**Faculty of Computer Sciences and Information Technology**
**University of Malaya**

# STUDENT MARKS MANAGEMENT SYSTEM
# (SMMS)

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**A Graduation Project Submitted to the Faculty of Computer Sciences**
**and Information Technology University of Malaya**
**in partial fulfillment of the requirement for the**
**Degree of Bachelor of Computer Sciences**
**Session 2001/2002**

# Abstract

Today, information technology has provided into almost every industry in the country. Institutions and Universities today are moving towards paperless environment and computerized their current systems to ensure smoother operations in the daily running operation. Student marks Management System (SMMS) is introduced as to give a new impulse for the Institution and Universities to gain competitive advantages.

SMMS is a web-based system develops with the objectives to computerized the current students' marks management system that are using in FSKTM. Besides, SMMS also defines the current problems that are facing by the user to ensure the proposed system will overcome these problems. The system allows authorize user to keep track of all the related students' marks in the FSKTM. It can be accessible through common browser and thus no installment of application in the user's workstation is needed.

This system is an idea from Dr. Mazliza Othman. This project is considered as a part of the e-faculty vision that provides greater conveniences and interaction between lecturers and tutors. Beside, that SMMS will also fulfills the aim of e-faculty vision of creating a paperless working environment. The lecturer can use SMMS as a platform to view or monitor the most updated students' marks. For the tutor, they will have a standard way to manage students' marks. These will significantly reduce the workload on both lecturer and tutor besides increasing the efficiency and simplicity for the staff in FSKTM.

This report introduces the project and provides a description on the topics studied and researched during the literature review. It also describes the software development process that occurred in the project with details on the system analysis and design.

# Acknowledgment

This Student Marks Management System was developed through the advice, assistance and contributions of many individuals. First of all, the author would like to express his deepest gratitude to his project supervisor, Dr. Mazliza Othman, for her unlimited support, guidance and advice throughout the whole development stage of this system. Same gratitude also been expressed to En. Mohd Nizam Ayub, the project moderator for attending the VIVA section. Besides, the author also would like to thank Mr. Woo Chaw Seng and Mr. Chow for all the valuable and effective guidance and advises.

Besides, the author would like to express his deepest gratitude for all his course-mates and friend for sharing their knowledge throughout the duration of the project especially Looi Cheong Yeng, Lian Kiong, Tan Hooi Kok and Ju Yee for their advice, guidance and moral support.

Finally, the author also likes to express his sincere thanks to all the faculty staff in the FSKTM and "Pusat Teknologi Maklumat", especially En. Bahar, Pn. Mina and Pn. Mohaidah for their assitance and tolerance.

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# Chapter One
# Introduction

# Chapter 1: Introduction

This chapter gives a brief introduction of the project definition, project motivation, project objectives, project scope, project schedule and report layout.

## 1.1 Project Definition

Today, the usages of computer are very important in our life. A computer system can save a lot of energy and time if compared to a manual system that are using before. The current Student Marks Management System (SMMS) that are used in Faculty of Computer Sciences and Information Technology (FSKTM), University of Malaya is a manual system.

The manual student marks management systems that are using now in FSKTM face several problems because of the increasing number students in each year. An automation system is need by the users to manage the students' marks record in a systematic form.

During to solve the current problems, this SMMS was proposed from the supervisor of this project, Dr. Mazliza Othman as a part of the e-faculty project in FSKTM. The concept of the e-faculty is to create a paperless environment by optimizing the usage of the computer system. Hence, increase the efficiency and simplify for the staff and student at the faculty.

Student Marks Management System (SMMS) is a web-based application, which contains of a web server and client server. It uses the Internet and web browser to present data and retrieve input. SMMS is online students' marks management system that uses to keep track several categories of students' marks such as tutorial marks, lab assignments marks, quiz marks and etc.

Besides, it also provides some functions to reduce the manual process while lecturers and tutors in FSKTM manage their students' marks. A reminder function also include in the system to remind the users to update the marks also included in this system.

## 1.2 Problem Definition

There are a few methods used by the lecturers and tutors to manage their students' marks. One of the methods that are preferred is a manual file transfer system. Lecturers will save the student name list in an Excel format file and send to tutors via e-mail or diskette. This method results in several problems because normally the marks are only sent to the lecturer at the end of semester or according the lecturer needs. The lecturer can't review the marks every week or anytime before end of the semester. If they wanted to review students' marks weekly, they have to request it directly from tutors each week. On the tutor side, they also have to send the file to lecturer either by manually or electronic file attachment each time for the request.

The tutor workload will significantly increases due to different methods proposed by several lecturers. This is because the same tutor may be assigned to handle a few tutorials classes that are of different subjects. In additional to that, these lectures may request that the layout of the students' marks is to be given in various formats.

How about if a course have involve more than one lecturers and one tutors? The interaction between the lecturers and tutors will be more unsystematic without a coordinator. A lecturer will be choose as a coordinator in that course to responsible the students' marks transfer between lecturers and tutors in the current system. These will increase the workload for the coordinator if there is no computerized system support him/her.

## 1.3 Project Motivation

The idea to develop this project came from the desire to solve some current problems and standardize the current system.

During to overcome the problems that stated, the inspiration and motivation to develop SMMS arise. The main benefit of SMMS is to provide greater conveniences and interaction between lecturers and tutors. Hence, the e-faculty vision can be success through optimizing the usage of computer system had developed and the paperless environment in faculty.

Besides, all the lecturers and tutors in FSKTM are equipping with computer and network service, so a web-based system is a very suitable solution to overcome the current students' marks management system.

## 1.4 Project Objectives

The main objective of this project is to develop a web-based SMMS. The objectives of the project are listed below.

1) Provide easy access to student marks information for lecturers and tutors

   Lecturers no longer need to look for the tutors to pass the student lab assignments or tutorial marks. Lecturers through Internet can access this information. They may access it at anytime.

2) Improve service

   Any request for information or records can be done very quickly since the information is stored systematically.

3) Create a paper less environment

   Most of the student information and their tutorial or assignment marks, which are currently kept in hardcopy files, will be kept in the computer storage.

4) Reduce data recording and manipulation errors

   Tasks, which are done manually, will be done automatically by the system. This will reduce errors in data entry or data calculation (grading).

5) Provide better information to meet lecturers' needs

   Lecturers will get the complete information of students and their marks in the subject. Lecturers on their monitor screen can preview current information or update information whenever the need arises.

6) Commemoration to update the marks

   E-mails will be send to the lecturer or tutor if they forget to update the student marks each week, or depending on a specified period, which is set by the lecturer.

7) Improve the backup system

   The student's marks will be store in the database after the user has configured data on the web site.

## 1.5 Project Scope

The project is a web-based client server database system design for staff in FSKTM. Hence, the targeted users for this system are the lecturers, tutors and students of this faculty. It provides various kind of function like grading, database storage, and commemoration to update the marks. All categories of students' marks in a courses such as students' assignments marks, tutorial marks, quiz marks is displayed on the web at the client site and stored in the database at the server site. This system is divided to 4 sections such as lecturer section, tutor section, administrator section and student section. The details of this 4 sections will be discuss on chapter 4 project design phase.

## 1.6 Project Schedule

To achieve the project objectives, a project schedule is planned to manage the time taken for each task. The schedule has been divided into 6 stages: Literature Review, System Analysis, Methodology and System Design, Coding and Prototyping, Testing and Documentation.

| Project Schedule (Jul 2001 – Feb 2002) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Key Activity | Jul 2001 | Aug 2001 | Sept 2001 | Oct 2001 | Nov 2001 | Dec 2001 | Jan 2002 | Feb 2002 |
| Literature review | ▬▬ | | | | | | | |
| Requirement Analysis | | ▬▬ | | | | | | |
| Design | | | ▬▬▬ | | | | | |
| Coding | | | | ▬▬▬ | | | | |
| Testing | | | | | | ▬▬▬ | | |
| Documentation | | ▬▬▬▬▬▬▬▬▬▬▬▬▬▬ | | | | | | |
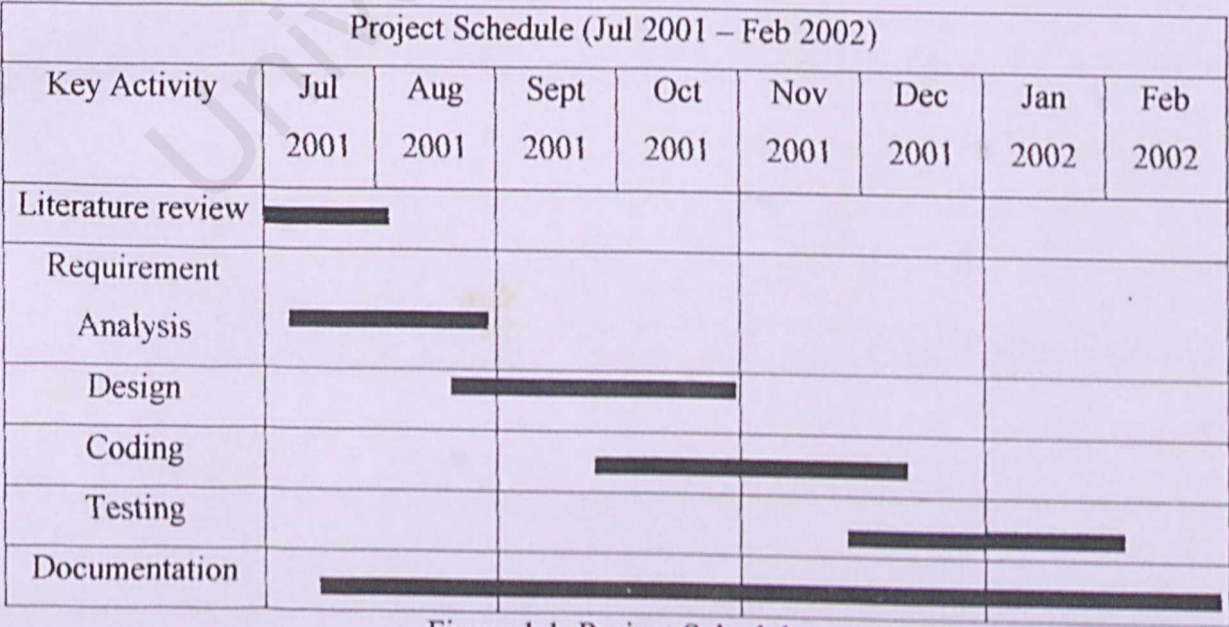
Figure 1.1: Project Schedule

## 1.7 Expected Outcome

SMMS is aimed at providing an effective and efficient communication tool to assist the operation, management and administration of the faculty. With the establishment of SMMS, well-organized system will be provided. Up-to-date information could be disseminated to the lecturers and tutors, who are responsible in a same course. They can use it to manage and keep track of several types of student marks in the courses. What user needs to do is go to SMMS homepage and log on to it by providing user id and user password. Lecturers can more frequently to review the students' marks or monitor the students' progress during each semester. Besides, tutors also have a standardized format and platform to view or update the students' marks for all the courses without depending on which lecturer.

## 1.8 Report Layout

The purpose of this report is to document essential information gathered during this system development stage. This report is divided into seven respective chapters.

Chapter 1: Introduction

This chapter gives an overview of the project, project objectives, project motivation, scope and the development schedule and expected outcome of this project.

Chapter 2: Literature Review

As for this chapter, it discusses the researches that are carried out during the analysis and design phases at this project. These include studies on the system architecture, development tools such as programming tools, database tools, web servers and etc.

Chapter 3: Methodology and System Analysis

This chapter discusses the methodologies and the details of functional and non-functional requirements that are using to develop the system.

Chapter 4: System Design

This chapter discusses the structure design for the system that includes the module level design, data flow diagram and the database relational table design.

Chapter 5: Implementation

This chapter will go through all the details of the proposed system and how it implemented based on the given requirement. Some development of the system such as database, user interface and application will be discusses at this chapter.

Chapter 6: System Testing

This chapter discusses some testing techniques and how this system had been testing.

Chapter 7: System Evaluation and Conclusion

Some system strength, limitation, future enhancement will discuss in this chapter.

# Chapter Two

# Literature Review

# Chapter 2 Literature Review

In the process of developing a web-based Student Marks Management System, researches have been done to understand the non-computerized and computerized system.

## 2.1 Literature Sources

There are have several types of sources to find the information and knowledge to developing a project:

- **Printing Sources**

These categories of sources are including the articles from newspaper, magazines, technical paper and the previous thesis, which are available in document room FSKTM.

- **Electronic Sources**

These categories of sources are including searching keyword by using the search engines in Internet like Yahoo, MSN, AltaVista and etc. Besides, the articles, which copy from the CD-ROM, like electronic encyclopedia 'Encarta' also helpful while developing this system.

- **Current Users**

Process interview and questionnaires will be done on the users for more understanding the current methods that they are using to manage their student marks. These categories of sources are the most important because it will helps a lot in understanding the scope and concept to develop this system. Besides, the supervising from the lecturers and tutors also important to gathering and share their experiences in developing a project.

## 2.2 Client/Server Architecture

The client/server architecture is based on hardware and software components that interact to form a system. The client is any computer process that requests services from the server. The client, also known as front-end application, is where the end user usually interacts.

On the other hand, the server is any computer process providing services to the clients. The server, also known as back-end application, reflects the fact that the server process provides the background services for the client process. A few typical background services on the server are file services, print services, communication services, and database services. There are two type of client/server architecture.

The client-server model has evolved from a two-tier architecture to three-tier and multi-tier architecture [1].

## 2.2.1 Two-tier Architecture

A two-tier architecture is where a client talks directly to a server, with no intervening server. It is typically used in small environment (less than 50 users). In this system, we have database server and the rest of the application including user interface was completely on client.

A common error in client/server development is to prototype an application in a small, two-tier environment and then scale up by simply adding more users to the server [2]. This approach will usually result in an ineffective system, as the server becomes overwhelmed. To property scale to hundreds or thousands of users, it is usually necessary to move to a three-tier architecture.
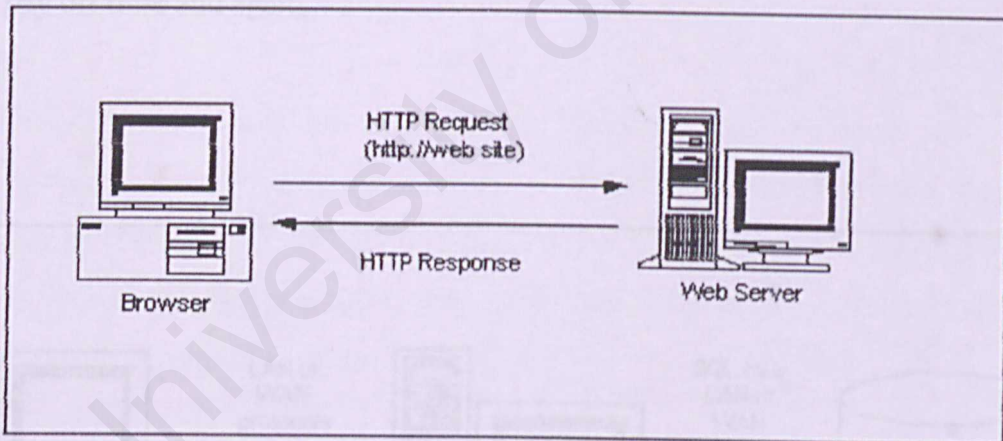
Figure 2.1: Two-tier Architecture

## 2.2.2 Three-tier Architecture

The three-tier, later to be called multi-tier, architecture grew out of this early experience with 'distributed' application. As the two-tier applications from individual and department units to the enterprise, it was found that they do not scale very easily.

And in our ever-changing business environment, scalability and maintainability of a system are primary concerns. Another factor that contributes to the more from two to multi-tier systems is the wide variety of clients within a larger organization.

In multi-tier architecture, as shown in Figure 2.2, each of the major pieces of functionality is isolated. The presentation layer is independent of the business logic, which in turn, is separated from the data access layer. This model requires much more analysis and design on the front-end, but dividends in reduced maintenance and greater flexibility pay off time and again.
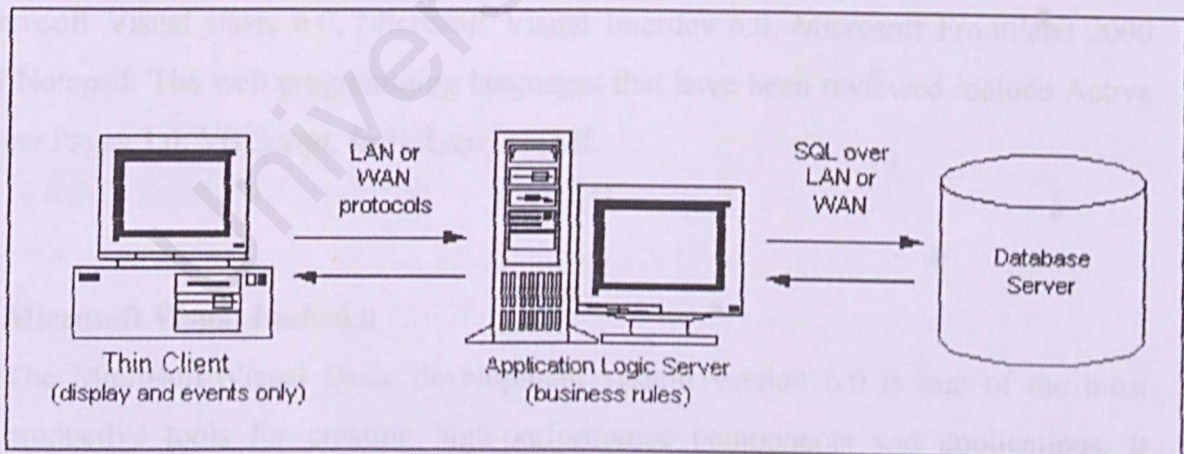


Figure 2.2: Multi-tier Architecture

## 2.3 Considered Development Tools

There are various development tools that can be used to develop the system. In general, three types can divide the tools. The first type is the programming tool, which is used to develop the processing the interface of the system. The second part is the database tools, which is used to create the database for storing inventory record. The last part is the operating system, which is used to provide the environments for the execution the system.

