An Alert Grading System for School by Using SMS

by

Siti Hidayah Mahmod

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CERTIFICATION OF APPROVAL

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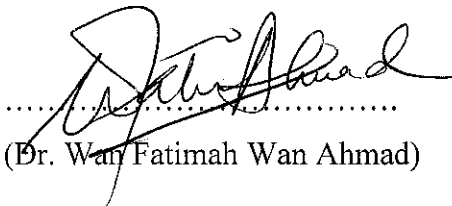Dissertation Submitted to the Information Technology Programme
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Approved By,

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(Dr. Wan Fatimah Wan Ahmad)

UNIVERSITI TEKNOLOGI PETRONAS
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December 2005

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CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in the project, that the originality work is my own expect as specified in the references and acknowledgements and that the original work contain herein have not been undertaken or done by unspecified sources or persons.

SITI HIDAYAH MAHMOD

ABSTRACT

In preparing new generation for the next challenges of world, each parents need to strengthen their children with high level of education. Parents need to keep track and aware on how well their children perform in the learning process. Having good interactions with children, providing adequate learning programs and nurturing mental and physical strength are some strategies could be used by parents in organizing their children. The objective of this study is to develop a prototype of an alert grading system specifically for school. The system integrated with Short Message Services (SMS), which is act as a medium to alert parents about student's performance in trial exam of Sijil Pelajaran Malaysia (SPM). Presently, parents are quite busy since they have less time to pay attention on children's learning performance. Therefore, the idea of this project is to increase parents' awareness about students' achievement in learning process. The scope of this study is ranging from the students' performance on SPM trial exam and the usage of SMS as a medium to alert parents. Besides, the SMS contains only the summary of students' achievements. For project work, Dual Development Methodology is used as methodology, which is comprises of two parts. There are research and development parts. Functional and integration testing used to ensure the system is well-functioning. SMS can be successfully sent from the system as an alert. As a conclusion, the system managed to alert parent on their children's achievement in trial exam and will make a contribution to the development of education field.

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ABBREVIATIONS

ASP	Active Server Pages
CGI	Common Gateway Interface
CSR	Confidential Student Report
DBMS	Database Management System
EDX	Engineering Design Exhibition
GB	Gigabyte
GSM	Global System for Mobile communications
HCI	Human Computer Interaction
HTML	Hypertext Markup Language
HTTP	Hypertext Transfer Protocol
IIS	Internet Information Services
ISAPI	Internet Server Application Program Interface
IT	Information Technology
MMS	Multimedia Messaging Services
RAM	Random Access Memory
SMS	Short Message Services
SMSC	Short Message Service Center
SPM	Sijil Pelajaran Malaysia
SQL	Structured Query Language
TAKS	Texas Assessment of Knowledge and Skills
UTP	Universiti Teknologi PETRONAS
VB	Visual Basic
WebDAV	Web Distributed Authoring and Versioning
XHTML	Extensible Hypertext Markup Language

CHAPTER 1

INTRODUCTION

1.1 Overview

Living in the world without boundaries makes communication as one of the most important aspect for people lifestyle. For this reason, mobile technology is extensively employed to facilitate people communicate and interact with each others even at different locations. Compare to traditional approach, mobile technology leads to the efficiency and effectiveness in cost, time and quality of data transmission. Besides, it also improves people's standard of life. With wide capability of applications embedded, mobile device has been used in many areas including education, business, telecommunication, transportation and medical.

Nowadays, the involvement of mobile technology in education area is moving rapidly. Researchers, professionals and educational institutions feel it is easier to accomplish their tasks by employing mobile technology. They feel data and information can be acquired at anytime and anywhere they need. In addition, mobile technology enable educational community interacts with outside parties such as parents, publics and even the government itself.

1.2 Background of Study

Throughout this report, the word 'parents' frequently used in place of children's guardian or parents. Generally, the idea on developing An Alert Grading System comes from the need of improving the awareness of parents on the children's achievement in

learning process and integrating it with the efficiency of Short Message Services (SMS) technology. Thus, it brings to a need of integrating a school system with SMS to alert the target audience (parent) about how well their child performs in trial exam. The study will be focusing on two different areas, which are parents, school and children's education and SMS mobile technology.

1.2.1 Parents, School and Children's Education

As economy, politic and social, education is another fundamental aspect of life that being emphasized by the world society, globally. If there is any chance given, we believe that each individual will grab and strive hard to improve their education performance.

Normally, education is taken into consideration at the early age of six for an ordinary individual. As the most important party, parents hold a responsible to provide sufficient education plans and supports to their children. It's primarily to prepare their children with useful and valuable knowledge to face the becoming challenges future. Without being pushy, parents need to keep track and aware on the progress of children's learning process. Parents might put a full of hope to see the successfulness of child's learning as what have been planned earlier. Thus, there is a need of their awareness, attention and involvement in child's education process. It may boost children's spirit to take learning as a natural and the most essential aspect of life regardless of which levels of education they will be involved.

Even though, this responsibility cannot be simply put on parents' hand itself. The community, including school and teachers, is another element in determining the successfulness of children's education. They are responsible to provide convenient educational environment and pour as much knowledge as possible to the children. Parents and this community are interdependent where they need to properly create an efficient neighborhood and plan appropriate strategies for children's learning process.

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In recent years, even though, this scenario seem had changed to an indefinite gap. Lack of communications and cooperation between both parties may lead to various problems associated with student's achievement in education.

1.2.2 SMS Mobile Technology

SMS mobile technology is seen to be evolving rapidly in order to cater the needs of people. With its broad usage, people tend to use and adapt the SMS technology to make their life easier. People can easily interact with others at various locations by simply typing and reading to short messages on their mobile phone. It can be done at anytime and anywhere people like to have such communication. Besides, SMS offers cost efficiency to people since its average rate is obviously lower than an average rate of a phone call.

Furthermore, SMS technology is seen to be a suitable medium of communication. The reason is as most people have their own mobile phone and they tend to carry it together to wherever they will go.

Nowadays, SMS is seen not only as a communication medium, but also for other purposes. For instance, SMS is used for business purposes, where is works as a medium to marketing and promoting companies products. A company may receive product orders from their customers through SMS. Overall, SMS enables the companies to improve their business and gain more profits.

1.3 Problem Statement

Nowadays, parents might have a dilemma between their responsibility on children's education and how much time they can spend together with them. From the observation and experience as a student, parents are unaware of their children's learning performance at school. They might be busy or tiring on works and lead to fewer time spent with their children. Even there are so many programs emphasized on the importance of parents-

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child's education, initiated either by government or private agencies, this problem still raised in some public conversations. Parents do not aware on how well their children can perform at school. This problem leads to inactive of parents' involvement in school activity. For example, they are absence during the School Report Card Day. Instead of coming to school and seating together with teachers to discuss about their children's learning progress, parents prefers to ask their children to bring back the report card to signed.

These inactive involvements of parents in children's education may affect parents-children relationship itself, as children felt failed in gaining supports and attentions. These feelings may weaken children's self-esteem, vision and enthusiasm to move successfully toward learning process. In addition, it seems to contribute to a wider gap between parents, teachers and the school. Lack of this communication makes parents might simply put hard responsibilities to the teachers and school to pour knowledge to their children.

Even though, this problem should not only be blamed on the parents itself. It is because there are children whose do not alert or inform the parents on their performance at school. They do no take an education as a motive of their life. They might think that parents do not have to be informed as they do not aware on children's learning process. For instance, a child does not inform the parents about their exam results.

1.4 Objective and Scope of Study

1.4.1 Objective

In this study, objectives to be achieved as below:

- To develop a system, which is uses SMS, to alert parent about children's performance on Sijil Pelajaran Malaysia (SPM) trial exam.

- To build up awareness among parent on the importance of children's achievements.
- To enhance the communication and connectivity between parents and school community.
- To ease parents who have a very tight schedule whereby they need to be reminded about the performance of children in learning process.

1.4.2 Scope of Study

- Focusing on the students' achievement of only a class of Form Five in SPM trial exam.
- Focusing on sending of SMS as a medium to deliver the objective of study.
- System output, the SMS will contain only the summary of student's achievement. It is including students' name, IC No, CGPA (Cumulative Grade Point Average) and remarks. By sending a full version of student's grade, it will cost extra SMS per sending and will incur extra cost need to be handled by the school.

CHAPTER 2

LITERATURE REVIEW

2.1 Overview

This section is objectively to review the analytical, critical and objective of written materials on the chosen topic. It covered two main areas of the project which are parents and children's education and SMS technology. Discussion on related works will be covered in the last section.

2.2 Parents, School and Children's Education

As the nature of live, the relationship between parents and children is a never ending story. It is not just a 'family relationship', but issues like communication and interaction, responsibilities, education, safety and health and social seems synonym to the uniqueness of the relationship of parent and children. This literature part will reveal and discuss on the scenario of parents and school involvement in child's education, in addition to bring out some advantages. Other matters will be discussed include the relationship between parents and school community in encouraging child's achievement and its scenario in our country, Malaysia.

2.2.1 Parents' Involvement in Child's Education

According to Cotton and Wikelund (2001), it is no wonder that parents' involvement with the schools has become a major educational issue in the 1980s. The term 'parents' involvement' defined as several different forms of participation in education and with

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the schools. Parents can support their children's schooling by attending school functions and responding to school obligations (parent-teacher conferences, for example).

Parents, as managers of their children, not only require to create learning environments within the home but also encourage, organize, and supervise their children's educational opportunities in the community. Moreover, parents need to interact with community institutions such as the school on their children's behalf in order to keep track the progress of children's achievement. Regardless education levels, parents also encouraged to manage their children's educational performances through involvement in their children's school.

As stated by Gutman (2000), parents and school involvement is a critical factor for children's education at all grade levels. Regardless of at which levels the children studied, parents and school involvement is significant in determining the successfulness of children's education. Even though, this would not beneficial only to the children itself. As stated by Brown (2005), when parents are involved in their children's education, both parents and children are likely to benefit. This would lead to the pros of parent participation in their children's schooling, which are:

- enhances children's self-esteem
- improves children's academic achievement
- improves parent-child relationships
- helps parents develop positive attitudes towards school
- and a better understanding of the schooling process.

2.2.2 Parents, School and Teachers Relationship

Throughout child's school years, there is always a need to communicate with school: teachers, administrators, and others concerned with child's education. There are also times when the school needs to communicate with parents. This scenario leads to a need of building good relationship between parent and school community.

Funkhouser (1997) pointed out that "schools that have developed successful partnerships with parents view student achievement as a shared responsibility, and all stakeholders-- including parents, administrators, teachers, and community leaders--play important roles in supporting children's learning."

The achievement on children's education is not only on the responsibility of schools and teachers, but also to parent itself. Parent should not assume that the school and teachers have the primary responsibility for teaching the children. They, school and teachers believe that when parents are involved, it makes education easier for the children, the parent and the teacher Thus, there is a need of nurturing the nature of parent-schools-teachers relationship.

According to Brown (2005), all teachers experience the frustration of trying to involve parents and getting little response. Teachers complain that parents do not come to conference or school open houses, check homework, or answer any notes. This leads some teachers to conclude that parents do not care about their children's education. This scenario shows the normal feelings among teachers and school in facing the problem of inactive parent's participation in school activities. It also would lead to uncomfortable relationship between both parties as well as affecting children's achievement at school.

