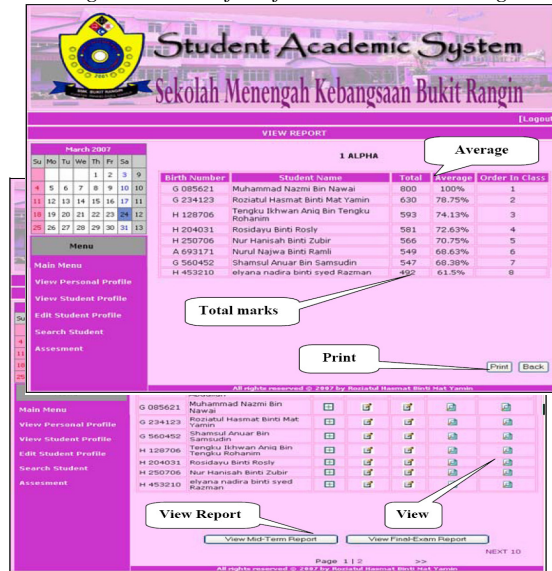

Fig 7. The interface for 'Add student profile'

Fig 8. The interface for 'Search student profile'

Fig 10.The interface for 'View class ranking'

5. Conclusion

E-SAS has been developed to replace the manual system in managing student profile and assessments evaluation. E-SAS saves teacher's time to manage student assessment process compared to the manual practices. The computerized records provide better management and manipulation of data, through searching of student profile and generating of class ranking. Student profile is stored in a secured database compared to the traditional file based system. Future enhancement to the E-SAS functionality includes adding another interface module specifically for subject teacher to key in student mark and automatically submits them to the class teacher.

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