A review on these development tools has been carried out as to identify the most suitable tools for developing this system.

## 2.3.1 Programming Tools

The programming tools can be divided into programming software and web programming languages. The programming software that have been reviewed such as Microsoft Visual Basic 6.0, Microsoft Visual Interdev 6.0, Microsoft FrontPage 2000 and Notepad. The web programming languages that have been reviewed include Active Server Pages 3.0, VB Script, Jscript, and HTML.

a) **Microsoft Visual Basic 6.0**

The Microsoft Visual Basic development system version 6.0 is one of the most productive tools for creating high-performance components and applications. It offers developers the ability to create the robust applications that reside on the client or server, or operate in a distributed n-tier environment. As an interpreted language system, the developers could test and debug application on the fly from within the development environment [3].

### b) Microsoft Visual InterDev 6.0

Microsoft Visual InterDev is a powerful development environment for rapidly creating database-driven Web applications. Integrated visual design tools, debugging, and database features enable user to build interactive, cross-platform Web sites quickly and easily [4].

### c) Microsoft FrontPage 2000

FrontPage 2000 comes as part of Microsoft's Office 2000 suite – it is another tool for creating and designing web pages, but it does not offer all the functionality of Visual InterDev. It is ultimately a weaker but easier application to use, and it costs a lot less than Visual InterDev. It is there fore a simpler, cheaper alternative for novice [5].

### d) Notepad

Notepad is a time – honored text editor. No matter how much Microsoft promotes its Visual InterDev, there will still be people using Notepad as their editor of choice. That fact that is free probably sustained its popularity. It does not highlight ASP in any way, but it also does not generate any extra code. It does not features may additional functions, but it is so simple that it is a very easy editor to master.

### e) Active Server Pages 3.0 (ASP 3.0)

An Active Server Page (ASP) is an HTML page that includes one or more script (small-embedded programs) that is processed on a Microsoft Web server before the page is sent to the user. An ASP is somewhat similar to a Server-side include or a common gateway interface (CGI) application in that all involve programs that run on the server, usually tailoring a page for the user. Typically, the script in the Web page at the server uses input received as the result of the user's request for the page to access data from a database and then builds or customizes the page on the fly before sending it to the requestor [6].

ASP is a feature of the Microsoft Internet Information Server (IIS), but, since the server-side script is just building a regular HTML page, it can be delivered to almost any browser. We can create an ASP file by including a script written in VBScript or JScript in an HTML file or by using ActiveX Data Objects (ADOs) program statements in the HTML file. The HTML file with the ".asp" file suffix. Microsoft recommends the use of the server-side ASP rather than a client-side script, where there is actually a choice, because the server-side script will result in an easily displayable HTML page. Client-side scripts (for example, with JavaScript) may not work as intended on older browsers.

## f) VB Script

VBScript is an interpreted script language from Microsoft that is a subset of its Visual Basic programming language. VBScript is designed for use with Microsoft's Internet Explorer browser together with other programming that can be run at the client, including ActiveX control, automation servers, and Java applets [7]. Although Microsoft does support Netscape's JavaScript (it converts it into its own JScript), Netscape does not support VBScript. For this reason, VBScript is best used for intranet Web sites that use the Internet Explorer browser only.

## g) JScript

JScript is a script language from Microsoft that is expressly designed for use within Web pages. It adheres to the ECMAScript standard and is basically Microsoft's equivalent to Netscape's earlier and more widely used JavaScript.

## h) HTML

HTML (Hypertext Markup Language) is the set of markup symbols or codes inserted in a file intended for display on a World Wide Web browser page. The markup tells the Web browser how to display a Web page's words and images for the user. Each individual markup code is referred to as an element (but many people also refer to it as a tag). Some elements come in pairs that indicate when some display effect is to begin and when it is to end.

## 2.3.2 Database Tools

Selection criteria for database tools were based on usability and effectiveness in cross platform deploying, cost, storage space required, and the portability of the records. The tools reviewed include Microsoft Access 2000 and Microsoft SQL Server 7.0.

### a) Microsoft Access 2000

Microsoft Access 2000 provides relational database power to give the information to the user to make better decisions. It integrates data from spreadsheets and other database, and is the easy way to find answer, share information over Intranets and the Internet, and build faster business solutions. Access 2000 allows the user to generate, analyze and create reports without hours of work. It integrates ease of use from the data entry point to printing in HTML. The features, improved features and database security of the Microsoft Access 2000 are listed as below [8].

❑ **Features include in Microsoft Access 2000**

- **Run Database Utilities On An Open Database**
  User can use the Compact Database and Repair Database subcommands on the current database.

- **Database Splitter Wizard**
  The front-end/back-end application is an application consisting of two database files. The "back-end" database file contains tables. The "front-end" database file contains all other database objects (quires, forms, report, macros, and modules) and links to the back-end database. Typically the back-end database is located on a network server, and copies of the front-end database are installed on individual users' computers.

- **Database Wizard**

  The Database wizard creates a wide variety of complete databases for tasks ranging from household inventory to event management. Users can then add their own data.

- **Performance Analyzer**

  Users can optimize the performance of some or all of the objects in database. The Performance Analyzer wills analyzes the database, suggest the best ways to optimize its speed and performance, and then automatically makes the necessary changes as requested.

- **Database Properties**

  From the Database Properties command, users can view, change, and define database properties, such as title, subject, author, and creation date, for use in locating and identifying the database.

- **Startup Dialog Box**

  User can customize an application easily in the Startup dialog box by specifying the database's startup form, and whether custom or built-in menus, the Database window, or status bar are displayed. Users can also make customization options unavailable to database users.

- **Database Security**

  Microsoft Access provides two methods of securing a database: setting a password for opening a database, or user-level security, which can be used to limit what parts of the database the user can access or changes. In addition to these methods, editable Visual Basic code can be remove from database and prevent modifications to the design of forms, reports, and modules by saving it as an MDE file.

## b) Microsoft SQL Server 7.0

Microsoft SQL Server 7.0 combines the best of traditional mainframe computing – centralized security, data integrity, and control – with the best of today's PCs – ease of use, rich user interface, and variety of off-the-shelf productivity tools. It makes it possible for multiple front ends to share information, enabling the developer to choose the most appropriate tool for the job. A SQL Server consists of multiple databases. Some of the databases are user database and some are system databases required by SQL Server to perform its own operation. SQL Server can hold up to 32,767 databases.

☐ **Features of Microsoft SQL Server**

- **Ease of Installation, Deployment and Use**

  Microsoft SQL includes many tools and features that simplify the ability to install, deploy, manage, and use databases. SQL Server provides database administrators with all the tools required to fine-tune SQL Server installations running production online systems. SQL Server is also capable of operating efficiently on a small, single-user system with minimal administrative overhead.

- **Scalability**

  The same Microsoft SQL version 7.0 database engine operates on Microsoft Windows 95/98, Microsoft Windows NT Workstation, Windows NT Server, and Windows NT Server Enterprise Edition. The database engine is a robust server that can manage terabyte databases being accessed by thousands of users. At the same time, when running at its default setting, SQL Server 7.0 has features such as dynamic self-tuning that let it work effectively on laptops and desktops without burdening users with administrative tasks.

- **Data Warehousing**

  Microsoft SQL Server version 7.0 introduces several components that improve the ability to build data warehouses that effectively support decision support processing needs.

## 2.3.3 Operating System

**a) Microsoft Windows Professional 2000 NT**

Microsoft Windows Professional 2000 NT is one of the powerful operating systems for business computing. It combines the ease-of-use of Windows 98 with the power and reliability of Windows 2000. Windows 2000 is also a powerful OS that reliable, secure, multithreaded, symmetric processing, support client-server system. Moreover, Microsoft is distributing Windows 2000 with its own web server software, Internet Information Server 5.0 (IIS 5.0), which supports ASP 3.0.

Windows 2000 is a complete platform available for building and hosting web-based application. It is the best platform to publish and share information securely over corporate Intranet and Internet. It is so reliable that when an application have problem it doesn't crash the whole program.

## 2.4 Database Access Method

Today's web database development tools offer several strategies for accessing a corporate database from within a browser web enabled RAD solution run in your browser via plug-ins or Active-X controls; HTML mixed with ActiveX or Java is the most typical approach to database design; and pure HTML provides an extremely thin-client. Some tools offer you the choice of deploying your applications using any of these options [9].

## 2.4.1 Rapid Application Development (RAD) Tools Model

In this solution, RAD tool forms can be displayed inside a browser using plug-ins such as Power Builder 5.0 or Active-X controls such as Visual Basic 6.0. The client accesses the database directly, so users need database drivers in addition to the plug-ins or controls, resulting in a much fatter client than with other approaches.
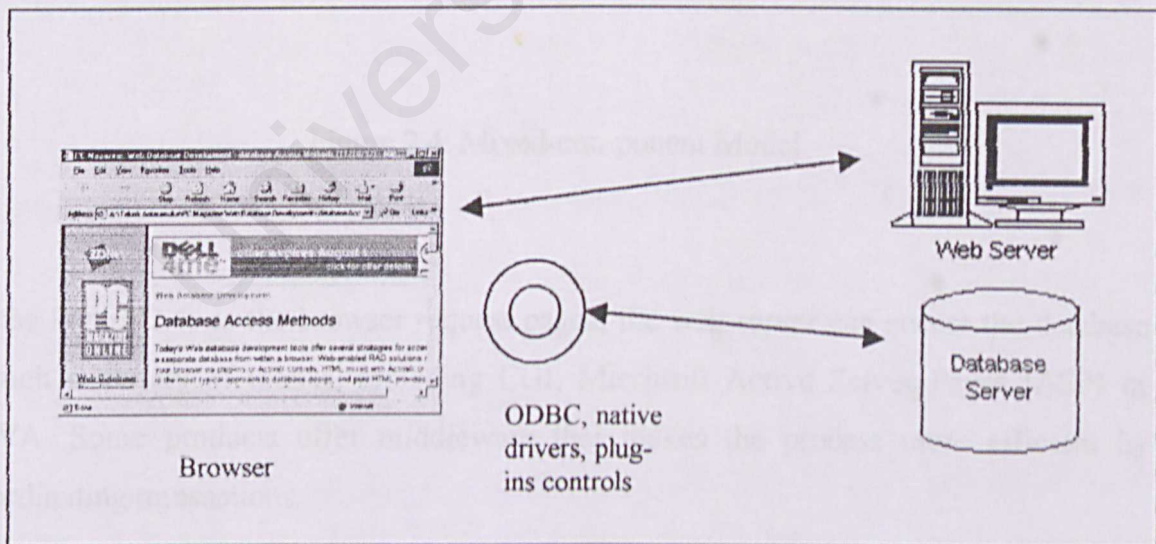


Figure 2.3: Rapid Application Development (RAD) Tools Model

In the diagram Figure2.3, the web server add the database function essentially independence of each other. Some product use pooled database connections to attempt to improve server side performance.

## 2.4.2 Mixed-component Model

Mixed-component Model here, the server renders the look and fell of the interface in HTML and forms built using Active-X or JAVA components, or a combination. No database drivers are needed, but users do need to download some components, creating a moderately chubby client. A disadvantages of this method is that not all browser support different components.
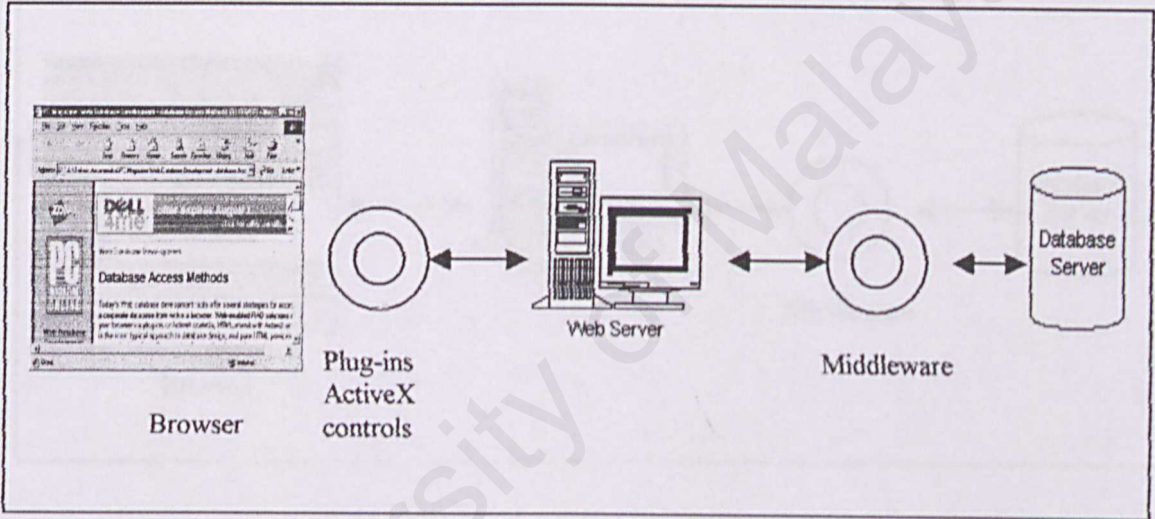


Figure 2.4: Mixed-component Model

In the Figure 2.4, as the browser request pages, the web server can access the database though a variety of menus, including CGI, Microsoft Active Server Pages (ASP) or JAVA. Some products offer middleware that makes the process more efficient by coordinating transactions.

## 2.4.3 Pure HTML Model

Pure HTML Model this approach offers the widest access for web users and the thinnest client. The server creates the user interfaces in standard HTML, JavaScript or both. In the current roundup, Microsoft, Netscape and Oracle offered this option.
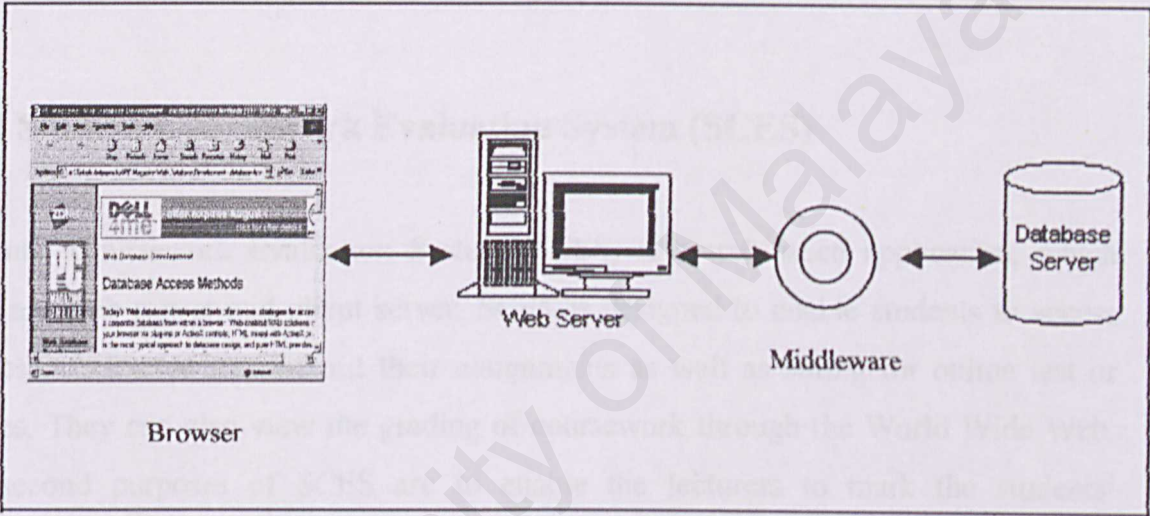


Figure 2.5: Pure HTML Model

In the Figure 2.5, the web server conducts all interactions between the client and the efficiency of transactions. The server employs CGI scripts; ASP or Java to generate HTML based on information form the database.

## 2.5 Review of Existing System

Before develop a new system, researches on existing system have been done. Based on the existing system we can found out the idea to develop a new system, which can overcome the weakness of current system. Besides, others web-based system also have been review as a case study in this project to give a better understanding how to develop a new web-based system.

## 2.5.1 Student Coursework Evaluation System (SCES)

Students' Coursework Evaluation System (SCES) is a web-based application, which contain a web server and client server. SCES is designed to enable students to access courses information and submit their assignments as well as sitting for online test or quizzes. They can also view the grading of coursework through the World Wide Web. The second purposes of SCES are to enable the lecturers to mark the students' coursework and evaluating the students' performance. For the security purpose, SCES requires all the users to enter their own username and password. SCES is able to provide a comprehensive web-based coursework environment for the education industry.

## 2.5.1.1 Analysis on SCES

SCES is a three-tier architecture system, which contain a web server, database and user interface. SCES is developing for FSKTM staff, but unfortunately it didn't launch and used in the faculty. Several aspects didn't considered for SCES developer before the system has been develops.