For many parents, Brown (2005) indicated a major impediment to becoming involved is lack of time. Working parents are often unable to attend school events during the working day. In addition, evenings are the only time these parents have to spend with their children, and they may choose to spend time with their family rather than attend meetings at school. As parent spent less time for children's education, then how can they keep track the progress of children's learning process at school? Thus, with the integration of mobile technology, this study would come with an initiate in solving this problem. It would discuss later in this report.

Furthermore, Greenberg (1989) stated for many apparently uninvolved parents at school were not a positive experience and they may feel inadequate in a school setting. Parents may also feel uneasy if their cultural style or socioeconomic level differs from those of teachers.

By having a good communication, the gap between parent and school or teachers could be narrowed down. As stated by Knipprath (2004), according to one element of Epstein's framework of six types of involvement of parents and the community in the school, there is a need of effective forms of school-to-home and home-to-school communications about school programs and children's progress.

2.2.3 Scenario in Malaysia

As reported by Evans (1995), since the 1970s, and due to the emphasis given to the importance of education, there has also been an increased awareness among parents, government and non-governmental agencies (NGOs) of the importance of preschool education for five-and six-year-old children. This statement proved that education is enforced in Malaysia since age of five or six years old with kids being sent to preschool.

2.3 SMS Technology

"The Short Message Service (SMS) is a basic service allowing the exchange of short text messages between subscribers"

(Le Bodic, 2002)

As stated by Lai (2004), SMS is not just a normal service anymore, yet, it has become an integral part of people's lives. It is comes with the significant implications for communications and information transmission. It is now a phenomenon that has grown and spread around the globe at an amazing speed. Furthermore, SMS is a service that available on Global System for Mobile (GSM) communication networks. It allows text

messages to be sent or received via the networks operator's message centre to a mobile phone, or from the internet by using the SMS Gateway.

Most mobile phones have this digital cellular network feature that allows users to send short alphanumeric messages at a relatively reasonable price. A question might be raised on why SMS medium is chosen for this study instead of electronic mail or email service. As SMS operates on a 'store-and-forward' concept where even if the recipients' phone is switched off, they will still be able receive the message and it can be considered as an almost instantaneous communication medium. Compared to the conventional email which operates on a 'store-and-retrieve' concept where a sender must wait for the receiver to come on-line and access the network to retrieve the message.

2.3.1 SMS Applications in Education

Nowadays, there are tremendous usage of SMS medium in many different areas such as education, business, health and medical and entertainment. As this study focus on education, thus the next part will discuss on the implementations of SMS medium in particular area.

SMS medium has been utilized for many applications such as an attendance notification, examination result, book overdue reminder and course registration. As reported by the Canterbury College, they used the 2-way SMS service for student's attendance notification. Students can text into the college and notify of their absence. This application allows the students to use the most convenient way, SMS medium, to notify the college of issues of absence and remain informed. In addition, the amount of unauthorized absences could be reducing. Compared to traditional landline telephone communication relied on the student being at home when called, SMS text messaging offers an easy and time and cost effective way to communicate directly and discreetly with students. Such system would assist the college to ensure the smoothness of student's attendance record.

In addition, there many educational institutions including universities and colleges have adopted SMS technology as a way to check exam results. According Academic Student Services of University of the Free State, stated by Loader (2005), such service provides students the opportunity to obtain exam results at any time and any place. The service is also quick and easy and result could be sent within seconds. In our country, Malaysia, such SMS application also applied in several universities such as University Multimedia and University Tun Abdul Razak. As reported by University Tun Abdul Razak's Announcement (2005), student needs to send a SMS as a request to check the exam results. Compared to system to be developed based on this study, it will be automatically sending a SMS to those parents to inform about their children's performance.

Kai (2004) stated that "Indeed, it is a global trend that educational sector has been one of the most aggressive market areas adopting wireless technology." He as a Legislative Councillor (IT) of University of Hong Kong has launched "Wireless Library Service of SMS Notification" for his university. The service used a specific library system to automatically send a SMS to students as a reminder regarding borrowed book overdue. It proved that SMS medium is widely used in improving an education field.

2.3.2 SMS Facts of Usage in Malaysia

The last decade has seen a significant increase in the use of mobile phones in the general community. This has led to changes in the way individuals communicate, including the fact that they can reach people by phone at anytime of the day no matter where they might be.

As reported by Malaysian Communications and Multimedia Commission (2004), presently in Malaysia, SMS usage seems significant where 74% of the subscriber (the mobile phone users) using SMS to communicate. As many 31.7% reported sending out more than five SMS messages in a day on average. This percentage comes from the survey on 4925 randomly selected phone subscribers of 012, 013, 016, 017 and 019.

This shows that Malaysian used SMS service as one of essential ways to communicate with others.

Table 2.1: Percentage Distribution of Subscribers by Broad Age Groups

Subscriber	Range of Age (years old)	Usage Percentage (%)
Adults	20 to 40	78.8
Preteens and teens	Up to 19	12.3
Seniors	50 above	9.0

Table 2.1 shows the percentage distribution of subscribers by broad age groups as reported in Hand Phone Users Survey 2004. This fact supports the idea of study that focusing parents, which fall under adult group of subscribers.

2.4   Related Works

There are several approaches used by school community in distributing student performance to parents. Within the past years, almost schools use traditional-style of distribution where a letter or report mailed directly to children's home. Limitations in communications technology leads it to be the most popular and preferable approach. The rapid evolution of communication technology tremendously changed school's direction in such distribution. They make it by sending an electronic mail (email), making a phone call or uploading to a school's website.

As stated in an article by Texas Education Agency (2001), every child who takes the Texas Assessment of Knowledge and Skills (TAKS) test gets a report of his or her score. This report is called the Confidential Student Report (CSR). The report will be presented as parent brochure which is available on agency's website. By providing children's test scores and performance evaluation on a website, the agency objectively to give parent an easy access the report via internet. Thus, parent can carefully examine their child's CSR while working at their office. It can assist parent to find out where children is doing well and may need to improve.

Report cards are typically used by teachers to inform parents about the child's progress in school. But report cards can become two-way by including the parents' report of the child's progress at home with such school-related topics as: willingness to do homework; reading for pleasure; moderation of televiewing; and attitude toward learning. The cards might also encourage parents to note specific concerns or request conferences (Redding, 2005)

Report card being tremendously used by school as an instrument to communicate with parent regarding their children's learning performances. Such communication can be established when parent and teachers sit together to discuss on several matters relating to student's performances. As many schools done, parent conferences are scheduled in coordination with the issuing of report cards.

CHAPTER 3

METHODOLOGY / PROJECT WORK

3.1   Procedure Identification

3.1.1 Designing Methodology

Generally, methodology is specifically defined at the early stage of project development. It is purposely to maintain and ensure the consistency of system development life cycle of the proposed system. In addition, methodology is also used to guide in achieving the objectives of project. There are several models of methodology that can be used as a project direction, such as waterfall model, evolutionary development, formal systems development and re-used based development.

Since methodology plays an important role, it has to be carefully chosen. Developers are encouraged to design their own methodology. There are several researches have been done in order to find what kind of methodology that best suit the project.

A Dual Development Methodology is designed and practically used as a project methodology. It is designed based on available methodologies, which are combined and analyzed to the best suit the requirement and time constraint of the project. The time constraint described as below:

- Time Constraint

The time frame given to complete the proposed project is limited to one semester, which is consisting of fourteen weeks. As required, the project needs to be completed

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within this given time frame. Therefore, the Dual Development Methodology is designed to the best suit the time constraint. The reason is to avoid any future problem that can lead to completing the project behind the schedule.

3.1.2 Project Methodology

As stated in previous, Dual Development Methodology is used a methodology for the proposed project.
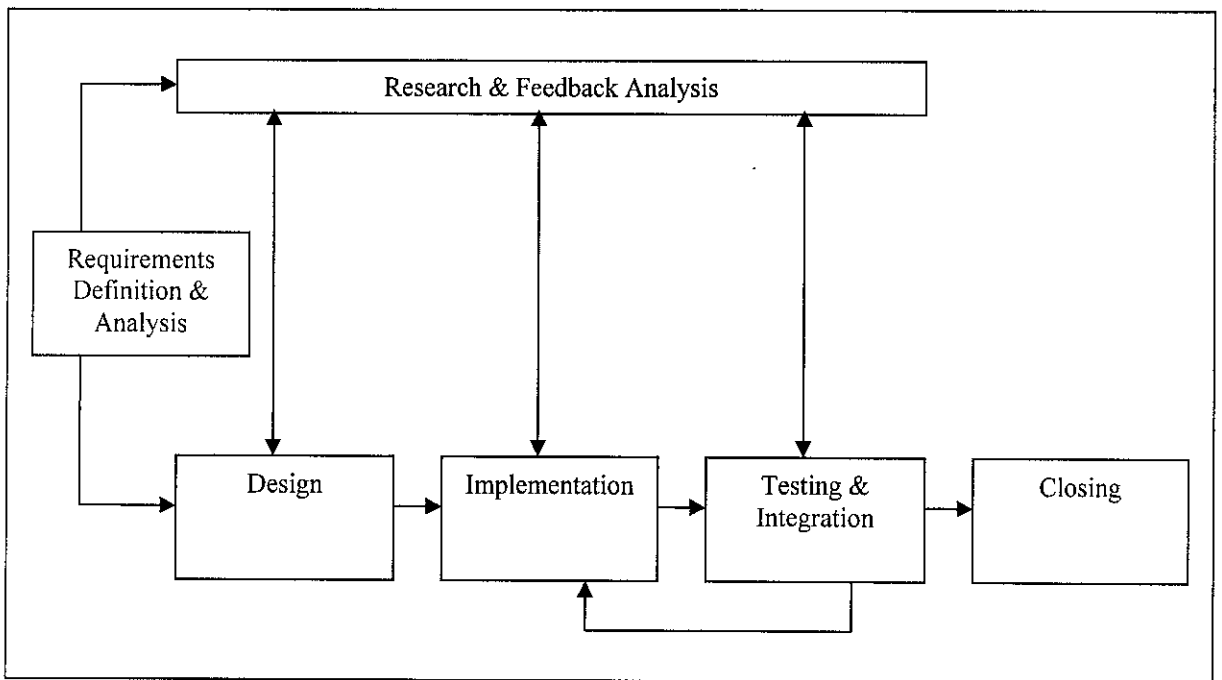

Figure 3.1: Dual Development Methodology

As shown in Figure 3.1, there are six phases identified in this methodology. Phases are illustrated in a form of diagram. Principally, the flow starts with Requirements Definition and Analysis phase. From these defined and analyzed requirements, tasks are divided into two parts which are research and development. As shown in the above figure, research and feedback analysis will works concurrently with Design, Implementation and Testing and Integration phases. It means that, further research and feedback analysis are required when there are some difficulties or problems realized along development part. By having concurrent activities, time consumption can be

reduced and leads in completing the proposed project within given time frame. Besides, any flaws can also be avoided.

Finally, the methodology ends with the Closing phase. Along this phase, activities will focus on finalizing the system, preparing final project report, presenting the system and preparing lesson learnt from the project. This methodology is carefully designed and applied in order to ensure that the proposed system would be developed in given limit. The effectiveness and efficiency of the project methodology are the factors that will determine the quality of the proposed system.

3.1.2.1   Requirements Definition & Analysis

Generally, activities are centered on defining and analyzing project's problem statement, scope, objectives and requirements from various components of the system. These activities are important since it will be affecting the whole development process of the proposed project. A good requirements definition and analysis phase leads to a smooth and good end-product. The requirements involved including requirements of target user and audiences, the system, hardware, software and tools.