Firstly, FSKTM isn't a virtual faculty and the examination system in University of Malaya didn't used the online test as to evaluate the students' performance. Secondly, several courses in FSKTM are needs more than a person to handle. For example certain courses such as WRES 3309 and WXES 1101 needs the tutor as assistance for the lecturer. So the SCES system should be consider on the tutor site also.

Although SCES didn't used in faculty after the establishment, but still a lot of knowledge about how to develop a web-based application can be found in the project. For example, an online students' marks management system after the online test provided by SCES can be review as a reference. Besides, SCES also give a better understanding how to develop a web-based system. Several types of development tools used in SCES can be use also in SMMS. The only changing for SMMS compare with SCES may be the project focuses and scope.

## 2.5.2 Student Information System (SIS) in University of Malaya

SIS in UM is a Local Area Network (LAN) system that used to keep track all the students' relevant details, registration information each semester and examination results in each semester. The SIS scope coverall the faculty in UM. One of the functions that provided by SIS is a course grading or evaluation method that used by a lecturer to evaluate the students' result in that course. For example WRES3309 Pengaturcaraan Multimedia evaluations methods consist 10% for tutorials, 10% for assignment, 5% for quiz, 5% for labs and the rest for final exam. The system will automatically calculate the marks and generate the grading result for the students. Because of security purpose, the administration not allows the SIS publishes to the web. So every semester, users have to access the SIS at the faculty office.

## 2.5.2.2 Analysis on SIS

SIS is a most stable system in University of Malaya. It uses Oracle as the database in the system. Besides, this system is being managed by a group of programmer in Pusat Teknologi Maklumat (PTM). The language that are using in SIS interface design is Malay Language. Because of the security purpose, students not allow access to SIS. This system is only can access by the administrator or staff in each faculty.

## 2.6 Summary

The purpose of literature review is to gain important information for this project, which includes the background study of the project to be developed.

To develop the system, various development tools have been reviewed and compared. The development tools been considered are consisted of programming tools, database tools and operating system. Programming tools been reviewed includes Microsoft Visual Basic 6.0, Microsoft Visual InterDev 6.0, Active Server Pages 3.0, Microsoft FrontPage 2000 and Notepad. The database tools been reviewed includes Microsoft SQL Server 7.0 and Microsoft Access 2000. Lastly the operating system been reviewed is Microsoft Windows Professional 2000 NT.

Beside three kind of database access methods also had been reviewed. There are rapid application developments tools model, mixed-component model and pure HTML model. The review on database access methods will give the clear view how to develop a web database application system like SMMS.

Study on existing system also an important phase while developing a new system. On that purpose, SCES and SIS had been chosen as the case study system in this project.

# Chapter Three
# Methodology and
# System Analysis

# Chapter 3    Methodology and System Analysis

## 3.1 Introduction

Before designing the proposed system, there is a need to do system analysis. It is an important phase in the software life cycle. It helps in defining a problem, determine requirements of the system, gathering pertinent information, developing alternative solutions and choosing among those solutions [9].

The purpose of this analysis phase are:

- To determine the needs or requirement of the user of the system.
- To acquire the knowledge on how does a students' marks management works.
- To find out the strength and weakness of the current working system.
- To identify the software and hardware requirement to develop and reside the system.
- To determine which methodology to use for analyzes and develops the system.
- To identify the major components to be included in the system.

## 3.2 Methodology Used

When performing system analysis on the current system. It is important to determine the user requirement and all related constraints that have direct influence to the new system to be developed. Otherwise, the new system will not achieve the goal set on the system thus bring little benefit to the user.

There are many methodologies that can be used to perform system analysis. All of them have theirs own advantages and disadvantages. Choosing a suitable methodology (may be than one if necessary) will be an important thing. This is because a system may be so complex (e.g. involving many constraints, many social influence or many problem that is hard to revealed).

Therefore, before choosing the methodology to be used, a study on the current system is necessary. Interviewing all related users can do this or an organization involved in the current system and monitoring activities perform by them. The subject to be study is determined by the scope of the system to be develops.

After performing the brief study on the current system, the author found out that there are several types of people that are directly or indirectly involved in the current system. The people involved are the faculty office, lecturers and tutors. The FSKTM office staff in charge of managing and keeping track the record of the students' relevant details in the faculty with using Student Information System (SIS), which is non-directly involved with the system. They are the person who can directly use and access the SIS to provide the full name list in a course to the lecturers. Secondly, lecturers will use the name list to manage the students' marks. If the numbers of students in a course are too large, it is divided into several classes that headed by a tutor. Lastly, a tutor conducts the tutorial class or lab and manages the students' marks according the name list provided.

After briefly studying the current system, the author thinks that since there are different types of people involved in the current system, each with their own requirement, own authority and role in the current system, it may have many social component. Some problem may not be well defined and unstructured, which need to be resolved. Therefore, the author thinks that it is important to carefully studying the current system in all-important aspect. For example, it is important to study why a problem arises and not just what problem is.

## 3.2.1 Waterfall Model

Methodology is a way that helps to determine the system requirements and the approach that needs to be taken to develop a system that satisfies the user's expectations. Several methodology models were studied before developing the SMMS. Finally, the Waterfall Model was chosen to develop this system because it is the easiest methodology to follow and apply.

It is the first model that describes the life cycle as a series of steps or phases in which all description levels between the problem and the implementation are found. Each step is description levels between the problem and the implementations are found. Each step is linked to the next step to represent chaining (where it should go if completed satisfactorily) and to the previous step to represent corrections by feedback. Each step contains associated with a verification phase to check that the selected solution conforms to the input specifications [1]. If does not conform, the step or the results of the previous step will have to be revised.
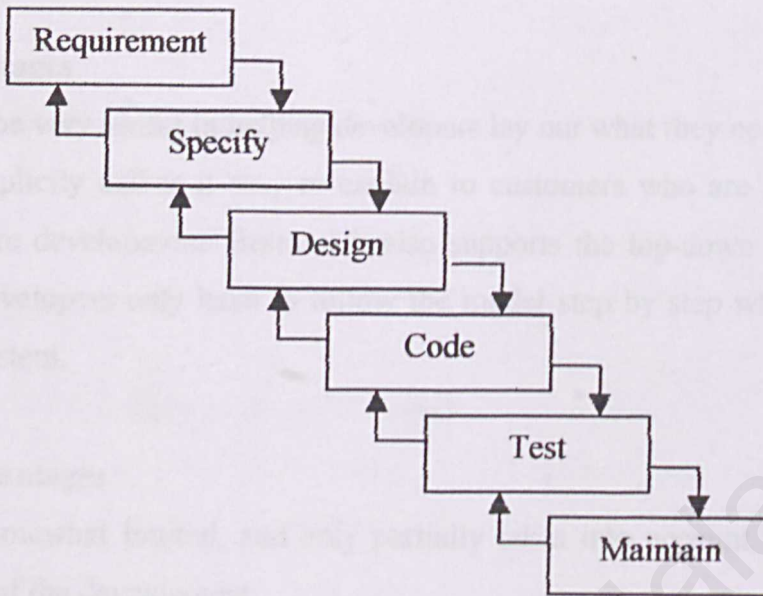
Figure 3.1: Waterfall Model

Notice that the waterfall model shows that development cannot take place using a top-down progress only. Any uncertainties or errors and omissions will have to be corrected by loop backs as soon as variations are observed. This is only possible if the result at the end of each phase is observable and can be compared with an objective.

The Waterfall model can be very useful in helping developers lay out what they need to do. Its simplicity makes it easy to explain to customers who are not familiar with software development.

However, this model is somewhat limited, and only partially takes into account the real iterative nature of the development [1].

## 3.2.2 Analysis on Waterfall Model

- **Advantages**

It can be very useful in helping developers lay out what they need to do. Besides, its simplicity makes it easy to explain to customers who are not familiar with software development. Besides, it also supports the top-down problem solving. The developers only have to follow the model step by step while developing a new system.

- **Disadvantages**

It is somewhat limited, and only partially takes into account the real iterative nature of the development.

## 3.3 Development Tools Analysis

Since this system focuses on students' marks management system, an analysis on the related development tools for the system has been carried out. After reviewing and analyzing the requirements, the tools for developing the system have been chosen. These tools include the operating system, database, development software and programming languages.

## 3.3.1 Operating System

- **Microsoft Windows Professional 2000 NT**
  - **Advantages**
    - Provides the web server IIS 5.0 that is used to publish the web pages, which is already developed in HTTP format.
    - Reliable, secure, supports multithreading, symmetric processing, support client/server system.
    - Supports a wide range of network protocols and Remote Access Protocol. This makes it easy to develop distributed applications.
  - **Disadvantage**
    - Needs a lot of system resources that result in lower performance.

## 3.3.2 Programming Languages and Technologies

- **Active Server Pages 3.0**
  - **Advantages**
    - ASP is compatible with Microsoft Web Server (IIS 5.0)
    - ASP code is browser independent. ASP code is executed on the web server, to generate pure HTML. Hence, the client machine does not need to provide any kind of ASP support at all.
    - Often provides shorter loading times than client-side dynamic web technologies such as Java applet or ActiveX controls.
    - Provides improved security measures, since the user write code, which can never be viewer from the browser.
  - **Disadvantage**
    - It increases the workload on the server.

- **Hypertext Markup Languages (HTML)**
  - **Advantages**
    - HTML is the basic tool that is necessary for the development of client's browser run script.
    - HTML documents work well across different browsers and platforms.
    - Supported by various of web programming software such as Notepad, Microsoft FrontPage 2000, Microsoft Visual Interdev, Macromedia Dreamweaver.

- **VB Script**
  - **Advantages**
    - Its function is to make the web application more dynamic.
    - More reliable in working with the ASP if compare to JavaScript.
    - VB Script is the pure interpreter that processes source code embedded directly in the HTML.

  - **Disadvantage**
    - It is browser dependent. Only Microsoft Internet Explorer and some web browsers that support VB Script support it. Netscape Communicator does not support it at all.

### 3.3.3 Web Application Development Software

- **Microsoft FrontPage 2000**
  - **Advantages**
    - Can develop web pages without having to program the HTML.
    - Several of Drag-and-Drop functions.
    - Can create and edit ASP code easily.
    - It can generate the HTML 'underneath the covers' without user having to raise a finger.

- o **Disadvantages**
  - It cannot give users a complete preview of an ASP page.
  - It only displays what the HTML tags do, but will not translate any of the ASP to HTML.

- **Microsoft Visual InterDev 6.0**
  - o **Advantages**
    - An ASP development tools.
    - Provides a whole range of editing, debugging and code building tools.
    - There are also many wizards that are designed to help the developers get the job done more easily.

  - o **Disadvantages**
    - More complex compared to FrontPage 2000.

## 3.3.4 Web Database

- **Microsoft Access 2000**
  - o **Advantages**
    - Data can be retrieved from the database in a client/server-based system using the ODBC driver for access.
    - It can support SQL Server 6.5 and 7.0 and incorporate the VBA environment.
    - It can integrate with web.
    - It provides an easy converter function between the members of Microsoft Office 2000.

  - o **Disadvantages**
    - Slow performance.
    - Limited database size. Cannot support more than 1 GB database.

## 3.4 Requirement Analysis

The IEEE standard 610 (IEEE Standard Glossary of Computer Languages, 1993) defines a requirement as a condition or capacity needed by the system developer to solve a problem or to achieve an objective. Another synonym for requirement is a condition that must be met or possessed by a system or system component to satisfy a contract, standards, specification or other formerly imposed documents.

According to the standard (IEEE Standard Glossary of Computer Languages, 1993), requirements are partitioned into functional requirements and non-functional requirements. Functional requirements are associated with specific functions, tasks or behaviors the system must support while non-functional requirements are constraints on various attributes of these functions or tasks. In terms of the OSI quality characteristics for evaluation, the functional requirements address the quality characteristic of functionality while the other quality characteristics are concerned with various kinds of non-functional requirements.

Because non-functional requirements tend to be stated in terms of constraints on the results of tasks, which are given as functional requirements (e.g., constraints on the speed or efficiency of a given task), a task-based functional requirements statement is a useful skeleton upon which to construct a complete requirements statement. It can be helpful to think of non-functional requirements as adverbially related to task or functional requirements: how fast, how efficiently, how safety, etc., is a particular task carried out by a particular system.

## 3.4.1 Functional Requirements

The functional requirements specify what actions a design must provide in order to benefit the users of the system enough to justify its existence. SMMS functional requirements can be divided into three sections, which are the administrator section, lecturer section and tutor section. Each of the section has its own module that performs different function and task. The overall SMMS functional requirements covering the following specification:

- SMMS should enable the users to input the required fields into system and subsequently keep all those information in the database.
- The system must allow users to edit and modify incorrect or mismatched records.
- The system must allow users to generate the printable report
- SMMS should provide the flexible reminder period setting
- The database in SMMS should be able to import the text file which is retrieved from SIS
- The system should include the security and authentication function

## 3.4.2 Non-Functional Requirements

The non-functional requirements specify certain criteria, which the system must satisfy in order to be useful and/or successful. While these criteria are not actual actions taken by the system, they are further conditions on what the system must be able to handle. The non-functional requirements that have to be embedded into SMMS can be categorized in the following aspects.

- **User Friendliness**

  The system interface design should be user-friendly to let users master SMMS easily, without any difficulties in manipulating the required functions.

- **Maintainability**

  The problems that occur in the system should be easily detected, understood, debugged and recovered.

- **Reliability**

  The System should be reliable involving the availability and integrity of information maintained and supplied to SMMS.

- **Security**

  The user-name and password are added features that permit only authorized user to access the system periodically.

- **Performance**

  Time/space bounds, such as workloads, respond time and throughput are factors considered in order for SMMS to function at its optimum performance.

- **Expandability**

  The degree of expandability should be high in order for the system to be enhanced into a better version in the future.

## 3.5 Development Requirement

### 3.5.1 Hardware Requirements

Development of this system requires a machine with

i.    At least a Pentium 180 Mhz processor

ii.   At least 32 MB RAM

iii.  LAN

iv.   Other standard Peripheral that include mouse, keyboard and monitor.

### 3.5.2 Software Requirements

Development of this system requires the following software

i.    Windows Professional 2000 NT for operating system

ii.   Microsoft FrontPage 2000 for web pages programming environment

iii.  Microsoft Access 2000 for database tools

iv.   VB Scripting and HTML codes for client side scripting

v.    Active Server pages 3.0 for server side scripting

vi.   Internet Information Server 5.0 for web server

# Chapter Four
# System Design

# Chapter 4 System Design

## 4.1 Introduction

System design is a critical part for the whole project. Good design is the key to successful software project. This is the stage in the system development process where the requirements for the system are translated into the system characteristics [10]. There are four stages in the system design process as follow:

The stages in the design process are:

- **Architectural Design**

  The sub-system marking up the system and their relationships is identified and documented. In this model, users interact though the use of server-side programs that provide for an enhanced experiences.

- **Process Design**

  Structured design is a process oriented for breaking up a large program into hierarchy chart of module that result in a computer programs which is easier to implement and maintain.

- **Database Design**

  The data structure used in the system implementation are designed in detail and specified. In a relational database, a table or relation is a collection of unique instances of similar data.

- **User Interface Design**

  Services are allocated to different components of the system and the interfaces of these components are designed to enable user interaction with the system.

## 4.2 System Architecture

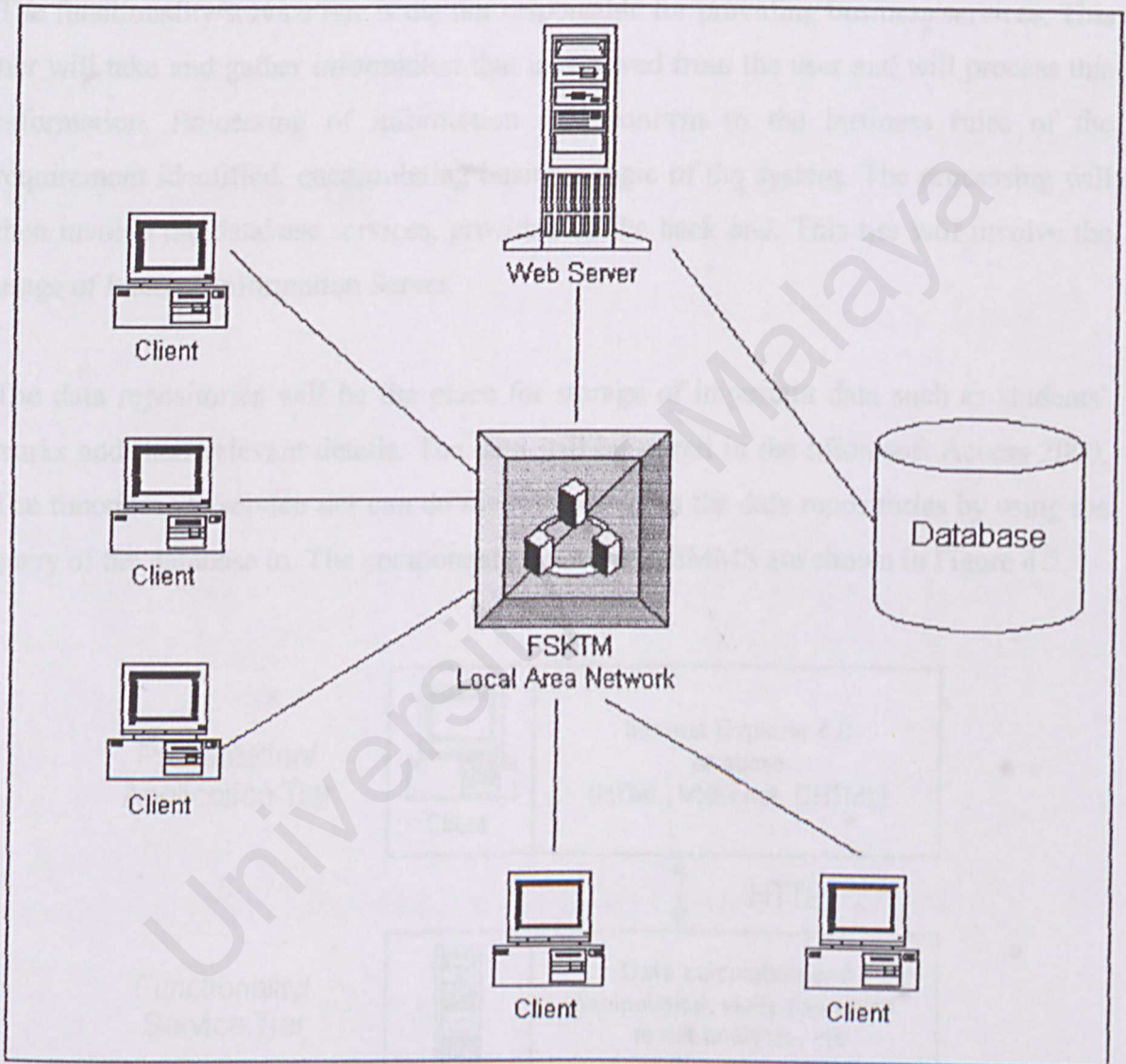The figure 4.1 shows the overview of the SMMS architecture.



Figure 4.1: SMMS System Architecture

The clients in system architecture will be the users in FSKTM such as administrator, lecturers, tutors and students.

The SMMS will be using a three-tier architecture design. This three-tier architecture can be represented by presentation/application tier, functionality/service tier, and data repositories. In SMMS, the presentation tier will be provided by the web browser (Internet Explorer 5.0 or above), which will display the web site of the project.

The functionality/service tier is the tier responsible for providing business services. This tier will take and gather information that is received from the user and will process this information. Processing of information will confirm to the business rules of the requirement identified, encapsulating business logic of the system. The processing will then involve the database services, provided by the back end. This tier will involve the usage of Internet Information Server.

The data repositories will be the place for storage of important data such as students' marks and their relevant details. The data will be stored in the Microsoft Access 2000. The functionality/service tier can do the retrieval from the data repositories by using the query of the database in. The components involved in SMMS are shown in Figure 4.2.
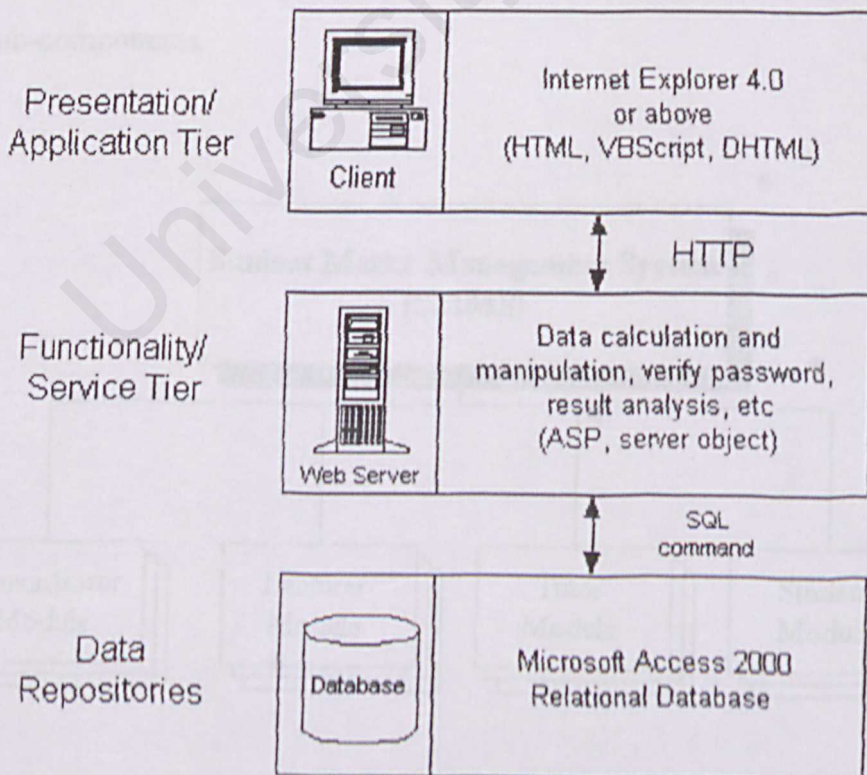
Figure 4.2: SMMS Three-tier Architecture Design

## 4.2.1 System Modeling

A system model is a representation of a proposed system that describes how data is flowing throughout the system. It shows what and where data or information enters a system and where it will be taken and the points where data will be output.

There are many varieties of design diagrams used to document the data flow diagram (DFD), structured charts, decision trees and so on. For the proposed system, structure chart was chosen to present the system.

## 4.2.1.1 Structure Chart

Structure chart is used to depict high-level abstraction of a specified system. The use of the structure chart is to describe the iteration between independent modules. Major functions from the initial component part of the structure chart that can be broken into detailed sub-components.
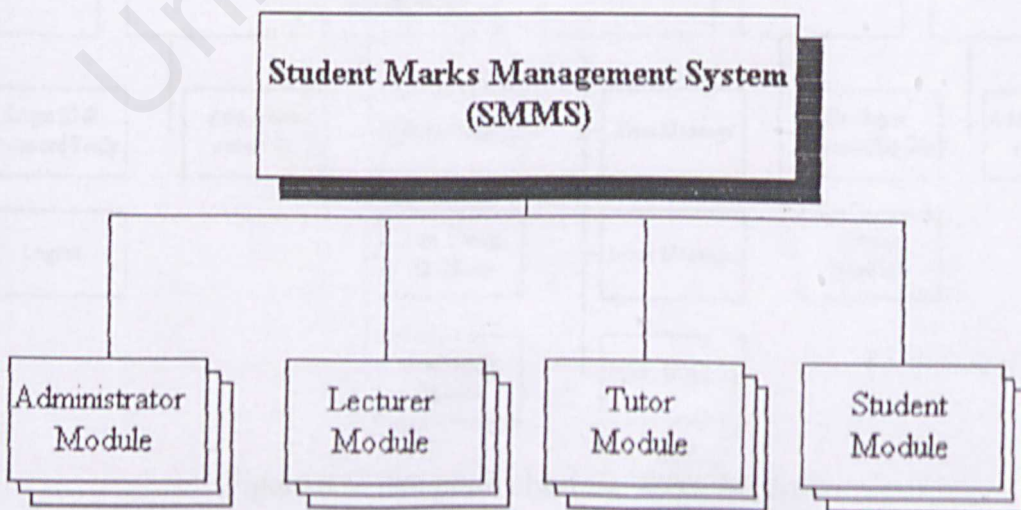


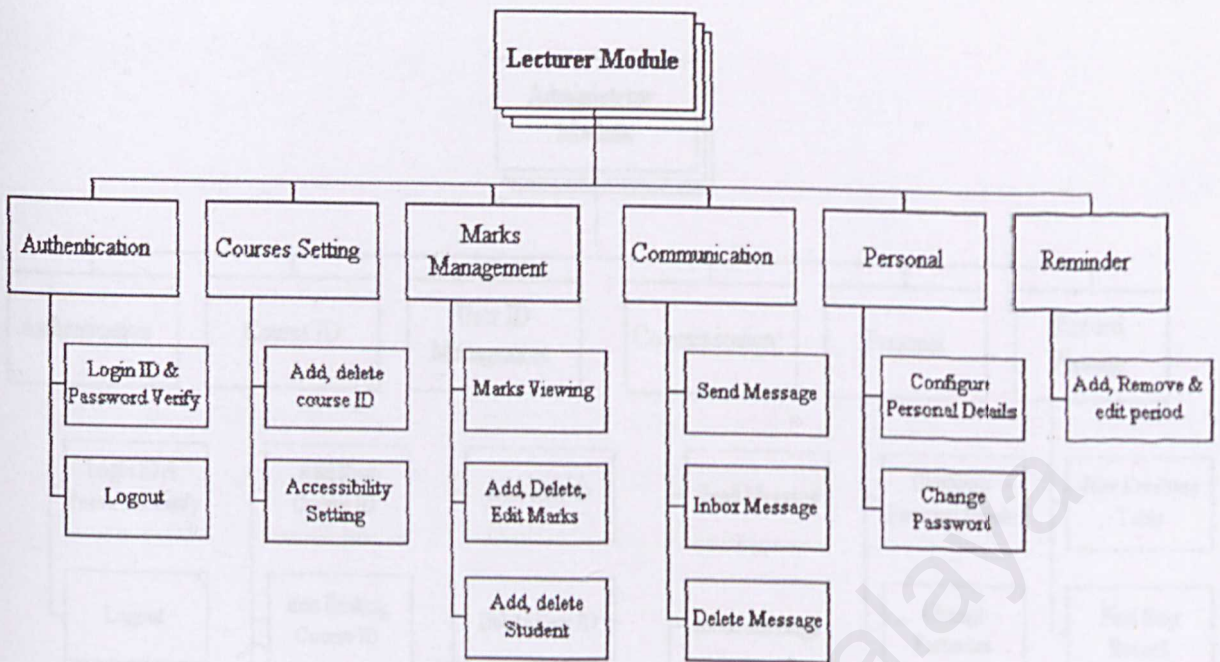Figure 4.3: General Structure Chart for the proposed system

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Figure 4.3: General Structure Chart for the proposed system

Figure 4.4: Structure chart for Lecturer Module
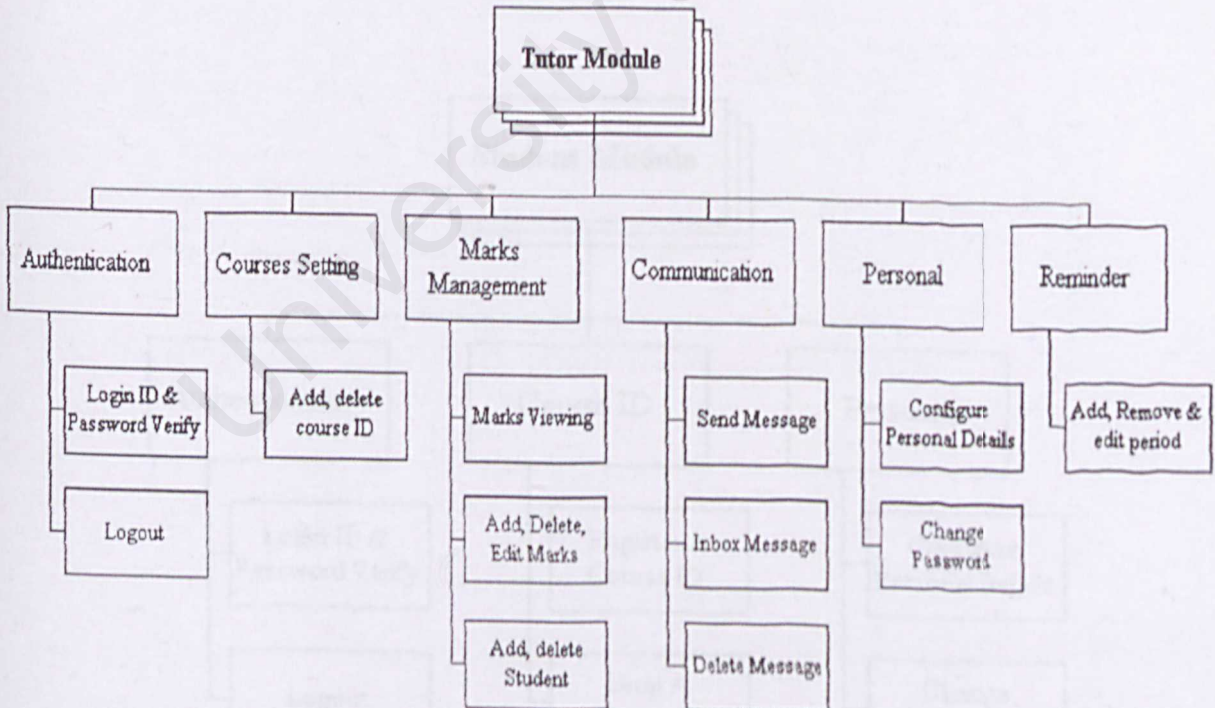


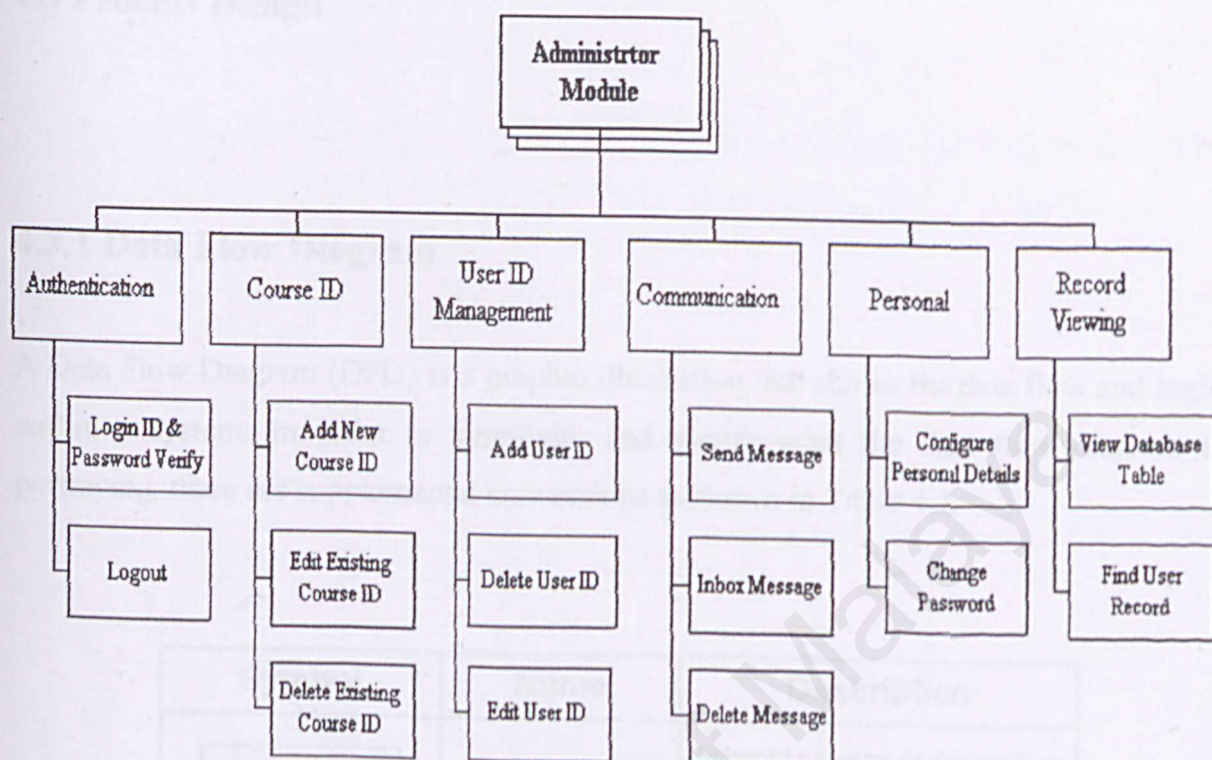Figure 4.5: Structure chart for Tutor Module
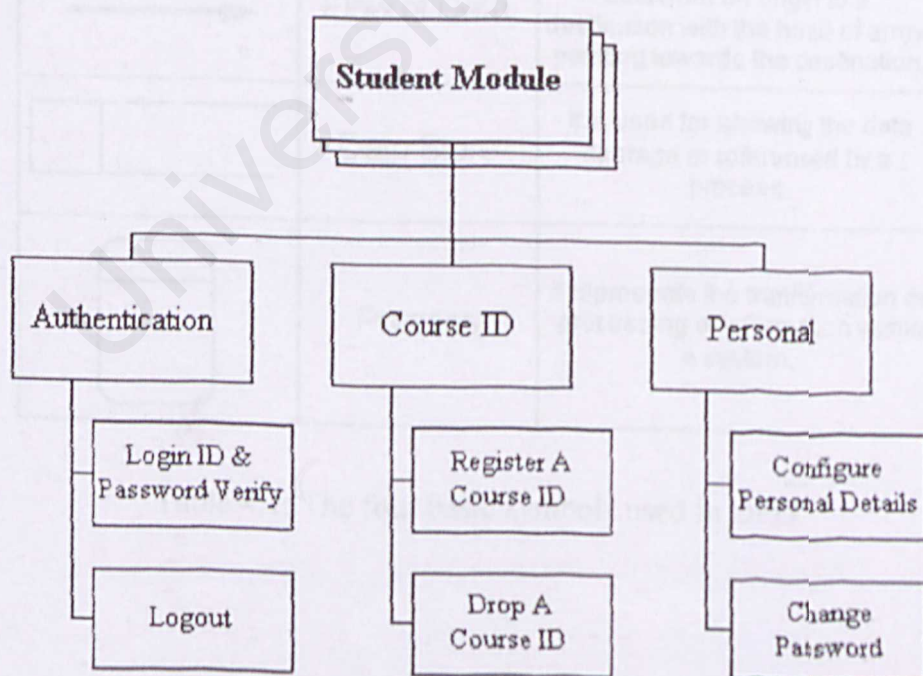
Figure 4.6: Structure chart for Administrator Module