The journey begins when a broad problem area is identified, where emphasizing on educational issues among children. A research process is carried out as the next step in narrowing the scope of problem. It involves observations, research findings and analysis activities.

The selection of observations activity is purposely to avoid from respondents who's unwilling to answer given questionnaires or be interviewed. In addition, it is a quick and easy method in getting information. Besides, observations covered on normal issues occurred at school and other educational institutions. As a need to require more information, research finding is carried out on various material including journals, professionalism speeches and seminars, internet, newspaper and magazine articles and reports. From the information collected, analysis is taken out.

As the narrowed problem statement is identified, the system goals, objective, constraints and requirements will be established together with system's users. They are then defined in detail and serve as a system specification.

3.1.2.2   Research and Feedback Analysis

Research and feedback analysis are conducted concurrently or in-line with the development part of the system. Research is done mostly through findings on the Internet. As it concurrent with design phase, for example, further research is taken during designing system storyboard. It was focusing on determining suitable and user friendly of system interface. Research covered from Human Computer Interaction (HCI) point of view. Then, feedback is get from the supervisor as she revised the created system storyboard.

Another example, in implementation phase, research is carried out when stuck while working on coding part. Thus, further research is taken to find the solution. Websites on related programming language are visited and feedback is getting from the available forum slot.

3.1.2.3   Design

In design phase, the activities involved including establishing and designing system work flow, system architecture, storyboard and database.

System Workflow

In designing the system workflow, several actors and corresponding activities involved in the system need to be identified. For this system, the actor involved is only the class teacher. The designed system workflow is shown in Figure 3.2.
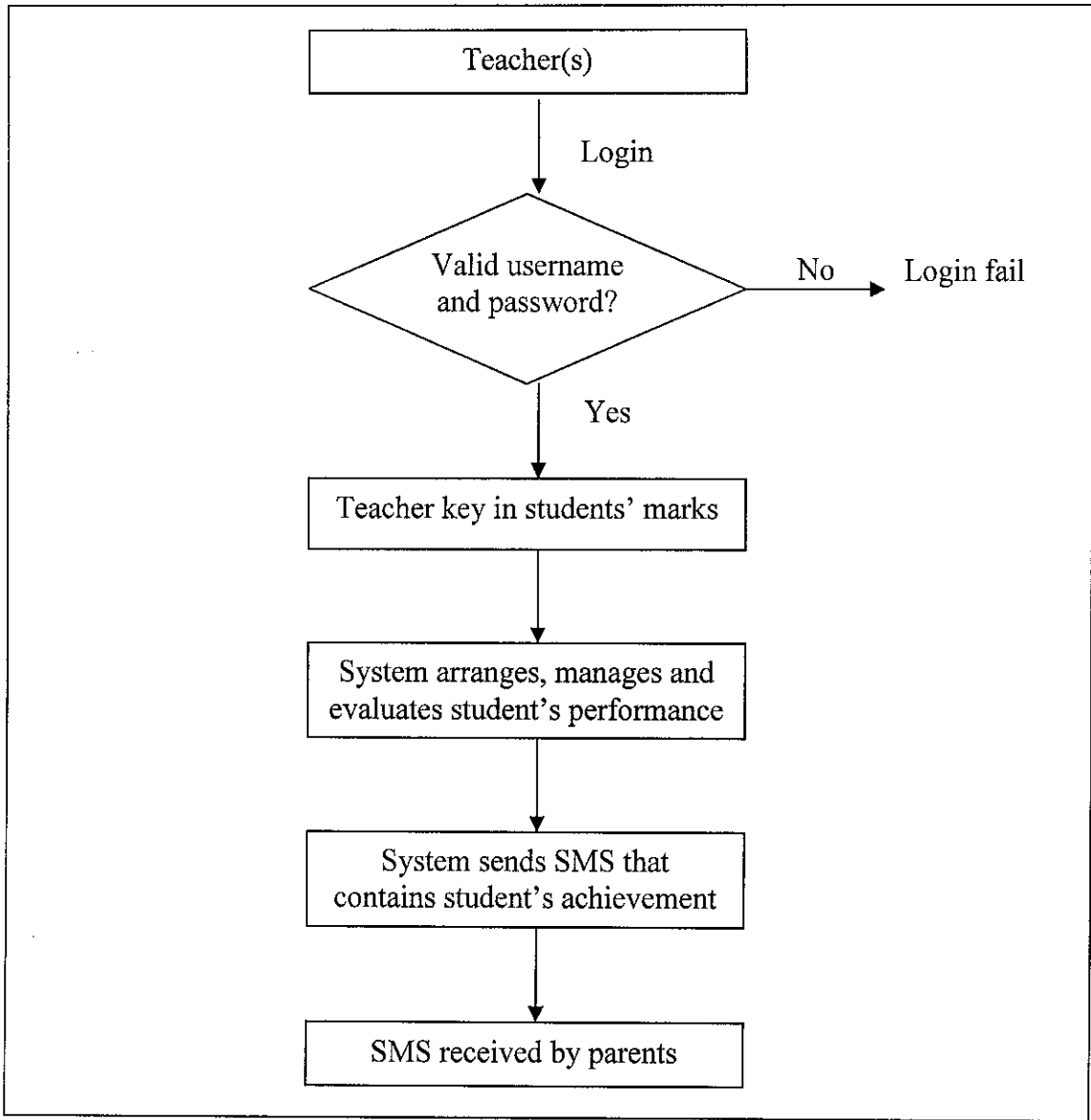
Figure 3.2: System Workflow

The system workflow begins with when the class teacher, which is system's user, login into the system. User needs to provide a correct combination of username and password in order to access into the system. System would verify it and allow for access in case of valid username and password is entered. If invalid username and password is entered, user login is fail. Afterward, teacher will key in students' marks into the system. The system will act by arranging and managing those marks as well as evaluating the students' performance. Finally, the system will send SMS to parents. Once the SMS received by parents, it will alert them on the student's achievements.
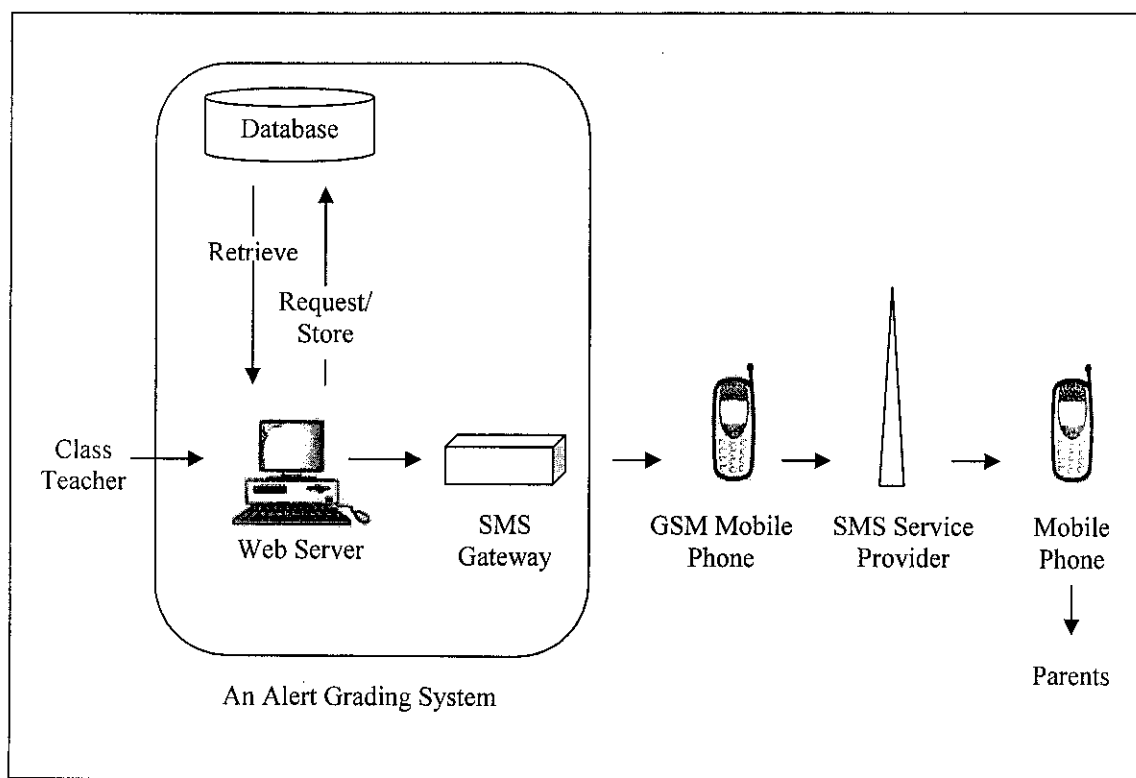
Figure 3.3: An Alert Grading System Architecture

Figure 3.3 shows the system architecture which is illustrates the components involved in An Alert Grading System. There are eight components that hold specific their own functions. These components interact and integrated together to form the entire system. There are seven components of An Alert Grading System are:

i. Class Teacher

In this system, class teacher act as a user of the system. As an initiator, the flow of the system begins when they enter sufficient information onto the system. They responsible to key in students' marks for each subject, including marks of Bahasa Malaysia, English, History, Islamic Studies, Modern Mathematics, Additional Mathematics, Chemistry, Physics and Biology. Even though, for security and confidentiality purposes, only authorized class teacher can log in into An Alert Grading System. A valid combination

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of username and password is required to be entered in at Login page before access is permitted. Furthermore, the system allows this type of user to add new, update and delete records of students' marks and data.

ii. Web Server

Internet Information Services (IIS) 5.1 web server is installed and setup in An Alert Grading System. Virtually, web server is specialized software that responds to any requests made by client (e.g. web browser). It provides resources such as Extensible Hypertext Markup Language (XHTML) or Active Server Page (ASP) documents. Along this interaction, the web server and the client communicate using the platform-independent Hypertext Transfer Protocol (HTTP). It is a protocol used for transferring requests and files over the Internet, for instance between web server and web browser. In addition, web server is integrated with database and system gateway in order to allow data flow.

For IIS 5.1 web server, there are some basic features compared to other web server:

- It is owned by Microsoft Corporation and included in the version of Windows XP Professional.
- Provides a broad range of administrative features for managing websites. It is compatible with programmatic features like ASP, where allows website creator to create and deploy scalable, flexible web applications on the Internet or local intranet.
- Supports for ASP. IIS support for ASP provides an easy-to-use alternative to Common Gateway Interface (CGI) and Internet Server Application Program Interface (ISAPI) by letting content developers embed any scripting language or server component into their Hypertext Markup Language (HTML) pages.
- IIS supports Simple Mail Transfer Protocol (SMTP) and Network News Transport Protocol (NNTP) Services. Both components allow website creator to set up intranet mail and news services that work in conjunction with IIS.

- Provides more extensive support for Web Folders using Web Distributed Authoring and Versioning (WebDAV). WebDAV is an Internet standard that lets multiple people collaborate on a document using an Internet-based shared file system.

- Web Folders let users maintain a consistent look and feel between navigating the local file system, a networked drive, and an Internet Web site.

For this system, ASP is chosen as a web programming language. Compare to basic standard HTML language, ASP is capable in providing a dynamic web programming language. It used server and client information to create and send dynamic web pages to clients. As a sever-side scripting, ASP documents (e.g. login.asp, logout.asp) are created in order to communicate and interact with web server.

There are some of ASP's main competitors including, PHP Hypertext Processor (PHP), Java Server Page (JSP), Practical Extraction and Report Language (Perl) and Python. Compared to these competitors, ASP has its own strengths as below:

- ASP is Microsoft's web development tool and supported by IIS web server.

- ASP is widely used for many small, medium and large companies web needs. It is because these companies are running on Microsoft platforms and products. Thus, it makes business to business transactions easier because everyone involved is running the same platforms and applications.

- It is easy to learn and use. The syntax in ASP is based on two client-side scripting languages which are VBScript and JavaScript. Developers who have basic knowledge in Visual Basic and Java will find easy to play with ASP.

- ASP pages provide standards-based database connectivity, where it used standard Structured Query Language (SQL) in accessing databases.

- ASP has wide database integration, where it can be connected to many database systems, for instance Microsoft Access, Microsoft SQL Server, MySQL Oracle, InterBase, IBM DB2, Sybase, Informix, PostgreSQL and many other database systems.

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- ASP pages have the ability to customize content for different browsers.
- It provides error-handling capabilities for web-based applications.

iii. *Database*

Generally, a database is a collection of data. In this system, database act as storage to store information of all students and their respective marks. As shown in Figure 4.1, there is dual interaction between web server and database components. Web server will send request of data to the database. Then, database will respond by providing required information effectively to the web server. Besides, web server also can send a request to store any information into the database.

Microsoft Access 2003 is used as a database in this system. It is a relational database system. Aside of other databases, Microsoft Access database is easy to use, access and manipulates. It provides comprehensive mechanisms for managing and organizing data or information. Information can be stored in a consistent manner with a database's format. In addition, Microsoft Access database allows data to be accessed and stored without addressing the internal representation of database. From the system point of view, it's easy to establish connection between Microsoft Access database and any ASP pages. Besides, it is easy to access and perform any actions, including retrieve, store, delete and search data from ASP pages. Furthermore, Microsoft Access is a multi-threaded database. Means that, it supports SQL, which is the standard database query language worldwide. Thus, this language been used by ASP pages in accessing information stored in the database.

iv. *SMS Gateway*

SMS gateway makes the transmission to GSM mobile phone more efficient. Basically, it provides the interface for the SMS to be delivered via the modem from the system. It performs two-way interaction, as it acts as an intermediary between modem and the system. It provides SMS gateway service to both of these components.

For this system, Now SMS/MMS Gateway v5.51 is used as a gateway. This gateway is downloaded from the Internet which has sixty days of trail period and licensed for thirty messages per minute. The gateway will send an alert to target recipients, which are the parents itself, in a form of SMS.

v. GSM Mobile Phone

In this system, the GSM mobile phone is functioning likes a modem. Instead of GSM mobile phone, GSM Modem can also be used. Even though, it's quite expensive and it's hard to find one which is only for rented. These are reasons of having GSM mobile phone as a system modem.

As illustrated in previous figure, it is located between the SMS gateway and SMS service provider. It gets data from SMS gateway, converts the digital data to an analog signal and transmits it to SMS Service Provider (e.g. Maxis) through the telecommunication line. In order to enable GSM mobile phone act as a modem, there is a need to setup a connection between it and the computer. Data cable, infrared and Bluetooth are ways could be used to setup the connection.

For this system, Bluetooth is used as a way of connection between GSM mobile phone and the computer. Generally, Bluetooth is defined as a wireless connection that enables digital devices to exchange information. It allows digital devices to easily transfer files at high speed and commonly available in many portable devices such as laptops and mobile phones.

vi. SMS Service Provider

SMS Service Provider is also known as Short Message Service Center (SMSC). In Malaysia, there are numbers of SMSC available including Maxis, Celcom and Digi. All these telecommunication providers nowadays have enable SMS services worldwide.

Generally, SMSC is defined as a store and forward service, in other words, short messages are not sent directly from sender to recipient, but always via an SMS Center instead. In this system, SMS Service Provider is communicated from GSM mobile in order to send SMS from the system.

vii. *Parents (target audience)*

Parents are the final components in the system. As the system audience, parents are expected to receive the significant system output, which is the SMS. SMS received will notify and alert them about student's achievements in SPM trial exam.

System Storyboard

Storyboard is used to demonstrate the system's flow in more meaningful style, where each system interfaces will be designed effectively. Before designing the storyboard, the whole system is divided into number of subsystems. Each subsystem represents each module or component of the system. It includes student, marks, performance evaluation, SMS, login and logout. It is done to ease the development process. Besides, each module has its own functions which are different from others. In designing the storyboard, HCI knowledge is being applied purposely to establish effective and user-friendly system interface. Storyboard is created roughly on paper which is including website elements such as textbox and command button.

System Database

The next step is designing database for the system. Database will be act as a storage which stored information and data about students and their marks. In designing database, several aspects are being emphasized. For instance, determining objects or tables, attributes of the object and its relationship. By having correct determination on these aspects, it allows effective data management. For this system, Microsoft Access 2003 is used as the Database Management System (DBMS) and some dummy data is stored.
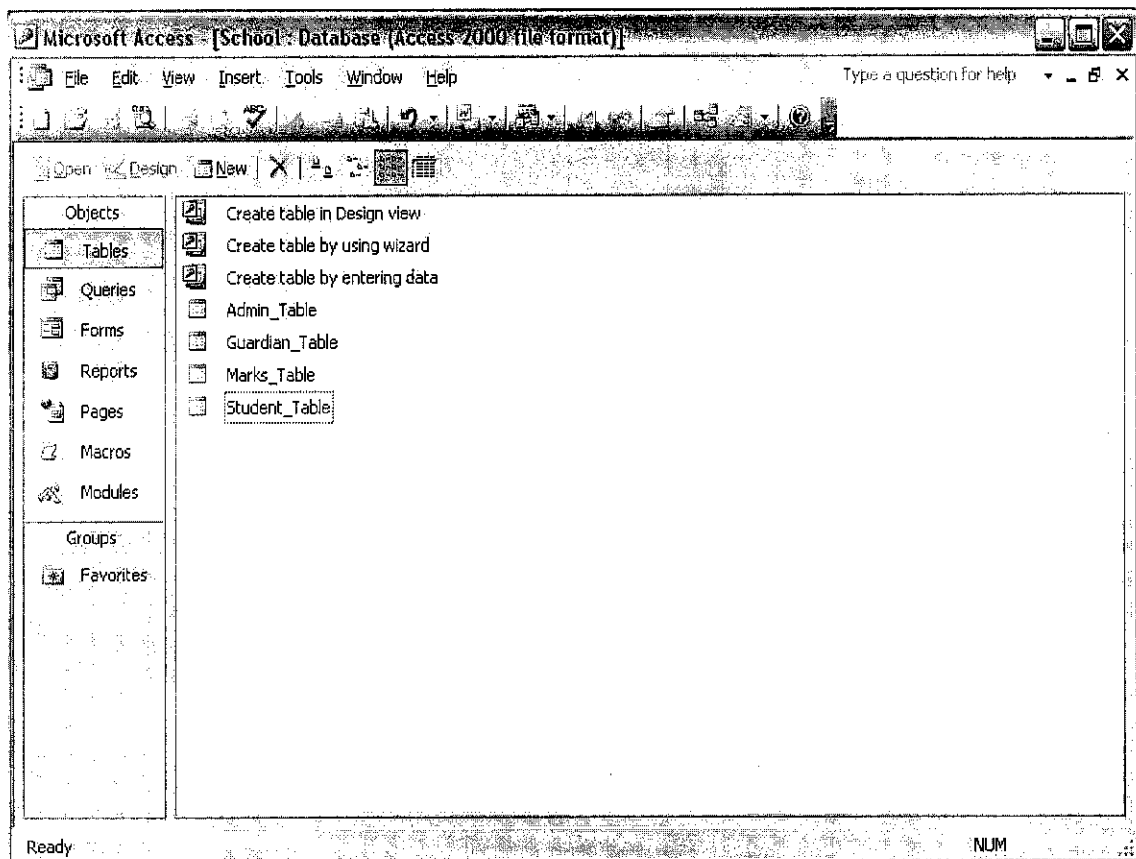
Figure 3.4 Screen Captured of System Database

Figure 3.4 shows the screenshot of system database created. As shown, there are four tables which are namely as Admin_Table, Guardian_Table, Marks_Table and Student_Table.

For Admin table, it consists of admin user's name, IC No, gender, username and their password. Basically, admin is the class teacher, who's the system user. In Guardian table, it consists of information about the student's guardian. It includes guardian's IC No, name, gender, permanent address, contact no., occupation and their relationship with the student.

For Marks table, it consists of students' marks for each subject, grades, CGPA and remarks for their overall performance. Besides, Student table consist of information about all students. It includes student's IC No., name, gender and class.
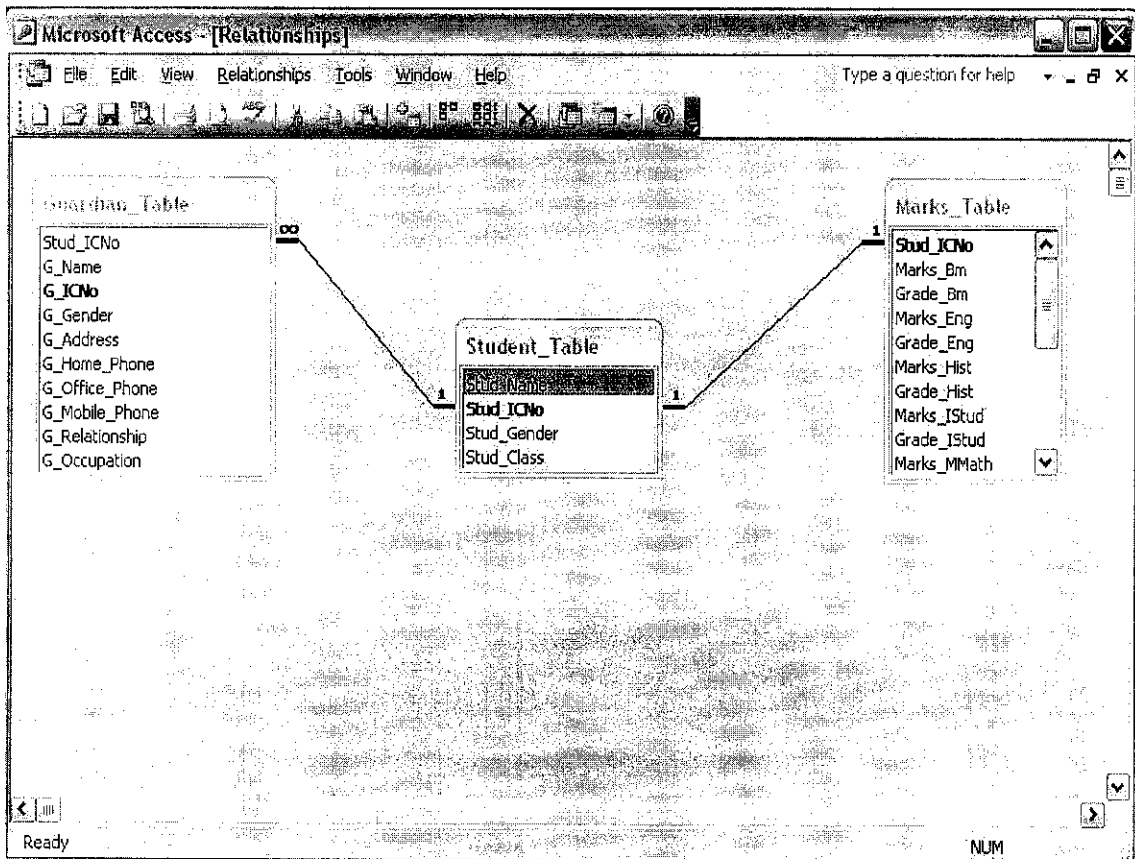
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Figure 3.5 Screen Captured of System Database

Figure 3.5 shows the relationship between tables in the system database. As shown, Student table has two relationships which are with Guardian and Marks tables. It is many-to-one relationship between Student and Guardian tables. Means that one student can have one or many guardians, but a guardian only can have one student. For Student and Marks tables, it is one-to-one relationship. It means one student can only have one record of marks.