Figure 4.7: Structure chart for Student Module

## 4.3 Process Design

### 4.3.1 Data Flow Diagram

A Data Flow Diagram (DFD) is a graphic illustration that shows the data flow and logic within a system. In order to simplicity and clarify what the data flow diagram is portraying, there are supplemental conversions as shown in Table 4.1.
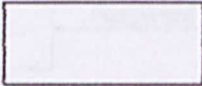
| Symbol | Name | Description |
|---|---|---|
| | Entity | External sources or destinations of data, interact with system but are outside its boundary. |
| → | Flow of Data | It used to show the movement of data from an origin to a destination with the head of arrow pointing towards the destination. |
| | Data Store | It is used for showing the data strorage or referenced by a process. |
| | Process | It represents the tranformation or processing of information within a system. |

Table 4.1: The four basic symbols used in DFD

## 4.3.2 Data Flow Diagram for Proposed System

To have a rough idea about how the system flow before the development of the system is put into action, a rough DFD is built according the user expectations and needs.
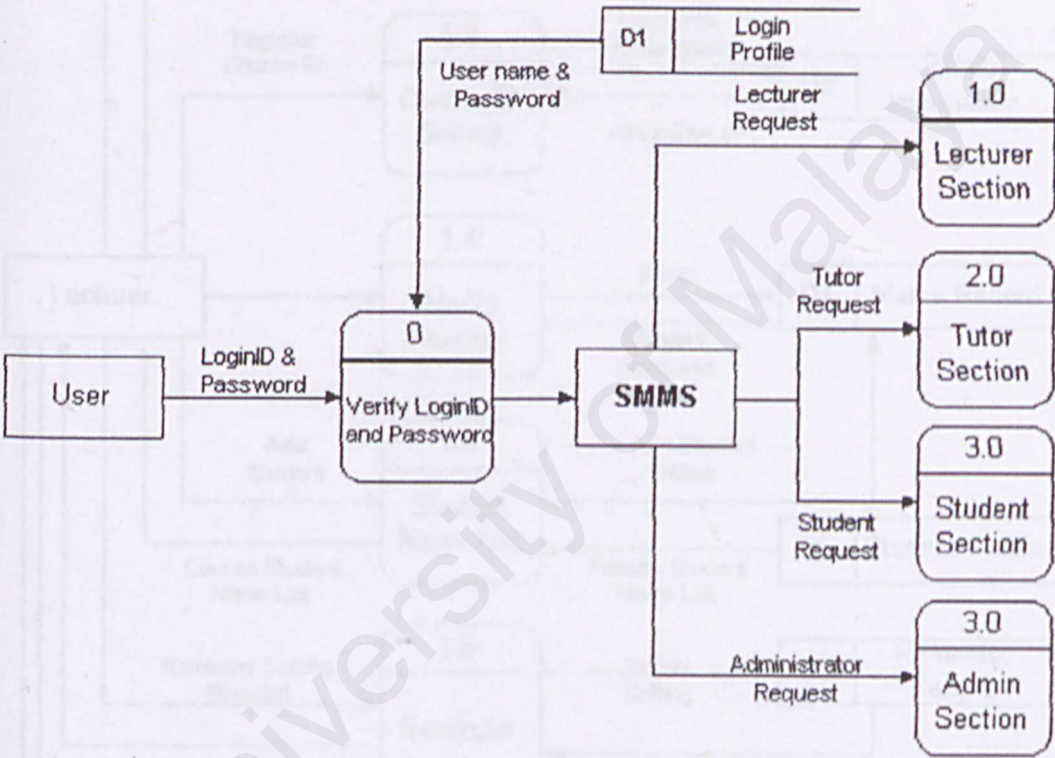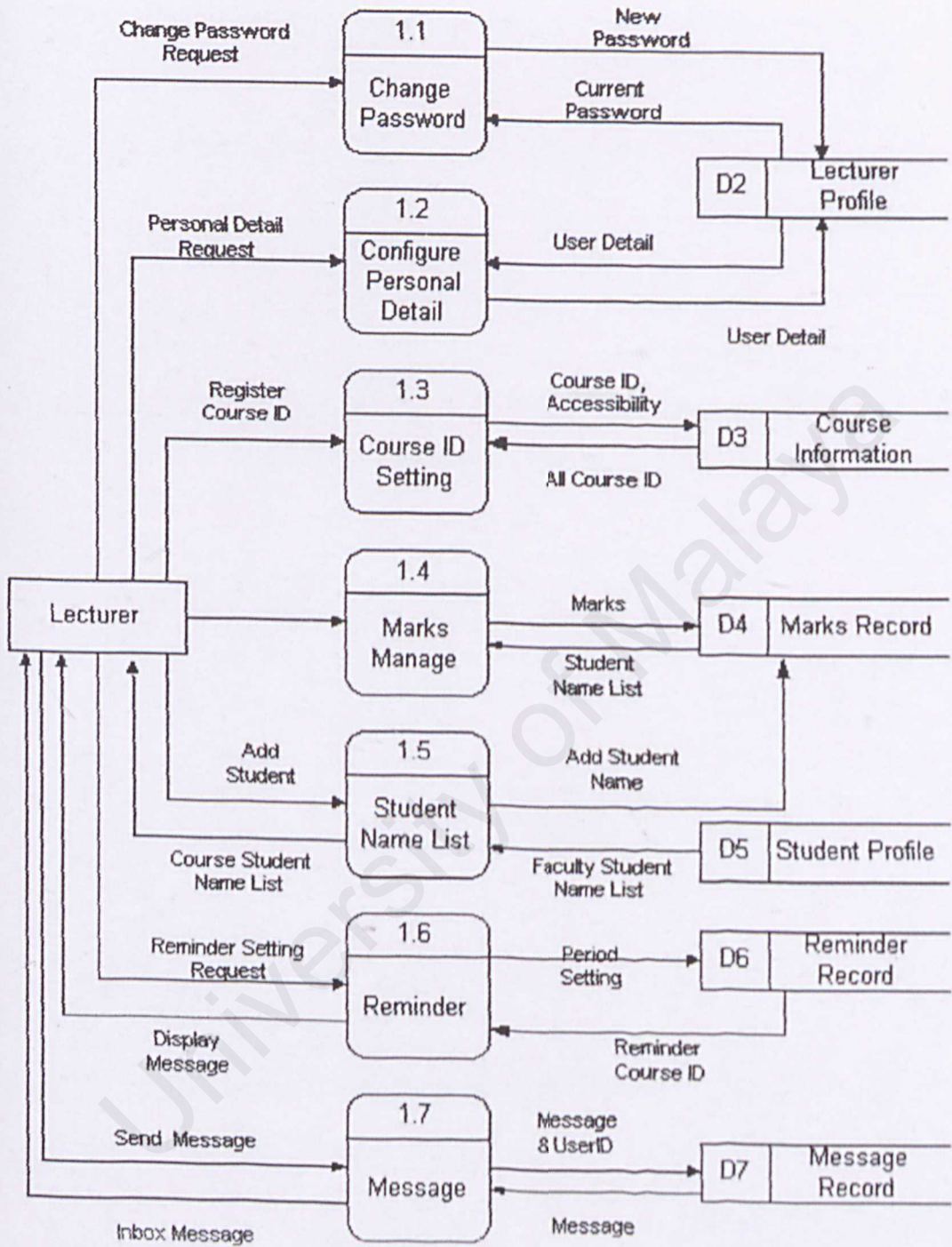


Figure 4.8: Data Flow Diagram Level 0
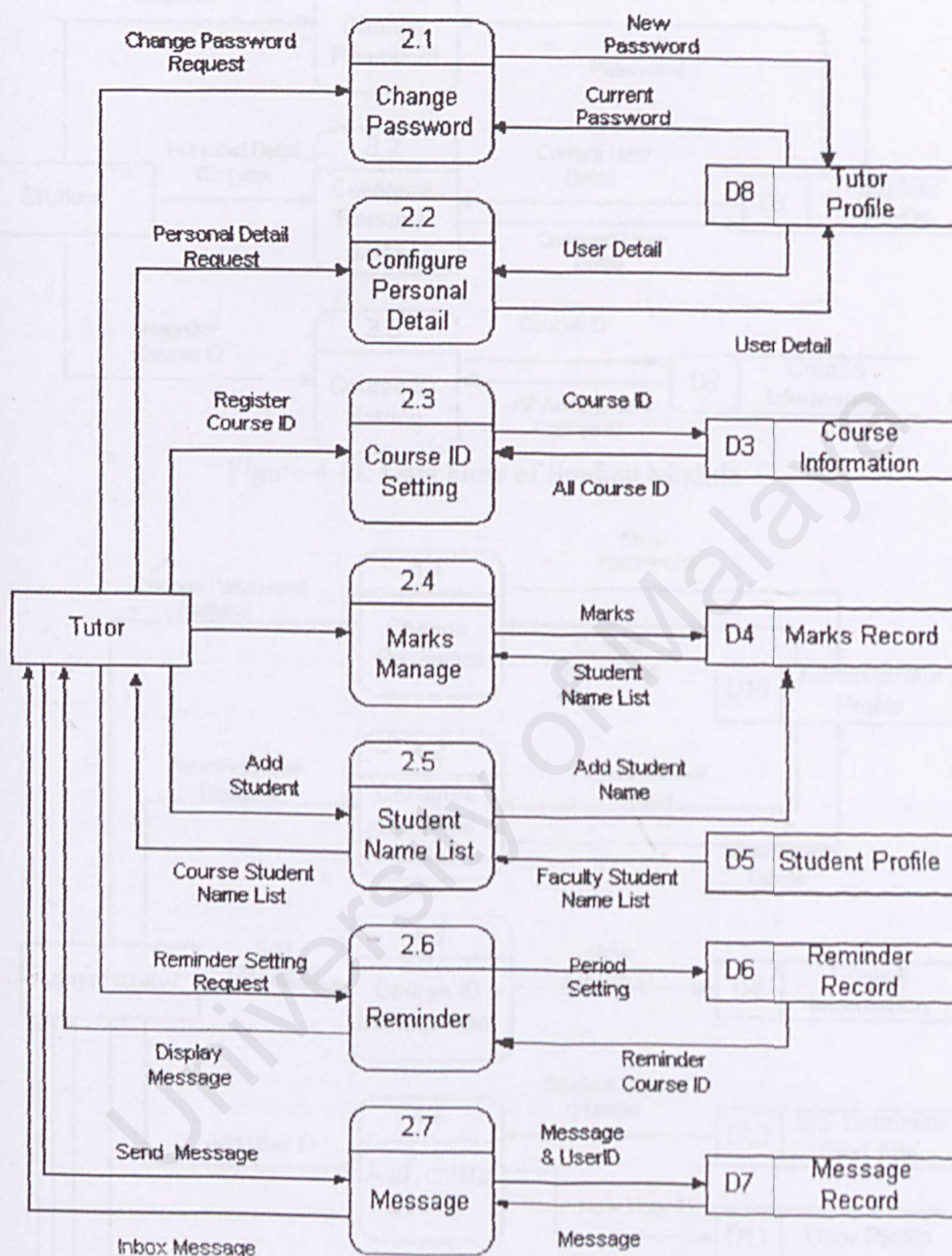
Figure 4.9: Data Flow of Lecturer Module

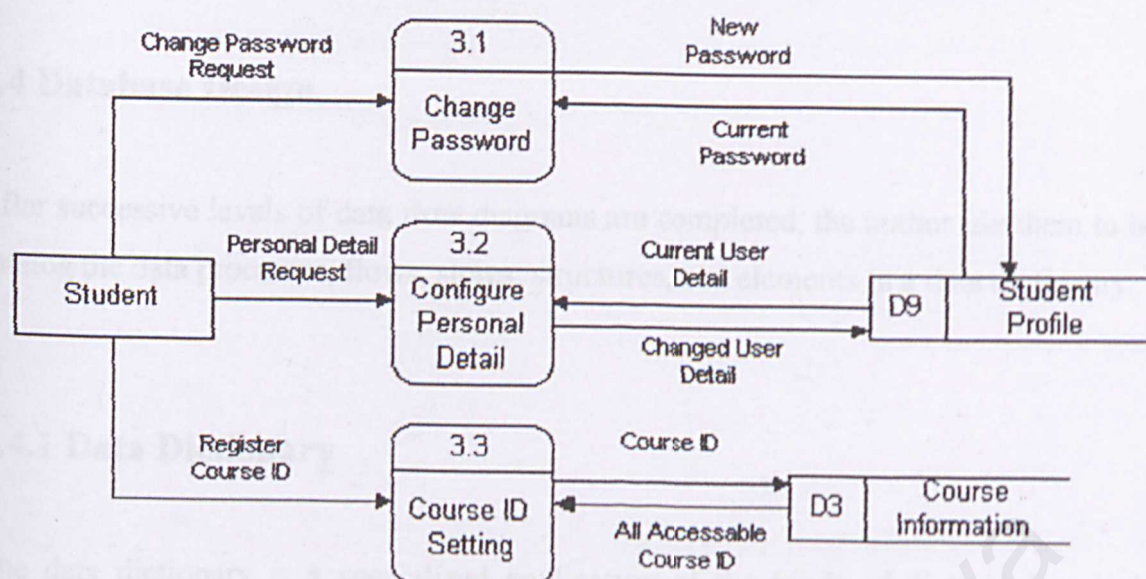Figure 4.10: Data Flow of Tutor Module
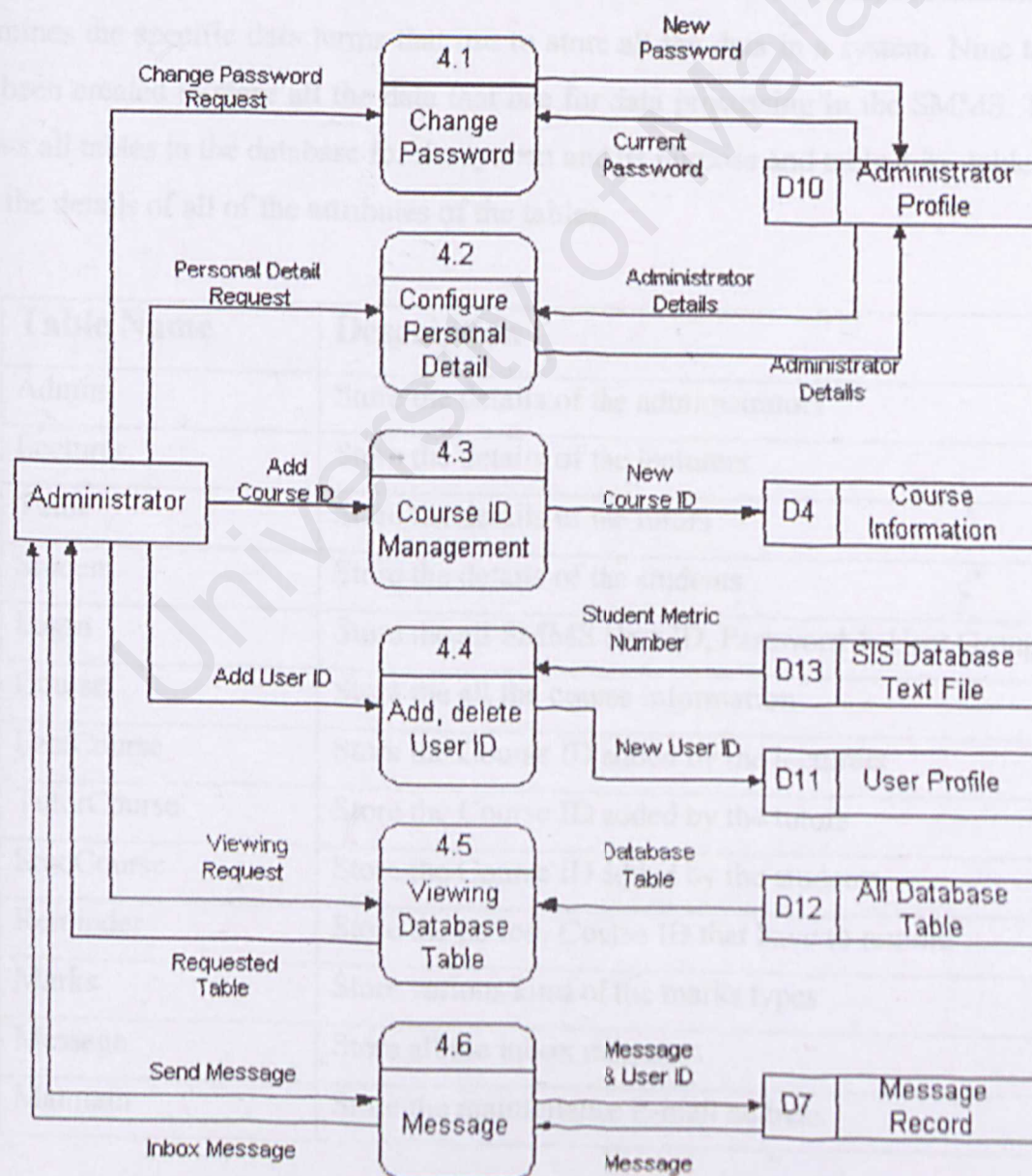
Figure 4.11: Data Flow of Student Module



Figure 4.12: Data Flow of Administrator Module

## 4.4 Database Design

After successive levels of data flow diagrams are completed, the author use them to help catalog the data processes, flows, stores, structures, and elements in a data dictionary.