The relationships are connected through reference key owned by each tables. In this system, student's IC No. is used as reference key. It is important to have a reference key as to reduce redundancy of data.

3.1.2.4 Implementation

This is the most critical phase in system development process. The reasons are, it is time consuming and involves a lot of activities. Activities involved in this phase are divided into two parts, which are technical and non-technical activities. For technical activities such as setup the IIS web server, establish connection between GSM mobile phone and the computer and installing SMS gateway. For non-technical activities, the main focus is the development of subsystems or modules of the system. It involves implementing storyboard (for each subsystem) to the real system, establishing connection between system subsystems and database and adding functionality on each subsystem.

3.1.2.5 Integration and Testing

As described in the system architecture, this phase work closely with implementation phase. Subsystem will be developed one by one at implementation phase. Every time the subsystem is completely developed, it will undergo testing phase individually. Any flaws or errors found will be resolved carefully. After the subsystem is completely developed and tested, it will integrate together. The process will iterate until all subsystems are integrated.

After the complete integration, the system as whole will be tested. It is purposely to ensure the system is working correctly as expected. At this point, presence of user is involved to test the system output ant its functionality. Debugging will be carried out if the system unable to perform as expected or there is any flaws or errors. There are two different testing used in this stage which is functional and integration testing. Both testing will be carried out by the author as the developer. All testing will be further explained on the chapter of result and discussion.

3.1.2.6 Closing

It is the final phase in the project methodology. At this stage, activities involved finalizing the system, presenting the system and preparing final documentation and lesson learnt. This phase is also known as close-out.

3.2 Tools and Equipments Required

As the system is a combination of web-based application and SMS technology, various software are used in order to assist and facilitate the development process. In addition, compatible hardware is used purposely to ensure the system is integrated and runs smoothly.

3.2.1 Software

1. Windows XP, Professional Edition with service pack 2
2. Macromedia Dreamweaver MX
3. Microsoft Access 2003
4. Microsoft Internet Information Services (IIS) v5.1
5. Now SMS/MMS Gateway v5.51
6. Microsoft Internet Explorer 6.0
7. Microsoft Office 2003 (for documentation purposes)

3.2.2 Hardware

1. Mobile phone, with SMS features
2. GSM Mobile Phone
3. Two Hotlink SIM Card
4. Desktop personal computer with following requirements:
   - Processor: Intel(R) Pentium® 4, CPU 2.40GHz
   - Memory: 512 MB RAM

- Storage: 80GB
- Display Card: S3 Graphics ProSavage DDR
- Operating System: Microsoft Windows XP Professional Service Pack 2
- Monitor: 15" with 1024 x 768 resolutions
- Media Device: 1.44 MB Floppy Disk Drive, Samsung DVD-ROM SD-616Q

3.2.2 Programming Languages

1. ASP as web programming language which is integrated with SQL and two client-side scripting languages, VBScript and JavaScript.

CHAPTER 4

RESULT AND DISCUSSION

4.1   Overview

The prototype of An Alert Grading System performs as expected. This chapter will explain the result of functional and integration testing. It also will represent the screen captures of the system and its brief descriptions.

4.2   Functional Testing

As described earlier, each subsystem will be tested once it is developed. It is to detect and debug any flaws before it is made up as a whole system. It is also to ensure each subsystem is well-functioning. All subsystems are tested by using functional testing. The successful of functional testing is when expected result or output is achieved from the respective input. The test results are described in Table 4.1 until Table 4.6.

Table 4.1 Test Result of Login Module

Component	Expected Test Result	Actual Test Result
Login button	- To ensure user access identification (username and password) text field is filled. - To verify user access identification. - To permit user access.	- Successfully notified unfilled text field through pop-up window. - Successfully verified user access identification. - Successfully permitted user access to the system.

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Table 4.2 Test Result of Student Module

Component	Expected Test Result	Actual Test Result
Search button	■ To search info for specific student's IC No. ■ To view the student's name and IC No.	■ Successfully searched for the student's info. ■ Successfully viewed the student's name and IC No.
View All button	■ To view all students' name and IC No. retrieved from database.	■ Successfully viewed all the info.
View link	■ To view details info of selected student.	■ Successfully viewed details info of the student.
Update button	■ To update student' info. ■ To ensure updated info will be stored in the database.	■ Successfully updated the student's info. ■ Successfully stored the info into the database.
Refresh button	■ To provide initial state of page.	■ Successfully provided the initial state of page.
Add New Record button	■ To enable user to add new student's record.	■ Successfully enabled user to add new record.
Add button	■ To add new student's record. ■ To ensure the new record will be stored in the database.	■ Successfully added the new record. ■ Successfully stored the new record into the database.
Delete button	■ To identify number of record(s) to be deleted. ■ To allow user to cancel delete action before it's performed. ■ To delete only record(s) selected by the user.	■ Successfully identified the record(s). ■ Successfully allowing user to cancel delete action. ■ Successfully deleted the respective record(s).

Table 4.3 Test Result of Marks Module

Component	Expected Test Result	Actual Test Result
Search button	■ To search info for specific student's IC No. ■ To view the student's name, IC No and all marks.	■ Successfully searched for the student's info. ■ Successfully viewed all the info.
View All button	■ To view all students' name, IC No. and all marks retrieved from database.	■ Successfully viewed all the info.
Update Marks button	■ To enable user to update student's marks for each subjects.	■ Successfully enabled user to update the student's marks.
Refresh button	■ To provide initial state of page.	■ Successfully provided the initial state of page.
Update BM Marks	■ To update students' marks for Bahasa Malaysia. ■ To ensure the updated marks will be stored in database.	■ Successfully updated the students' marks. ■ Successfully stored the updated marks into the database.
Update ENG Marks	■ To update students' marks for English. ■ To ensure the updated marks will be stored in database.	■ Successfully updated the students' marks. ■ Successfully stored the updated marks into the database.
Update HIST Marks	■ To update students' marks for History. ■ To ensure the updated marks will be stored in database.	■ Successfully updated the students' marks. ■ Successfully stored the updated marks into the database.

Update ISTUD Marks	- To update students' marks for Islamic Studies. - To ensure the updated marks will be stored in database.	- Successfully updated the students' marks. - Successfully stored the updated marks into the database.
Update MMATH Marks	- To update students' marks for Modern Mathematics. - To ensure the updated marks will be stored in database.	- Successfully updated the students' marks. - Successfully stored the updated marks into the database.
Update AMATH Marks	- To update students' marks for Additional mathematics. - To ensure the updated marks will be stored in database.	- Successfully updated the students' marks. - Successfully stored the updated marks into the database.
Update CHEM Marks	- To update students' marks for Chemistry. - To ensure the updated marks will be stored in database.	- Successfully updated the students' marks. - Successfully stored the updated marks into the database.
Update BIO Marks	- To update students' marks for Biology. - To ensure the updated marks will be stored in database.	- Successfully updated the students' marks. - Successfully stored the updated marks into the database.
Update PHYS Marks	- To update students' marks for Physics. - To ensure the updated marks will be stored in database.	- Successfully updated the students' marks. - Successfully stored the updated marks into the database.

Table 4.4 Test Result of Performance Evaluation Module

Component	Expected Test Result	Actual Test Result
Search button	■ To search info for specific student's IC No. ■ To view the student's name, IC No., accumulated grade, CGPA and remarks.	■ Successfully searched for the student's info. ■ Successfully viewed all the info.
View All button	■ To view all students' name, IC No., accumulated grade, CGPA and remarks retrieved from database.	■ Successfully viewed all the info.

Table 4.5 Test Result of SMS Module

Component	Expected Test Result	Actual Test Result
Send SMS button	■ To send SMS as an alert to all parents (who's has data stored in the database).	■ Successfully sent SMS to all parents.

Table 4.6 Test Result of Logout Module

Component	Expected Test Result	Actual Test Result
Logout link	■ To end the user session. ■ To ensure the user is logout from the system.	■ Successfully ended the user login session. ■ Successfully ensuring user is logout from the system.

Each subsystem as listed above is functioning as expected. In addition, testing on error-checking functionality for each subsystem is also being carried out. It is including ensuring any data key in by user is in the correct and required format. For instance is for

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student's IC No. text field. In case of user entering 831129045240 instead of the correct format, 831129-04-5240, then the subsystem notify through pop-up error window. As a result, all subsystems are successfully notifying the user in case of error in keyed-in data. The functional testing on error-checking is successfully completed and functioning as expected. Figure 4.1 shows the example of error-checking function available in the system.
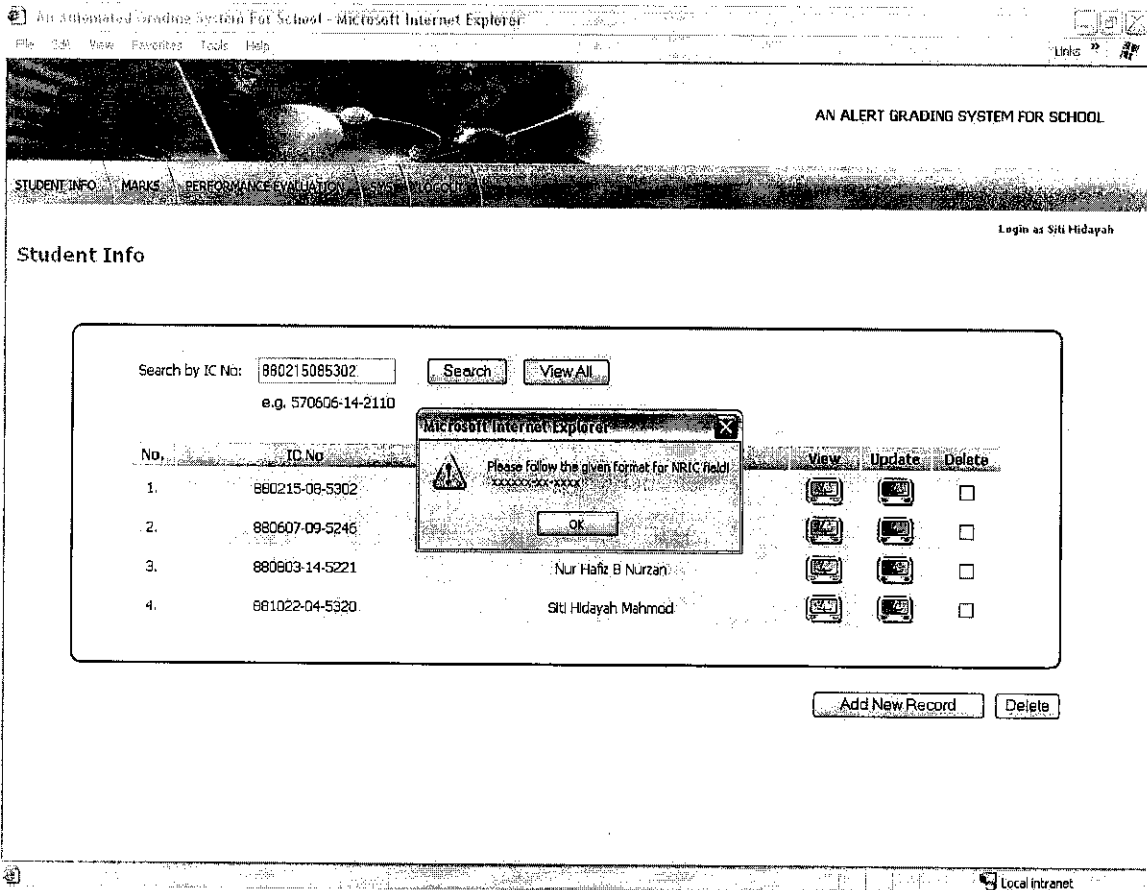

Figure 4.1 Example of Error-Checking Function in the System

Overall, during the testing, the whole system is functioning well without much redesign has been made.

4.3 Integration Testing

Integration testing will be conducted when each subsystem completely developed and on the system as a whole. It is to ensure there is no flaw or error every time integration of subsystems is performed. It also to ensure the system is well-functioning as a whole. In case of error found, debugging will be carried out. Under this testing, the system linkages are also being tested. It is to ensure each link or hyperlink in the system is well-functioning. Besides, this testing is used for ensuring the successfulness of connection between the system and other system components, including database and SMS gateway. Testing is done without outsider interference. The results of integration testing are described as shown in Table 4.7:

Table 4.7 Test Result of Integration Testing

Module / Component	Expected Test Result	Actual Test Result
Integration between Subsystems	■ To ensure the integration between subsystems is successful without any flaws or errors. ■ To ensure each subsystem is well-functioning.	■ Successfully integrated. ■ Each subsystem is well-functioning.
Integrated Subsystems as A Whole System	■ To ensure the system is well-functioning. ■ To guarantee there is no flaw or error after integrated all subsystems.	■ The system is functioning successfully. ■ Successfully guaranteed there is no flaw or error after the integration.

Linkage		
i. Subsystems / Module Links (the main menu of the interface)	■ To ensure the main menu links (which represent each subsystems / module) is functioning and linking.	■ The main menu is well-functioning and linked together.
	■ To ensure user can go (jump) directly to another subsystem while navigating other subsystem's page.	■ The main menu is successfully allowing the user to go to another subsystem, even though they are currently navigating other subsystem's page.
ii. Pages Links – link to the following page.	■ To ensure any links (which have linking to the following page) is successfully linked.	■ Each links are successfully linked to their following page.
	■ To ensure no lost of variable's value or data after integration.	■ Successfully ensuring that there is no lost of data after integration.

As stated in previous, the integration testing is also being used to test the connection between the system and outside components including database and SMS gateway. The results of testing are as shown in Table 4.8:

Table 4.8 Test Result of Integration between the System and Outside Components

Module / Component	Expected Test Result	Actual Test Result
System and Database	▪ To ensure the connection between the system and database is successful.	▪ The connection is successful.
System and SMS Gateway	▪ To ensure the connection between the system and SMS gateway is successful.	▪ The connection is successful.

Overall, the integration testing is successfully carried out and the system is performed successfully as whole. There was not much redesign being made along the testing.

4.4   Screen Capture and Descriptions

The following section will capture screens involved and describe what would be each interface does in the system.
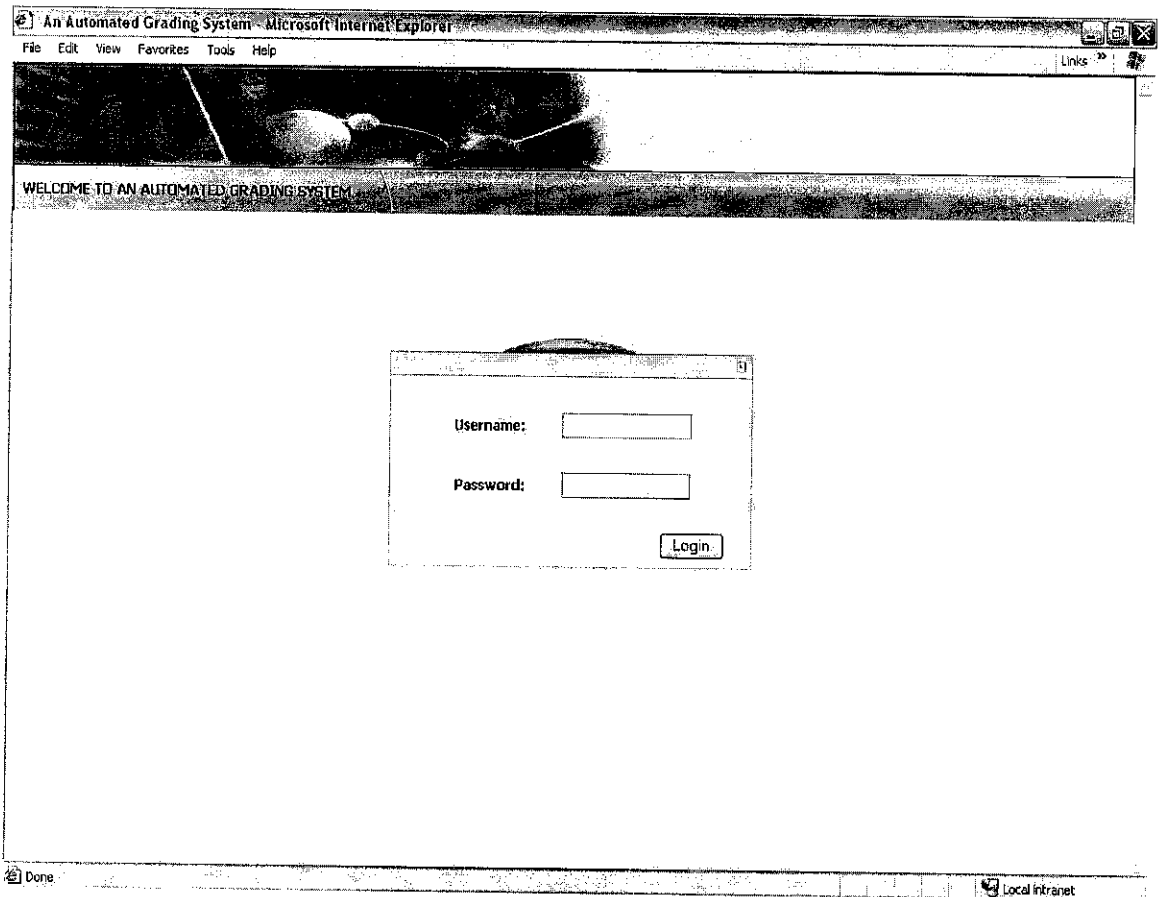

Figure 4.2: Login page

Figure 4.2 shows the screenshot of the login page. It is the first page of the system. User needs to key in an appropriate username and password in order to login into the system.
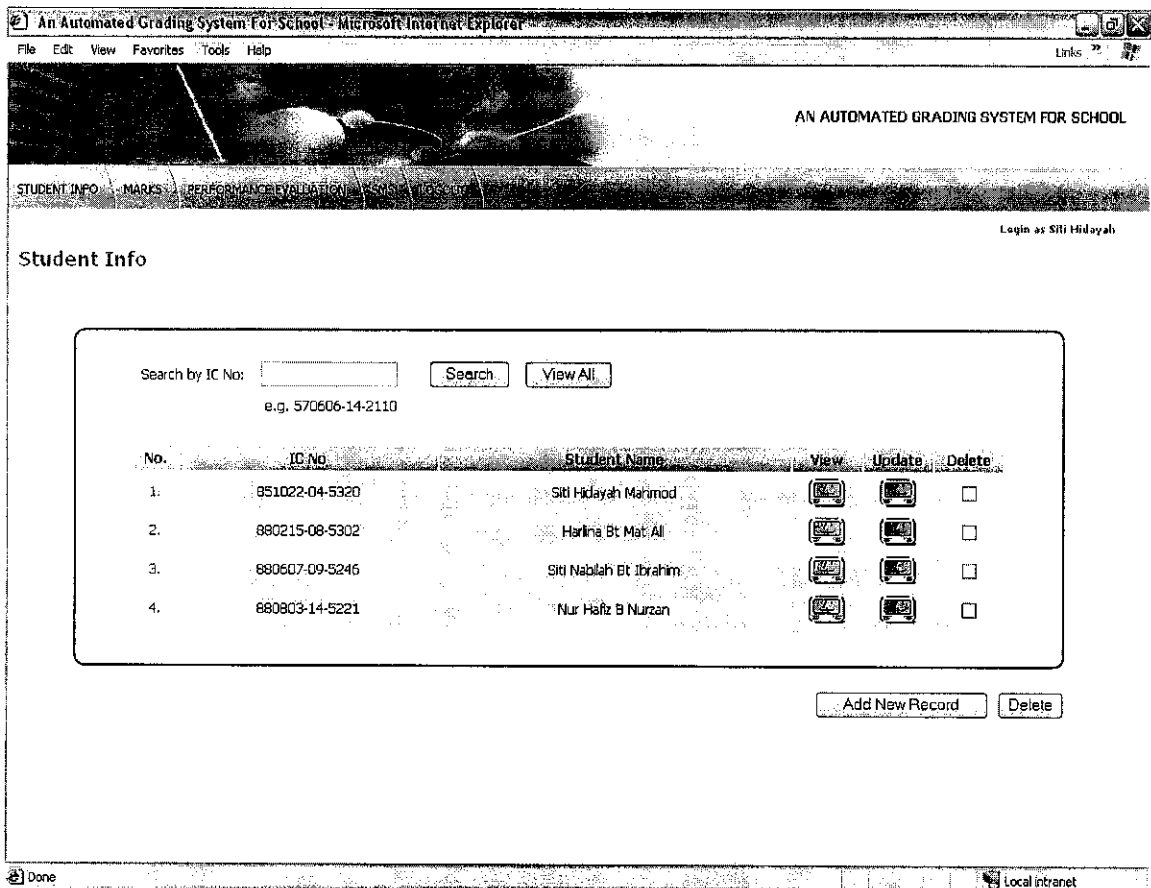
Figure 4.3: Student Info page

Figure 4.3 shows student info page which is the default page once user successfully login into the system. At top left of the page, there are available main menu of the system, which is representing each subsystems. The five main menus which are:

- Student Info - links to student module
- Marks - links to marks module
- Performance Evaluation - links to performance evaluation module
- SMS - links to SMS module
- Logout - links to Logout module