## 4.4.1 Data Dictionary

The data dictionary is a specialized application of the kinds of dictionaries used as references in everyday life. As a document, the data dictionary collects, coordinates and determines the specific data terms that use to store all the data in a system. Nine tables have been created to store all the data that use for data processing in the SMMS. Table 4.2 lists all tables in the database for the system and its purpose and table 4.3 – table 4.15 show the details of all of the attributes of the tables.

| Table Name | Description |
|---|---|
| Admin | Store the details of the administrators |
| Lecturer | Store the details of the lecturers |
| Tutor | Store the details of the tutors |
| Student | Store the details of the students |
| Login | Store the all SMMS User ID, Password & User Group |
| Course | Store the all the course information |
| LectCourse | Store the Course ID added by the lecturers |
| TutorCourse | Store the Course ID added by the tutors |
| StudCourse | Store the Course ID added by the students |
| Reminder | Store the period, Course ID that have to remind |
| Marks | Store various kind of the marks types |
| Message | Store all the inbox messages |
| Maintain | Store the maintenance E-mail address |

Table 4.2: Relational tables in SMMS

1. Table 4.3 shows the basic structure of "Admin" table.

| Field | Data Type | Description |
|---|---|---|
| Index | AutoNumber | Generate index record |
| UserID | Text | Admin ID |
| Title | Text | Admin title (Mr., Ms., ... ) |
| Name | Text | Admin name |
| OfficePhone | Text | Admin office phone |
| Email | Text | Admin e-mail address |
| Department | Text | Department (NT, MIS, AI, SE) |
| Password | Text | Password |

Table 4.3: Structure of "Admin" table

2. Table 4.4 shows the basic structure of "Lecturer" table.

| Field | Data Type | Description |
|---|---|---|
| Index | AutoNumber | Generate index record |
| UserID | Text | Lecturer ID |
| Title | Text | Lecturer title (Mr., Ms., ... ) |
| Name | Text | Lecturer name |
| OfficePhone | Text | Lecturer office phone |
| Email | Text | Lecturer e-mail address |
| Department | Text | Department (NT, MIS, AI, SE) |
| Password | Text | Password |

Table 4.4: Structure of "Lecturer" table

3. Table 4.5 shows the basic structure of "Tutor" table.

| Field | Data Type | Description |
|-------|-----------|-------------|
| Index | AutoNumber | Generate index record |
| UserID | Text | Tutor ID |
| Title | Text | Tutor title (Mr., Ms., …) |
| Name | Text | Tutor name |
| OfficePhone | Text | Tutor office phone |
| Email | Text | Tutor e-mail address |
| Department | Text | Department (NT, MIS, AI, SE) |
| Password | Text | Password |

Table 4.5: Structure of "Tutor" table

4. Table 4.5 shows the basic structure of "Student" table.

| Field | Data Type | Description |
|-------|-----------|-------------|
| Index | AutoNumber | Generate index record |
| Matrices | Text | Metric number |
| User ID | Text | Student ID |
| Name | Text | Tutor name |
| Major | Text | Majoring |
| Email | Text | Tutor e-mail address |
| Password | Text | Password |

Table 4.6: Structure of "Student" table

5. Table 4.6 shows the basic structure of "Login" table.

| Field | Data Type | Description |
|---|---|---|
| LoginID | Text | User login ID |
| Password | Text | User login password |
| UserGroup | Text | L=Lecturer, T=Tutor and etc |

Table 4.7: Structure of "Login" table

6. Table 4.7 shows the basic structure of "Course" table.

| Field | Data Type | Description |
|---|---|---|
| CourseID | Text | Course ID |
| Course Name | Text | Course Name |
| Tutor | Yes/No | Accessibility by tutor |
| Student | Yes/No | Accessibility by student |

Table 4.8: Structure of "Course" table

7. Table 4.7 shows the basic structure of "LectCourse" table.

| Field | Data Type | Description |
|---|---|---|
| Index | AutoNumber | Generate index record |
| UserID | Text | Lecturer ID |
| Name | Text | Lecturer name |
| CourseID | Text | Course ID added by lecturer |
| CourseName | Text | Course name added by lecturer |
| Tutor | Yes/No | Accessibility by tutor |
| Student | Yes/No | Accessibility by student |

Table 4.9: Structure of "LectCourse" table

8. Table 4.9 shows the basic structure of "TutorCourse" table.

| Field | Data Type | Description |
|---|---|---|
| Index | AutoNumber | Generate index record |
| UserID | Text | Tutor ID |
| Name | Text | Tutor Name |
| CourseID | Text | Course ID added by tutor |
| CourseName | Text | Course name |

Table 4.10: Structure of "TutorCourse" table

9. Table 4.9 shows the basic structure of "StudCourse" table.

| Field | Data Type | Description |
|---|---|---|
| Index | AutoNumber | Generate index record |
| UserID | Text | Student ID |
| Matrices | Text | Student metric number |
| Name | Text | Student name |
| CourseID | Text | Course ID added by student |
| CourseName | Text | Course name |

Table 4.11: Structure of "StudCourse" table

10. Table 4.9 shows the basic structure of "Message" table.

| Field | Data Type | Description |
|---|---|---|
| Index | AutoNumber | Generate index record |
| To | Text | Receiver user id |
| From | Text | Sender user id |
| Date | Date/Time | Time that message send |
| Message | Memo | Store the message content |

Table 4.12: Structure of "Message" table

11. Table 4.10 shows the basic structure of "Marks" table.

| Field | Data Type | Description |
|---|---|---|
| Index | AutoNumber | Generate index record |
| UserID | Text | Student ID |
| Matrices | Text | Student metric number |
| Name | Text | Student name |
| CourseID | Text | Course ID |
| CourseName | Text | Course name |
| MarksType | Text | Marks type (tutorial, lab, etc) |
| SessionM | Number | Marks type session (1, 2, 3…) |
| Date | Date/Time | Date while marks updated |
| Marks | Text | Student's marks in number form |
| Grade | Text | Student's marks in alphabet form |

Table 4.13: Structure of "Marks" table

12. Table 4.11 shows the basic structure of "Reminder" table.

| Field | Data Type | Description |
|---|---|---|
| Index | AutoNumber | Generate index record |
| UserID | Text | Lecturer or tutor id |
| Name | Text | Lecturer or tutor name |
| Period | Number | Days that remind user update marks |
| LastUpdate | Date/Time | Last update the marks |
| CourseID | Text | Course id that have to remind |
| CourseName | Text | Course name |

Table 4.14: Structure of "Reminder"table

13. Table 4.9 shows the basic structure of "Maintain" table.

| Field | Data Type | Description |
|---|---|---|
| Index | AutoNumber | Generate index record |
| Email | Text | Maintainer E-mail |

Table 4.15: Structure of "Maintain" table

## 4.5 User Interface Design

Graphical User Interface (GUIs) has been chosen as an interaction devise for SMMS. They are available on all PCs, Apple Computers and Unix Workstation. The reasons GUIs has been chosen are:

- They are relatively easy to learn and use. Users with no computing experience can learn to use the interface after a brief training session.
- The user has multiple screens (windows) for system interaction switching from one task to another is possible without losing sight of information generated during the first task.
- Fast, full-screen interaction is possible with immediate access to anywhere on the screen.

Table 4.16 below shows the principal characteristics of this type of interface [11].

| Characteristic | Description |
|---|---|
| Windows | Multiple windows allow different information to be displayed simultaneously on the user's screen. |
| Icons | Icons represent different types of information. Some systems icons represent files and the system process. |
| Menus | Commands are selected from a menu rather than typed in command languages. |
| Pointing | A pointing device such as mouse is used for selecting choices from a menu or indicating items of interest in a window. |
| Graphics | Graphical elements can be mixed with text on the same display. |

Table 4.16: The Principal Characteristic of SMMS Interface

The Figure below shows the examples of the first draft or idea how the SMMS user interface look like.
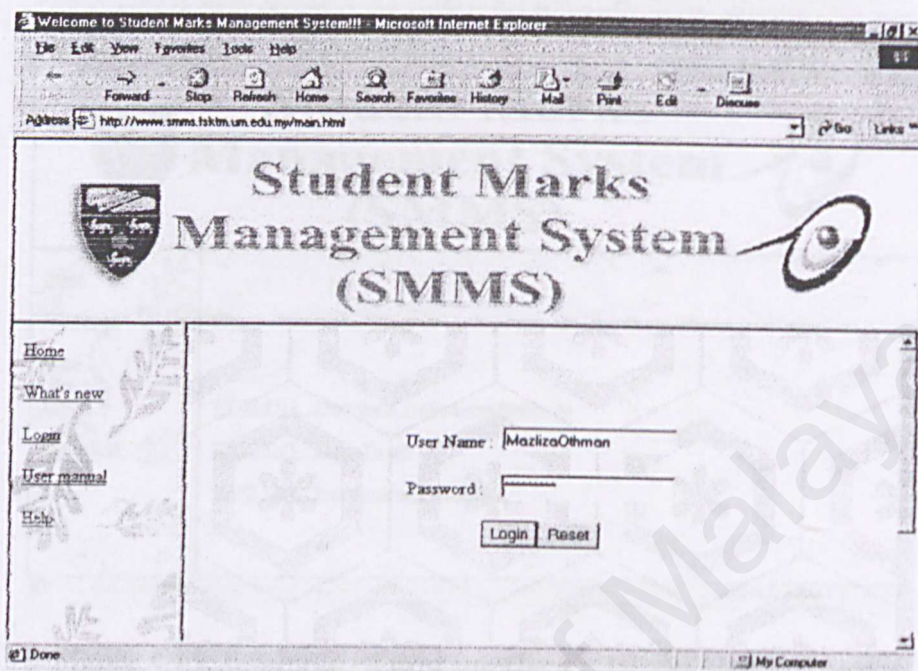


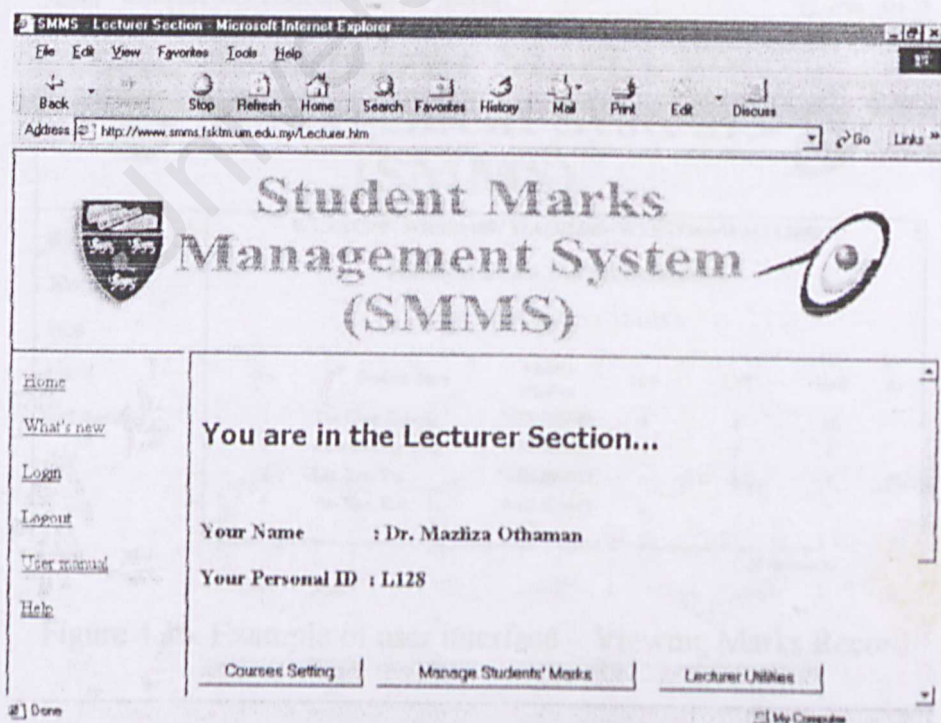Figure 4.13: Example of user interface – Login Page



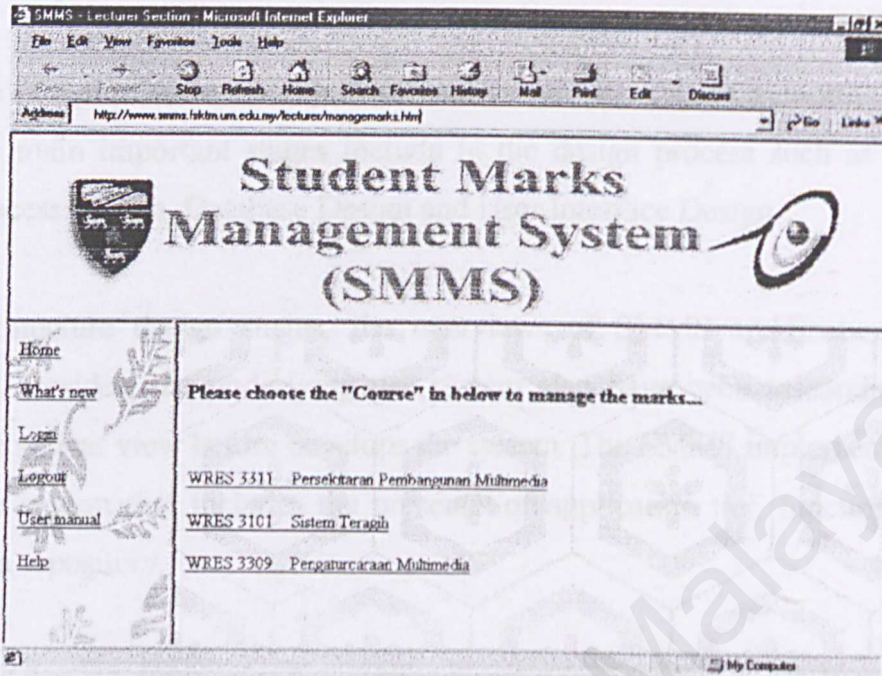Figure 4.14: Example of user interface – Lecturer Section

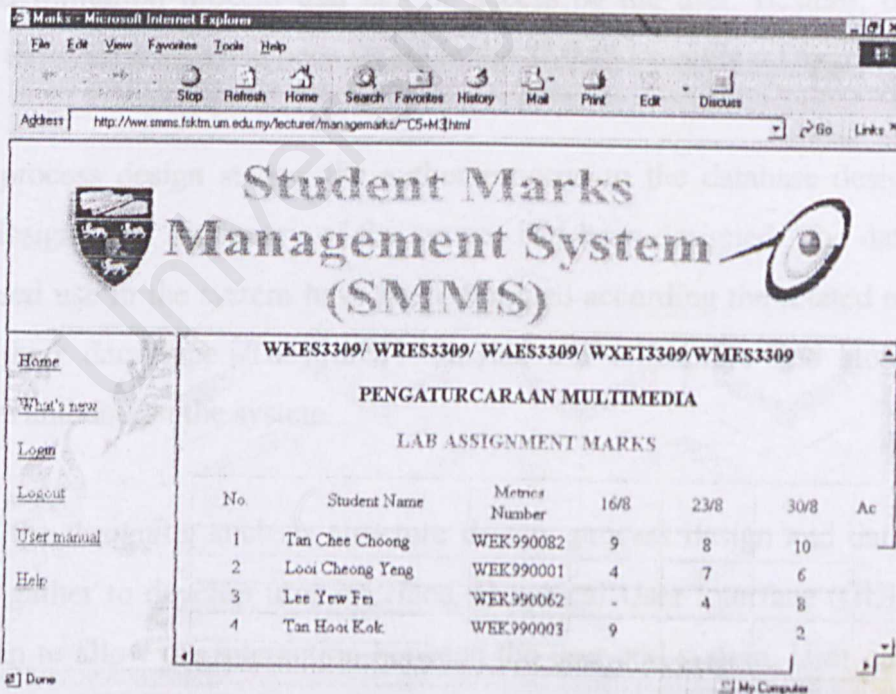Figure 4.15: Example of user interface – Marks Management

Figure 4.16: Example of user interface – Viewing Marks Record

## 4.6 Summary

The system design phase is an important phase while developing a project. In this phase there are 4 main important stages include in the design process such as Architecture Design, Process Design, Database Design and User Interface Design.

In the architecture design stages, the overviews of SMMS architecture have been determined. Besides, the underlying tier system also have been researched to let the author have a clear view before develops the system. The SMMS implemented three-tier architecture system that includes the presentation/application tier, functionality/service tier and data repository.

The process design stages stated the structure of the SMMS and the data flow in each process that running in the system. There are three main modules in SMMS such as Lecturer Module, Tutor Module and Administrator Module. Each module has their special and limitation process that can be access by the user. Besides, the data flow process in the system also had been stated in the SMMS Data Flow Diagram (DFD).

After the process design stages, the author proceed to the database design stages. In database design, data dictionary of the system had been designed. The database tables that proposed use in the system have been designed according the related name of each data and their data type. They are 13 tables use to capture and store the useful information and data in the system.

Lastly, all the designing such as structure design, process design and database design have been gather to develop user interface. Graphical User Interface (GUI) design has been chosen to allow the interaction between the user and system. User can use mouse pointer and to click the anchor that linked to another related pages.