The student info page is the first page for Student module. It provides a table for a list of students in one class. Search button enables the user to search for a specific student's info by entering their IC No. For each student, three functions including view, update and delete are provided.
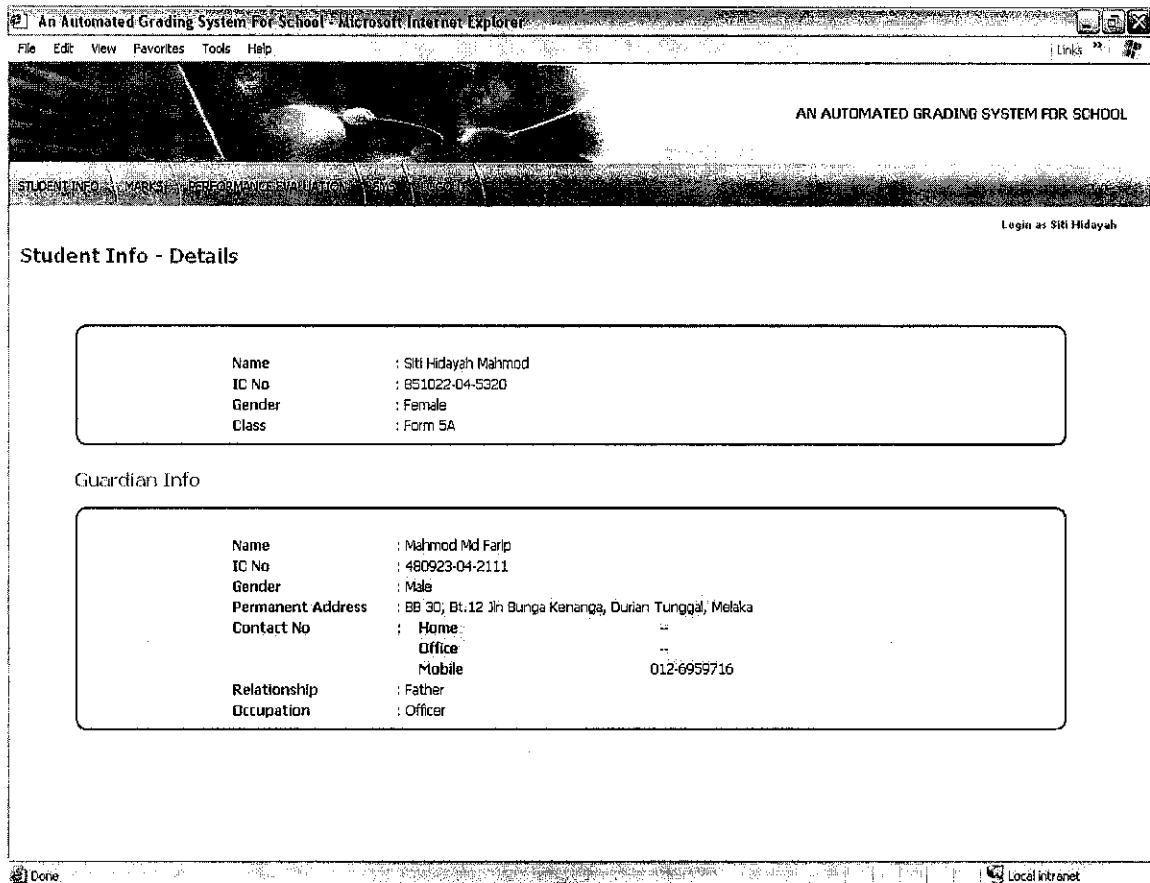
40

Figure 4.4: Student Info – Details page

Figure 4.4 shows student info - details page where it presents details information about the student and their guardian. The information about that particular student is including name, IC No., gender and class. On the other sides, guardian information is including name, IC No., gender, permanent address, home, office and mobile contact no., relationship with the student and their occupation.

Figure 4.5: Student Info – Update

Figure 4.5 shows student info - update page where user can update student's and guardian's information. For data integrity purposes, there are error-checking for each data entered by user *(please refer Figure 4.1: Example of Error-Checking Function in the System)*. It means, user needs to enter valid data before proceed with updating the record. By having this error-checking functionality, only valid data will be stored in the database. Thus, it able to avoid any conflict in data type in the database. Refresh button is provided to bring the initial state of the page. Therefore, user can view the original data without having to go back to the previous page.

Figure 4.6: Marks - Overall page

Figure 4.6 shows Marks - Overall page which provides a list of overall marks achieved by each students. From this page, Update Marks button is provided where user can update students' marks for each subject. For example, user wants to update students' marks for Bahasa Malaysia subject.
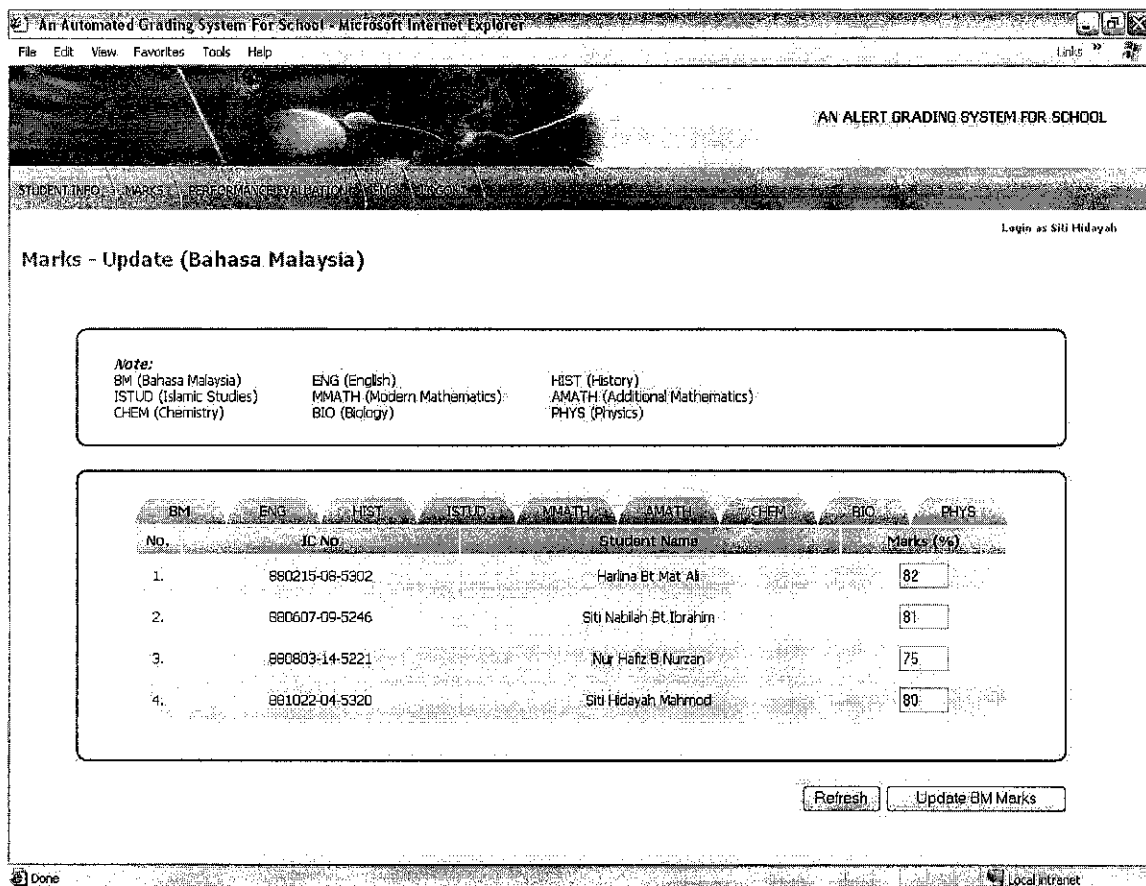
Figure 4.7: Marks – Update (Bahasa Malaysia)

Figure 4.7 shows Marks - Update (Bahasa Malaysia) page which user can update each student's marks for this subject. This page allow user to change and update the students' mark for Bahasa Malaysia. As shown, there are also provided links of each subject. Marks for each subject are presented in different interface. Thus, each subject can be updated separately. The reason of this idea is to avoid user's feeling of confusing while updating the marks.
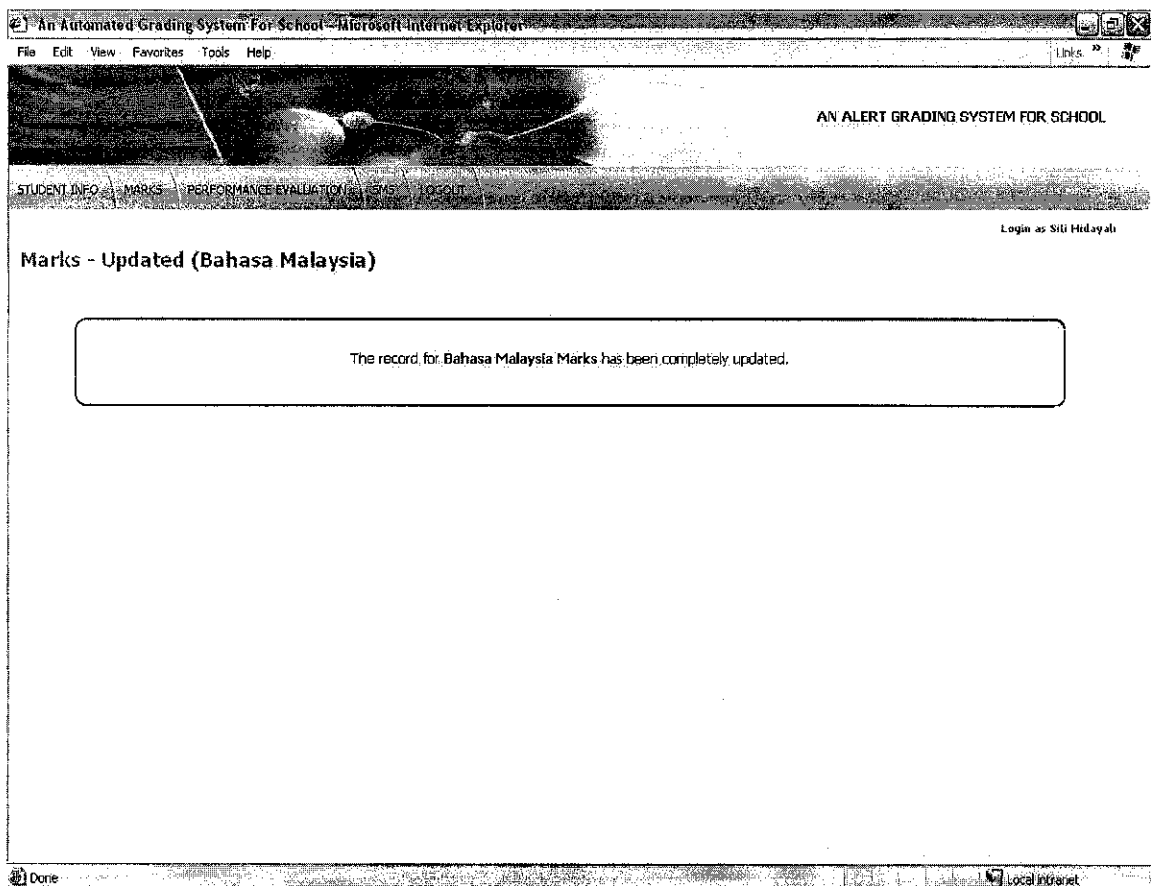
Figure 4.8: Marks – Updated (Bahasa Malaysia) page

Figure 4.8 shows Marks - Updated page for Bahasa Malaysia subject. Once this page is appearing, then it informs on the completeness of previous update action. For the info, this type of notification is also available for each function available in the system. It is including update, delete and send SMS functions. By having this, user is able to know that they are successfully performing an action.