# Chapter Five
# Implementation

# Chapter 5   Implementation

## 5.1 Implementation

System implementation is a process of developing a system based on the given requirements. In order to do that, appropriate tools and suitable languages are needed to code the programs. A number of software was chosen in this case.

## 5.2 Development Environment

Development environment has certain impact on the development of a system. Using the suitable hardware will help speed up system development. The hardware and software tools used to develop and documented the entire system is as discuses below.

### 5.2.1 Hardware Requirement

The hardware used to develop this project are listed below:

- 700MHz AMD Duron Processor
- 128MB RAM
- 52X CD-ROM Drive
- 20GB Hard Disk
- Other standard desktop PC components

### 5.2.2 Software Tools/Components requirements

- Software Tools for Design and Report Writing

  Visio ® Professional 5.0 was used to do the graphical design and Microsoft Word 2000 was used to do the documentation and user manual.

- Software Tools for Development

  A few software tools were used for the system development as listed in Table 5.1

| Software/ Tools | Purpose | Description |
|---|---|---|
| Windows 98 | System Requirement | Operating System (OS) |
| IIS 5.0 | Web server | Testing web page in FSKTM |
| Microsoft Access 2000 | Database | As the system database to store data |
| Microsoft InterDev 6.0 | Coding | Coding ASP and HTML |
| Microsoft FrontPage 2000 | Interface design | Design web page interface |
| Adobe Photoshop 6.0 | Interface design | Create image and background |

Table 5.1: Software Tools Used

## 5.3 Development of Proposed System

This section explained the development of this system, which focuses on the analysis of usage of the technology and development tools that had been used.

## 5.3.1 Database Development

The database server of this project is Microsoft Access 200. Microsoft Access 2000 is a very user-friendly database, which support amount of record up to 2GB and much more secure.

## 5.3.2 User Interface Development

The user interface for this project was developed using Microsoft InterDev and Microsoft FrontPage 2000. Both are web page editor programs that allow the user to edit HTML and ASP file.

To make the interface of this project more attractive, image-editing tool such as Adobe Photoshop was used.

## 5.3.3 Application Development

The application development involves creating and designing the user interfaces, coding the application using Microsoft InterDev and FrontPage 2000 and linking the application to the database.

***Structure Programming***

Structure programming is a programming method of organizing and coding programs that aims to simplify control paths so that the program can be easily understood and modified. Structure programming reduces the complexity created when programs jump forward and backward to other parts of the program, obscuring the logic and flow of the program.

ASP (Active Server Pages) support structure programming by providing sequential, iteration (FOR and WHILE statement etc.).

***Modular Programming***

Modular programming is defined as breaking and application into small programming units that perform a single task. In ASP, this can be done by using the function and sub function based on the events.

When an application is composed of small function that perform a single task, maintenance is much easier. Functions can be shared among forms by coding the functions into .inc or .asp file. The other file can share these functions by include that file in the header.

## 5.4 Problem Encountered

In this project, the problems encountered are related to software, hardware and programming language used. Nevertheless, most of these problems were solved eventually.

### 5.4.1 Problem of Changing Student Name List in each Semester

This system will use back all the existing student metric number and course information in FSKTM although students registered courses are different in each semester. The lecturers or tutors have suffered from manually input of key in the student name list for each semester for a course. Beside, the system database also become no reliable if the every semester has to delete the previous semester student name list and input the new name list.

Solution:

SMMS has design a student section and all the FSKTM student metric number added to the system as a user id. So students can login as a user of the system to change the registered course by themselves in each semester and it will reduce the lecturer or tutor workload because the new student name list will be generate in each semester automatically by the system according the student registered course in each semester.

### 5.4.2 Problem of Different Lecturer Requirement

Some lecturer doesn't like the student to add the courses to provide automated generating student name list in a course in each semester. Besides, it also not all the course involved the tutor to manage the students' marks.

Solution:

SMMS has provided a "Course Accessibility" function in Lecturer Section to restrict the access control to a course. This function manipulates the combo box to display the accessible courses only to the student or tutor section interface. So the tutor or student can't add or registered some courses, which restricted access by the lecturers.

## 5.4.3 Problem of entered the null or unmeaning value

Sometimes user didn't input some value in the required field before summit the page, this will make the system error because the database will not accept the null value or the unmeaning value.

Solution:

Some JavaScript will be used as the error control to improve the reliability of the system. System will prompt a message box if the user didn't input the suitable value in the system.

## 5.4.4 Problem of creates an automatic E-mail Reminder function

At the beginning phase of develop SMMS, the author had suggest a reminder function that used to remind the users (lecturer and tutor only) update their students' marks frequently according the period set by them. But after the author discovering the automatic send E-mail function, the author found that this function is not easy to built, because it involve the coding about the SMTP server and an .exe program that used to always perform checking the date from the web server before the reminder mail send to users' e-mail address. The ASP components that need are such as AspMail, AspQMail, Jmail, OCX Mail/ASP and etc. These types of component also need to purchase through Internet.

Solution:

The reminder function had change to displaying a reminder message in the main page of the SMMS system while the user had login into the system. So users can just click on the following message, which is a hyperlink to the marks management section for the related course.

# Chapter Six
# System Testing

# Chapter 6   System Testing

## 6.1 Introduction

Testing is a process of verification and validation of a system. Verification and validation are sometimes confused but actually both different activities. The difference between them are succinctly summarized by Boehman (1979):

- Verification, Are we are building the right product?
- Validation, are we building the product right?

This phase ensures that the system is doing and producing the perceived output. It is also a critical element of software quality assurance and represents the ultimate review of a specification, design and coding [12]. The objectives of testing are stated as below:

- Testing is a process of executing a program with the intent of finding an error.
- A good test case is one that has a high probability of finding an as yet undiscovered error.
- A successful test is one that uncovers an as yet undiscovered error.

## 6.2 Testing Techniques

There are two techniques applied in testing this system: white box testing and black box testing.

## 6.2.1 White Box Testing

White box testing is a test case design method that uses the control structure of the procedural design to derive test cases. Using white box, the developer can derive test cases that:

- Guarantee that all independent path within a module have been exercised at least once

- Exercise all logical decisions on their true and false sides

- Exercise all loops at their boundaries and within their operational bounds

- Exercise internal data structures to assure their validity
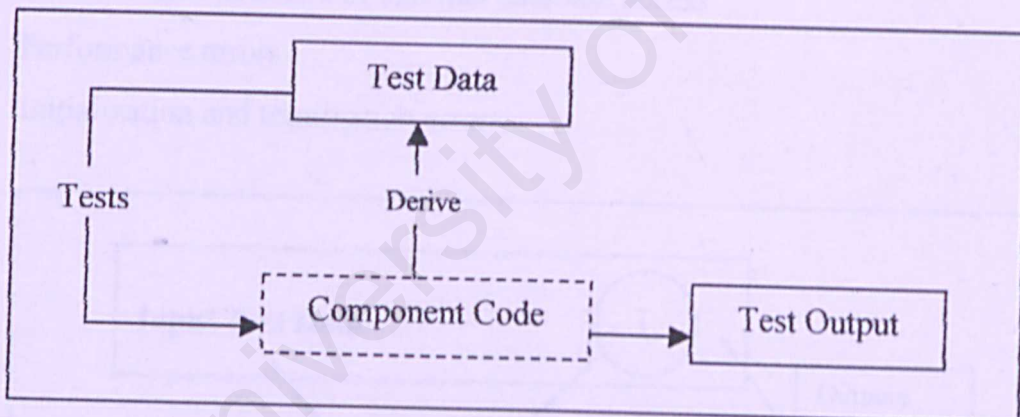


Figure 6.1: White Box Testing

## 6.2.2 Black Box Testing

Black box testing focus on the functional requirements of the software. That is, black box testing enables the software engineer to derive sets of input conditions that will fully exercise all functional requirements for the program. Black box testing is not an alternative to white box techniques; rather it is a complementary approach that is likely to uncover a different class of errors.

Black box testing attempts to find errors in the following categories:

- Incorrect or missing functions
- Interface errors
- Errors in data structure or external database access
- Performance errors
- Initialization and termination errors.
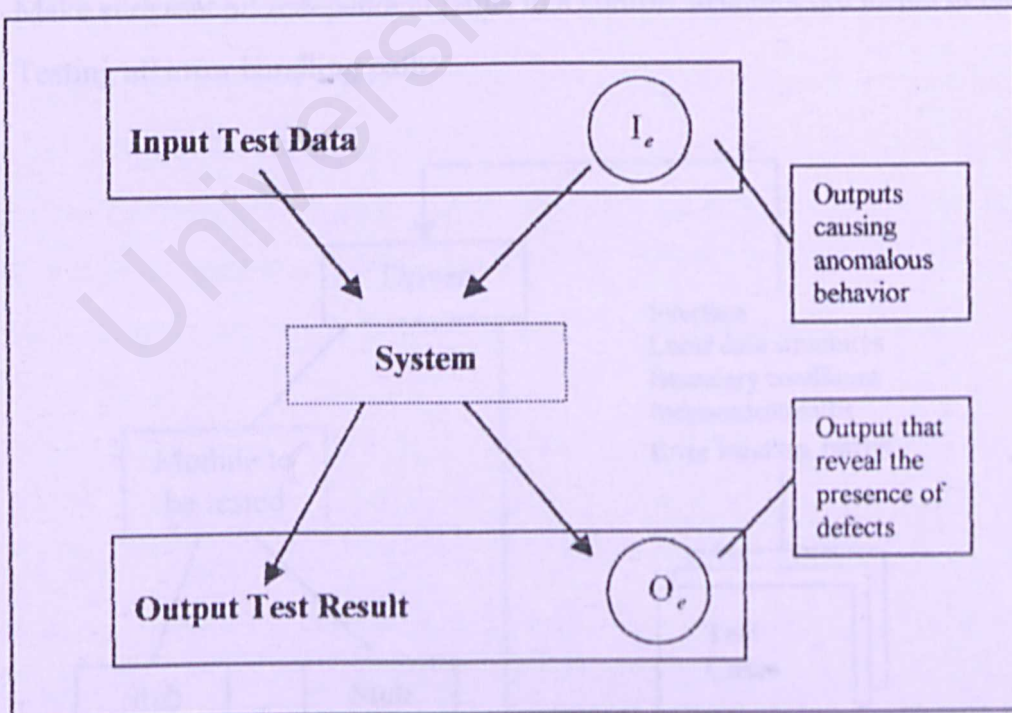


Figure 6.2: Black Box Testing

## 6.3 Testing Strategies

The testing process is implemented throughout the development of this system. It is implemented in stages because the system itself is composed of procedure and functions. The testing process consists of unit testing, integrating testing and system testing.

## 6.3.1 Unit Testing

Unit testing focuses verification effort on the smallest component of the system design. Each Component is treated as a stand-alone entity and tested individually to ensure that they operate correctly.

The unit testing involves:

- Testing the interfaces to ensures that information flows properly into and out of the program unit.

- Testing the boundary conditions to ensure that the component is operating correctly at boundary values.

- Make sure that all independent paths in a control structure are tested at least once.
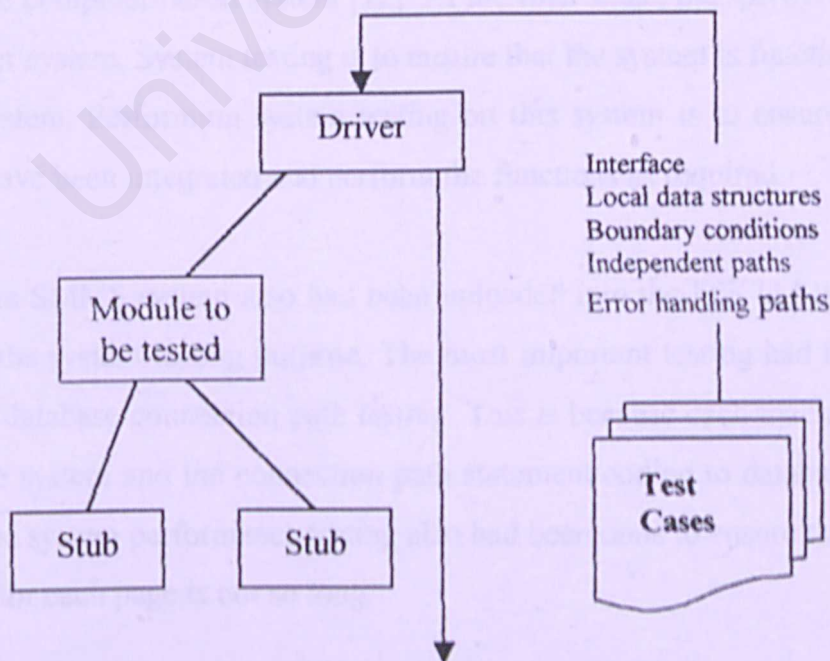
- Testing all error handling paths.



Figure 6.3: Unit Testing Environment

## 6.3.2 Integration Testing

Integration testing is a systematic technique for constructing the program structure while at the same time conducting test to uncover errors associated with interfacing. The objective is to take unit-tested modules and built a program structure that has been dictated by design [12].

The incremental integration approach was used in testing this system. By using this approach, the program is constructed and tested in small segments where errors are easier to isolate and correct. Moreover the interfaces are more likely to be tested completed too. The testing such as generating the relevant students' name list for each course that construct by the lecturer also had been done. That means each lecturer or tutor will get the correct students' name list.

## 6.3.3 System Testing

System testing is actually a series of different test whose primary purpose is to fully exercise the computer-based system [12]. At the final stage, the software is incorporated into a larger system. System testing is to ensure that the system is functioning well under a larger system. Performing system testing on this system is to ensure that all system elements have been integrated and perform the functions as required.

Besides, the SMMS system also had been uploaded into the FSKTM thesis lab IIS web server for the system testing purpose. The most important testing had been done by the author are database connection path testing. This is because each machine had different file storage system and the connection path statement/coding to database also different. Besides, the system performance testing also had been done to ensure the time waiting to download for each page is not so long.

# Chapter Seven
## System Evaluation & Conclusion

## Chapter 7: System Evaluation And Conclusion

### 7.1 System Strengths

- **Independent of operation Platform**

  This system can operate in any platform as a long as the web browser been used support JavaScript and ASP. JavaScript has been used as client scripting for form validation and error control. Using the client side scripting can reduce the workload on the server and JavaScript has been used because of it is the most widely use scripting among others. ASP codes has been used to data manipulation and interface design.

- **Simple and user-friendly interface**

  The user interface of the system is very user-friendly and quite consistent from one interface to another in the same component. The flow of the system is very easy to follow and users do not have to follow ant complex procedure in performing certain function. All the function can be performed easily by just clicking a button and filling the require information.

- **Security**

  Like most system, security is the one of the most important aspects in the system. System security is implemented using ID and password. A valid login ID and password is required to access and make changes in the system database. This system provides four levels of user login controls that administrator, lecturer, tutor and student. ASP codes has used the "Session" validation for detection the validate user group such as A = Administrator Section, L = Lecturer Section, T = Tutor Section and S = Student Section. Every login have their own privilege and the privilege will determine the relevant page that the user can handle in the system. With FSKTM Microsoft Internet Information Service 5.0 as the web server, all client machine in the faculty that connect to it must be have a trusted connection or granted permission to manipulate the database stored inside it.

- ## Maintainability

The system is easy to maintain because some of the functions are stored in files. Meanwhile every object type is written in standard form and the file name of every component also rename in a standard way. This is important for administrator in doing maintenance work. Besides, the system also provide a maintainer e-mail address allow the user send e-mail to the system programmer or maintainer if the system have any problem. For the convenient of the changing person in charge for the maintenance in future, the maintainer e-mail address can vary from time to time in one of the function that provide in the administrator section.

- ## System Transparency

System transparency refers to the condition where the users do not need to know where the database resides, how is the system structure, its database management system and anything related to the system built. This feature is very important to avoid confusion that could lead to destruction of the important data.

- ## Easy Navigation

Each of the function page consist a "BACK" button, which allow the easy navigation from a page to another page. This system doesn't have the page that link to the outside web page, so if what the users do is just click a function to perform the function and click the "BACK" button to display back the previous page.

## 7.2 System Limitation

- **JavaScript Enabled Web Browser**

    The browser been use must be JavaScript and VBScript compatible. As mention earlier, JavaScript has been use as the client side scripting for error checking and data handling.

- **Marks input function for each student must perform one by one**

    System didn't provided input marks function for all student in a page but separated the input to one by one. This is because the error and data checking for the marks input page for all students in a single page could slow down the system performance since there is only one web server.

- **User Cannot Register through web**

    Another limitation is the user cannot register as a new user through web. This limitation exists due to the central maintenance by administration. The registered User ID and Password only can get from the administrator for each new user (except Student). However, this structure will increase the security of the system. The student user id is automatically generated by the administrator where the user id for each student is their metric number and the first time password is "1234". They can change the password after their first time login through the "Personal Module" in the student section page.

- **No online Help assistance**

    Because of the time constraints, there is no online help assistance for this system.

- **Less users testing**

    After finish this project, there are lack of the real users testing and give opinion about this system. Due to the time constraints, it only demo to the supervisor for this project.