Figure 4.9: Performance Evaluation page

Figure 4.9 indicates the Performance Evaluation page. This page provides the user with such information; students' name, IC No, accumulated grade and cumulative grade point average (CGPA) they had achieved and remarks of their overall performance. From this page, user would know how well student performs on SPM trial exam. Student's CGPA is calculated from their marks by using an equation as below:

Student CGPA =   Sum of (Mark for Subject *N* * 3 Credit Hours)

                                    Total Credit Hours

Equation 4.1

Where,

- *N* represents nine subjects taken by each student including Bahasa Malaysia, English, History, Islamic Studies, Modern Mathematics, Additional Mathematics, Chemistry, Biology and Physics.

- Total Credit Hours = nine subjects multiply three credit hours for each subject
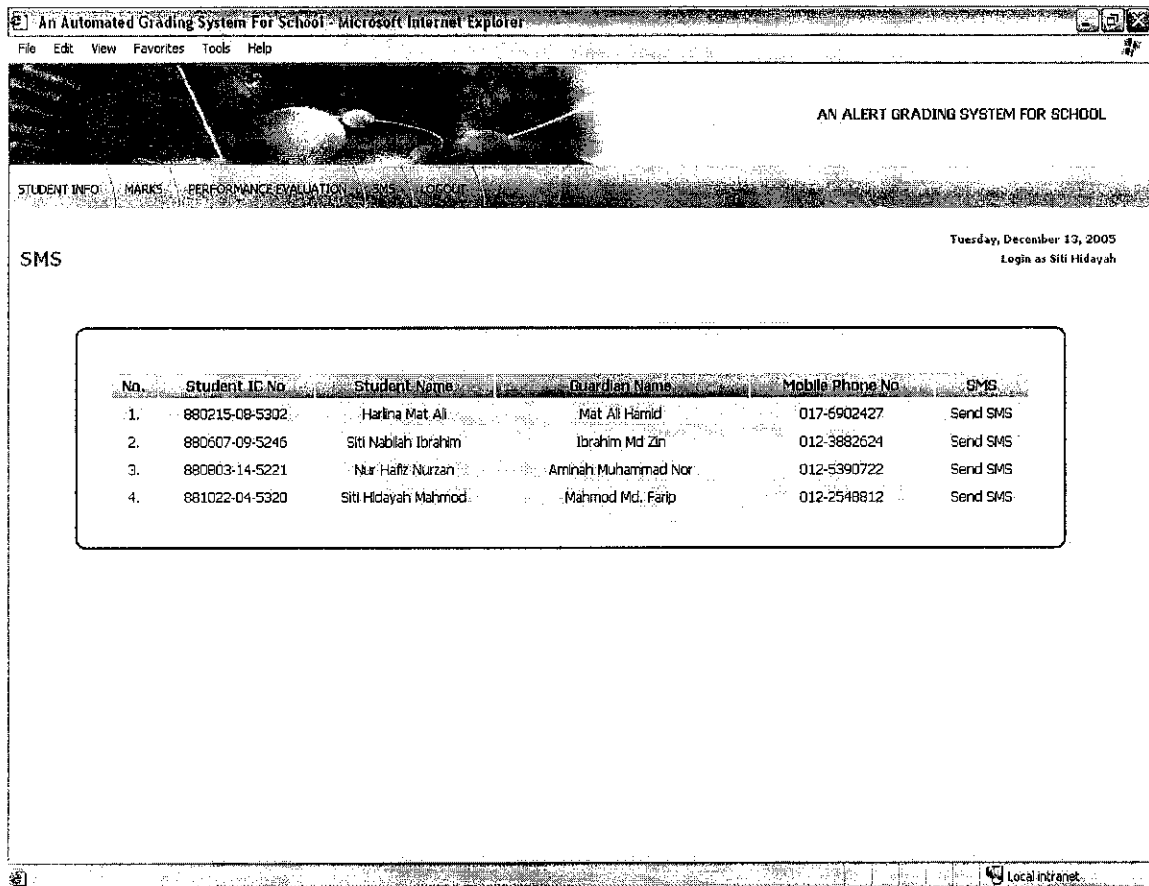
Figure 4.10: SMS page

Figure 4.10 indicates the most essential page in the system, which is the SMS page. It is important since SMS is being sent to parents from this page. As SMS is successfully sent to target recipients, it shows that the objective of the proposed project is achieved.

The SMS will contain only the summary of student's achievements. There are student's name, IC No. and their CGPA. It is because of limited number of characters are allowed in per SMS. In case of sending a complete results of the students, which is including the

accumulated grade achieved, then it will require at least two long of SMS. This would lead to an extra cost of the SMS being sent. By sending only the summary of student's achievement, it is enough for the SMS to act as an alert to the parents. Besides, the school management could also reduce the cost of per SMS being sent.
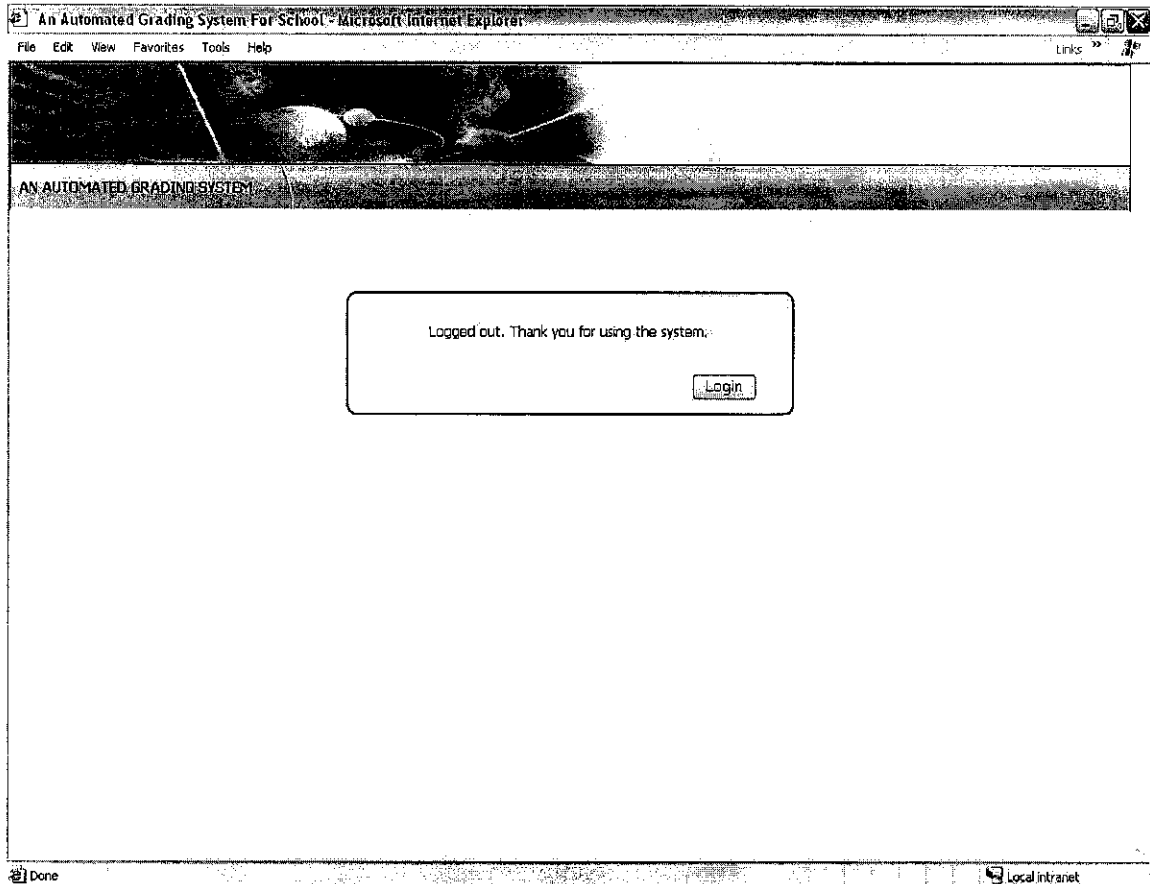
Figure 4.11: Logout page

Figure 4.11 shows logout page. It shows that user has been logged out from the system and their session is ended.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

As a conclusion, the project has successfully met its objective. The system managed to send SMS to alert parent on their children's achievement in SPM trial exam. There is a need for this system as through a thorough research and study, parents need to be alert about student's achievement at school. Most of them are not aware with their children's learning performance. They are just simply waiting for somebody, for instance their children, to inform them about their children's achievements.

In addition, the system also could make a contribution to the society. It's where the system could increase the awareness among parents on the importance to keep track the progress of children's learning process. Thus, parents would know how well their child performs at school.

Furthermore, a good communication between parents, school and teachers can also be developed. It's done through active involvement of parents in activities initiated by school.

Hopefully, this project will make a contribution to the development of an education in our country, Malaysia.

5.2 Suggested Work for Future Expansion

There are a few recommendations that can be done to the system, so that it can be expanded in the future to be more reliable and practical.

5.2.1 Send SMS Button

In the developed system, SMS is sent to each parent once in a time. It means, there is a send button on every single name of parent in the system interface (*please refer to Figure 4.10: SMS page*). In order to send a SMS to a parent, user needs to click the Send SMS button. Then, click continue button to back to the SMS page. This might caused a problem to the user as they need to repeat these steps in order to send SMS to all parents. Thus, in future, it's suggested for the system to provide a button which capable to send SMS to all parents. It means, by just click the button once, all parents will received the SMS.

5.2.2 SMS Delivery Report

The function of SMS delivery report is not provided in the system. For future purposes, SMS delivery report could be added. It can show the status of SMS being sent to the parents, whether it is still pending or sent. Therefore, the system user will know whether parents have received the particular SMS. In case of undelivered of SMS, then the class teacher can send it again individually to the parents.

5.2.3 Expansion of the System Scope

Since this project only focus on the result of SPM trial exam, there might be helpful if the system can capture the result of all activities (including quizzes, tests and exams). These activities can be captured and evaluated from the beginning and end of Form 5 learning period. Therefore, students' performance level can be determined effectively. It also can help the students knowing their level of preparation in facing the real SPM

exam. Furthermore, instead of focusing on the students' achievement of only one class of Form Five, the system can cover many classes and regardless any educational levels (either primary, secondary or tertiary levels). For instance, in a school, the system can cover the students' performance of all classes from Form One until Form Five.

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APPENDIX 1: PROJECT TIMELINE

No.	List of Activities	Status	Week														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Preliminary Research ▪ Determine objective and scope of study ▪ Determine scope of research ▪ Prepare project planning	Planned	█														
		Completed	▒														
2	Submission of Preliminary Report	Planned			█												
		Completed			▒												
3	Requirements Definition ▪ Analyze user, system, hardware and software requirements	Planned		█	█												
		Completed			▒												
4	Research and Feedback Analysis	Planned			█	█	█	█	█	█	█	█	█	█	█		
		Completed			▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	
5	Design	Planned				█											
		Completed				▒											
6	Implementation ▪ Implement storyboard into subsystems	Planned					█	█	█	█	█	█	█				
		Completed					▒	▒	▒	▒	▒	▒	▒	▒			
7	Submission of progress report	Planned							█								
		Completed							▒								
8	Integration and Testing	Planned												█	█		
		Completed												▒	▒		
9	Prepare Final Report / Dissertation	Planned												█			
		Completed												▒	▒		
10	Submission of Dissertation Report	Planned														█	
		Completed														▒	
11	Submission of Dissertation Final Report	Planned															█
		Completed															▒