## 7.3 Future Enhancements

System development is a dynamic process. This system was developed in less than three month. While developing this system, new ideas come about. However, due to time constraint, not all of these ideas could be incorporated into the system. Some of the ideas that come about are as follows:

i. There is no password encryption used in this system. Passwords are store directly into the database. If password can be encrypted, then the system will be much more secured.

ii. The system should provide database backup so that data can be recover if the database is corrupted.

iii. The system should provide a function that can automatically read the SIS text file which content all the student name list and their relevant details into the database so can reduce the administrator workload for each year to update the new user id.

iv. Provide more efficient online user guide to guide user to use the system efficiently.

v. The interface of the system can be designed in a more standardized way, which show the professional of designing a system.

vi. The system should enhance the reminder function to automatic generate the e-mail through the SMTP server in the faculty to the user.

vii. Refining coding to improved system performance.

## 7.4 Knowledge Gained

Valuable knowledge was gained throughout the development of this system. Author has expose to client – server development environment, database distributed system, programming and concepts, as well as LAN configuration.

Author have learn many skills on how to develop application using software tools like Microsoft Visual InterDev 6.0, Microsoft Access 2000, Microsoft FrontPage 2000, Visio ® Professional 5.0, Adobe Photoshop 6.0 and other unmentioned software tools.

SMMS are develop by the some web programming languages such as ASP 3.0, VBScript, JavaScript, HTML, DHTML and database programming languages such as SQL. The author has learned how to develop a real database server web application system. There are a lot of the coding techniques had been learn after develop this system.

The author also has chance to applied theories and knowledge gained through the course of computer science studies like WXES2104 System Analysis & Design and WXES3204 Software Engineering.

There is also improvement in skill of finding information and classifying facts, besides improving skill of problem solving and trouble – shooting.

Besides, the author also understands better on the students' marks management system and concept.

## 7.5 Overall Conclusion

Overall, the main objectives of the project had been achieved through there are still plenty rooms for improvements.

However, like other software application, this system is not escapable from its limitation. But these all can be overcome in time, by making the necessary future enhancement.

Finally, it is hope that this project really helps improving marks management system in the Faculty of Computer Science and Information Technology, University Malaya.

At last, the author hopes SMMS are not limited only to the marks management in FSKTM but it can support others faculty need in University of Malaya.

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# CONTENTS OF SMMS USER'S GUIDE

# List Of Figure

# Chapter 1 Introduction

## 1.1 Introduction

The Student Marks Management system (SMMS) is web-page marks management systems that help lecturers and tutors to manage the students' marks in FSKTM more efficiently. All the useful information will be store in the database through the user interface that provided by SMMS web page. It is a new idea from the current non-centralized system, which is currently using by the lecturers or tutors in the faculty.

This system consists of 4 Section such as Admin Section, Lecturer Section, Tutor Section and Student Section. It may have some same or different modules provided in each of the section.

## Admin Section

- **Record Viewing Module**

  - This module provides function for administrator to viewing the table record in SMMS database system. Administrator can choose which table records need to be display in the browser.
  - Besides the administrator also can find a user records in the database table records by input the User ID in the record finding function.

- **Users Management Module**

  - This module provides function for administrator to add, edit and delete the all type of User ID for SMMS. All the User ID can be categories first to several user groups such as admin, lecturer, tutor and student before add to the system.

- **Courses Information Module**

  - This module provides function for add, edit and delete the courses information in FSKTM. The courses information will display in the others three-user section to convenient users add or drop the course in each semester.

# Lecturer & Tutor Section

- **Marks Management Module**

  - This module consists of several types of marks management functions such as add, edit and delete students' marks, student marks record viewing, add or delete student name list in certain courses.

- **Reminder**

  - This module provides function for user to set the reminder period to each course, which construct by them.

- **Course Management Module**

  - This module allows the user to add or drop the courses in each semester by choosing the course code from the combo box. For lecturer section it provide an extra function, "Course Accessibility". This function allows the lecturers restrict the accessibility from tutor or student to certain courses.

## Student Section

- **Student Course Module**

  - This module can let the student to add or delete the course in each semester by them. But the accessibility to courses are depends from the lecturers "Course Accessibility" setting.

## All Section

- **Communication Module**

  - This module provides the convenient message system to the users (except student section). User can send or receive message from the other users in SMMS.

- **Personal Module**

  - This module provides function to user add, edit or delete their personal details such as name, e-mail, password, etc.

- **Logout Module**

  - Users can logout from the system through this module by clicking the hyperlink that provided.

## 1.2    Hardware Requirement

The minimum requirements to run SMMS are:

- ✓ A IBM compatible PC with 486 processor and above
- ✓ 32 MB RAM (64MB recommended)
- ✓ SVGA Graphic Adapter (able to support 800x600 resolution)
- ✓ Keyboard
- ✓ Mouse
- ✓ Network card

## 1.3    Software Requirement

The software requirements to run SMMS are:

- ✓ Any JavaScript – enabled browser (Microsoft Internet Explorer 5.0 and above recommended)
- ✓ Microsoft Windows 98, NT, ME and 2000.

## Chapter 2   SMMS Main Menu

### 2.1 Starting SMMS

To start SMMS, users need to start their web browser. It is recommended that security setting for the web browser set to Medium to maximize SMMS functionality. Then users need to type http://10.100.1.195/wek990082/smms/home.asp and press Enter key. For your information, the network connection User name = wek990082, Password = 791227 and Domain = finalyear.
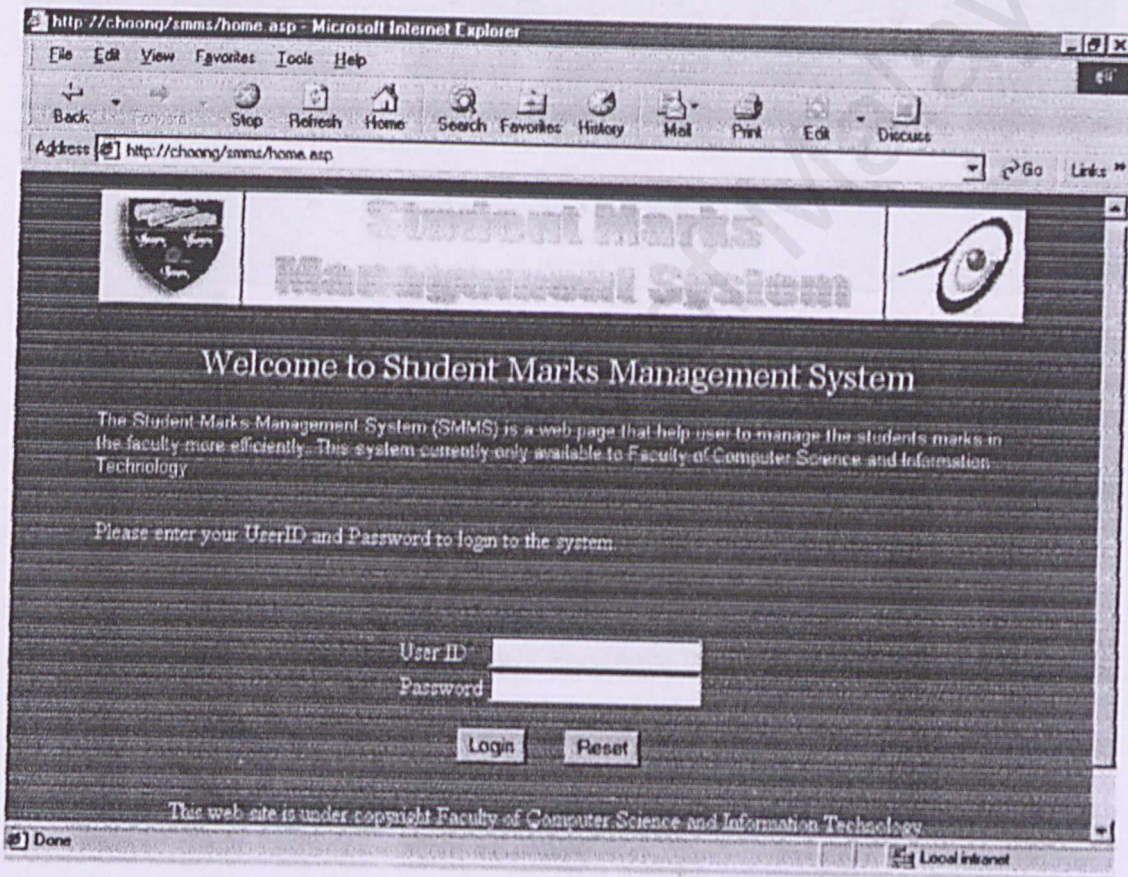


Figure 2.1: SMMS main page

### 2.2 Logon

To logon, the user has key in a valid login identity (ID) and a valid password. After typing your user ID and password, you may click the login button to allow the system to process the verification.

## 2.3 Login as admin

After login successfully, user will be bring to the system main page. In this page, it provides some brief explanation on what the system can do for you. Below is what was seen when user login as admin.
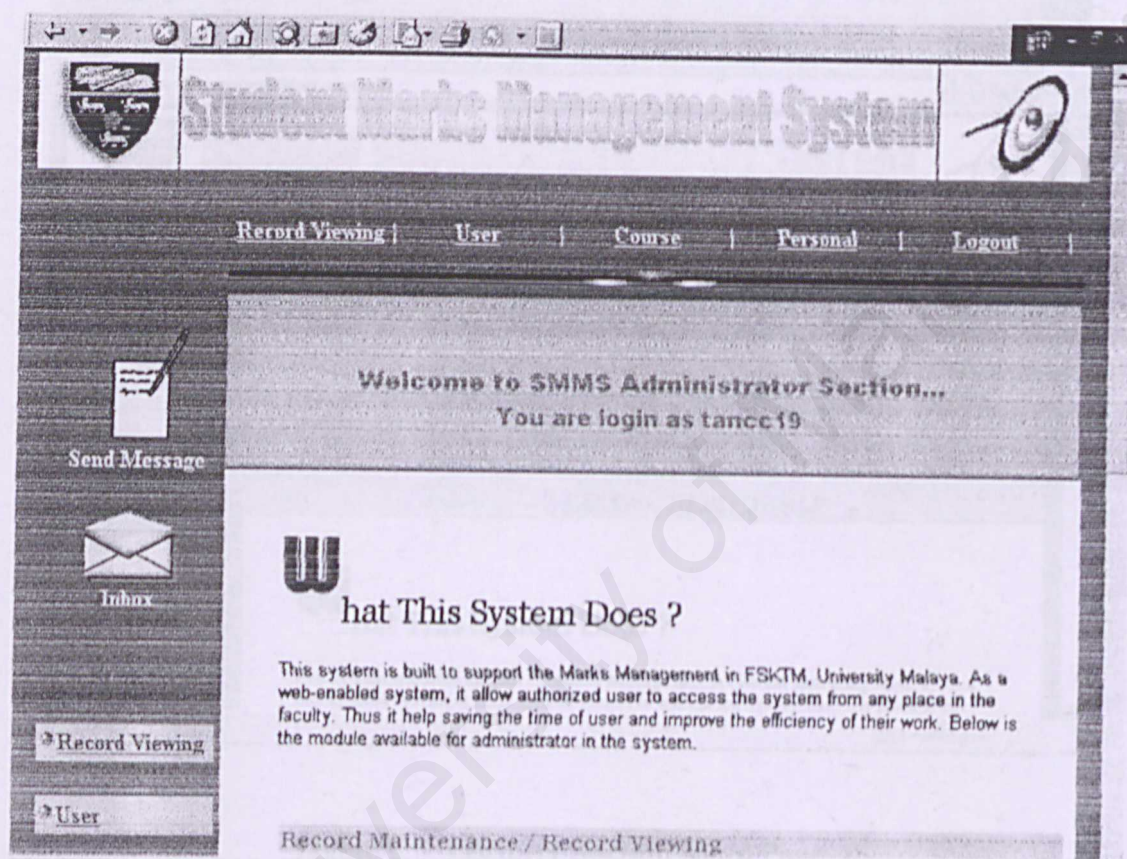


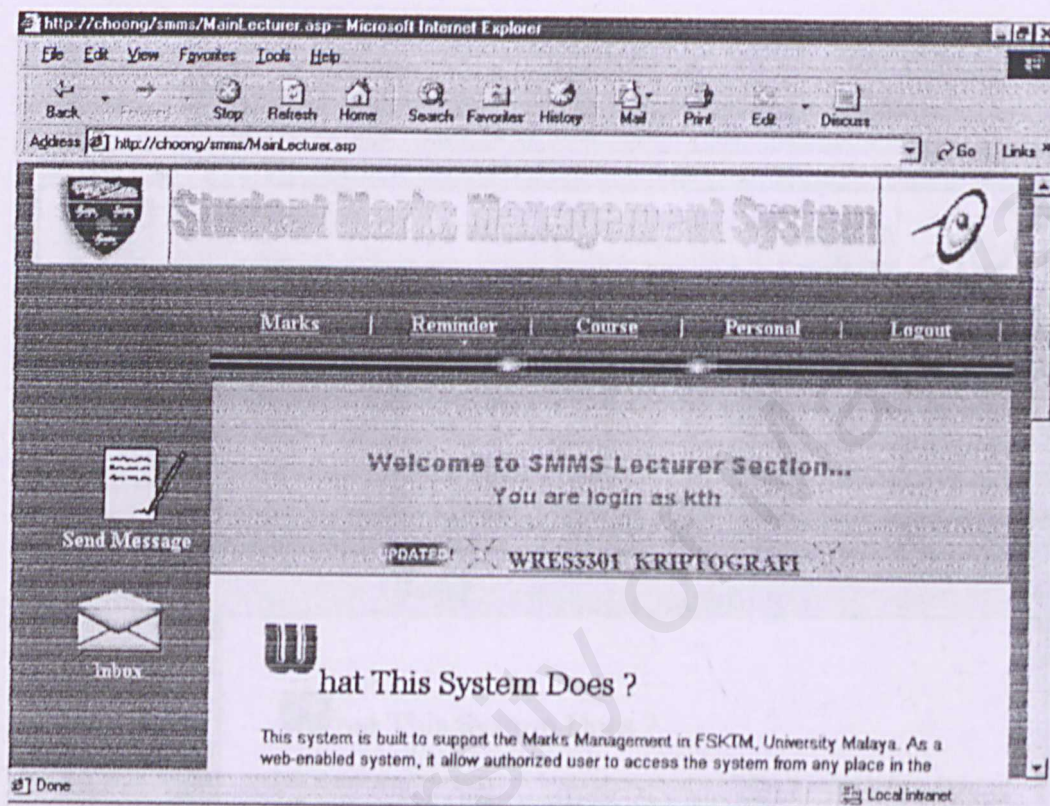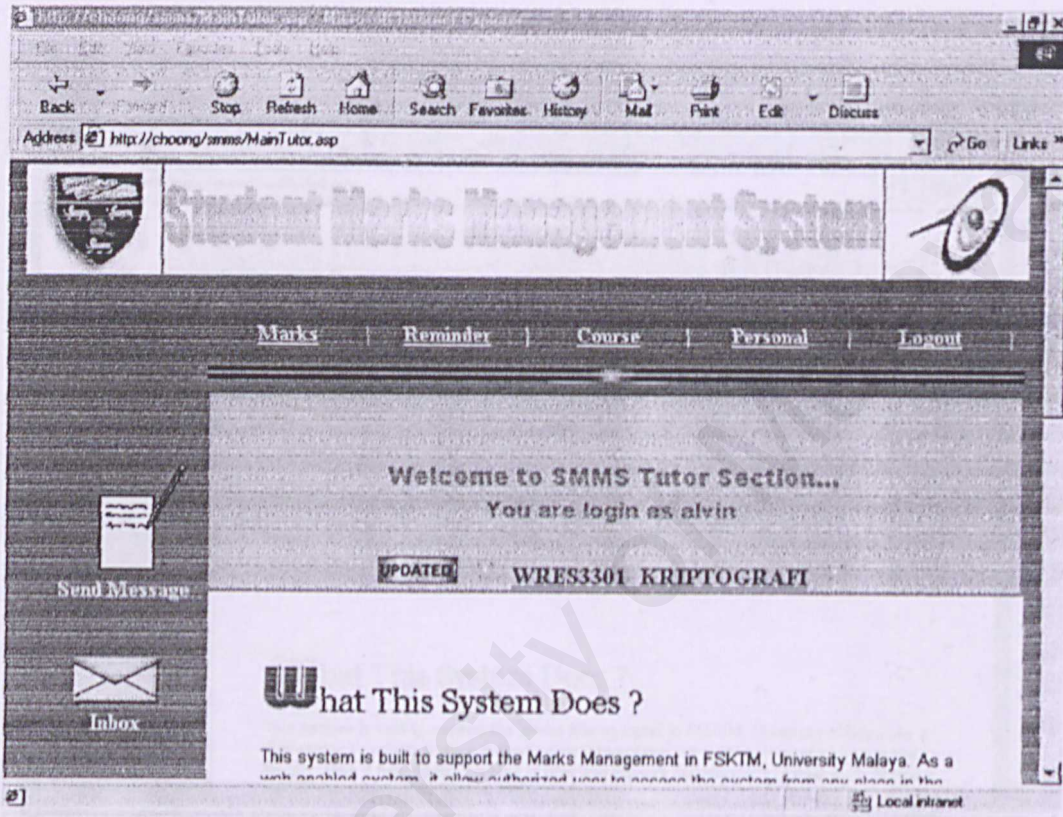Figure 2.2: Admin Section Main Page

Module available to administrator are Record Viewing, User, Course, Personal, Message and Logout.

## 2.4 Login as lecturer

After login successfully, user will be bring to the system main page. In this page, it provides some brief explanation on what the system can do for you. Below is what was seen when user login as lecturer.
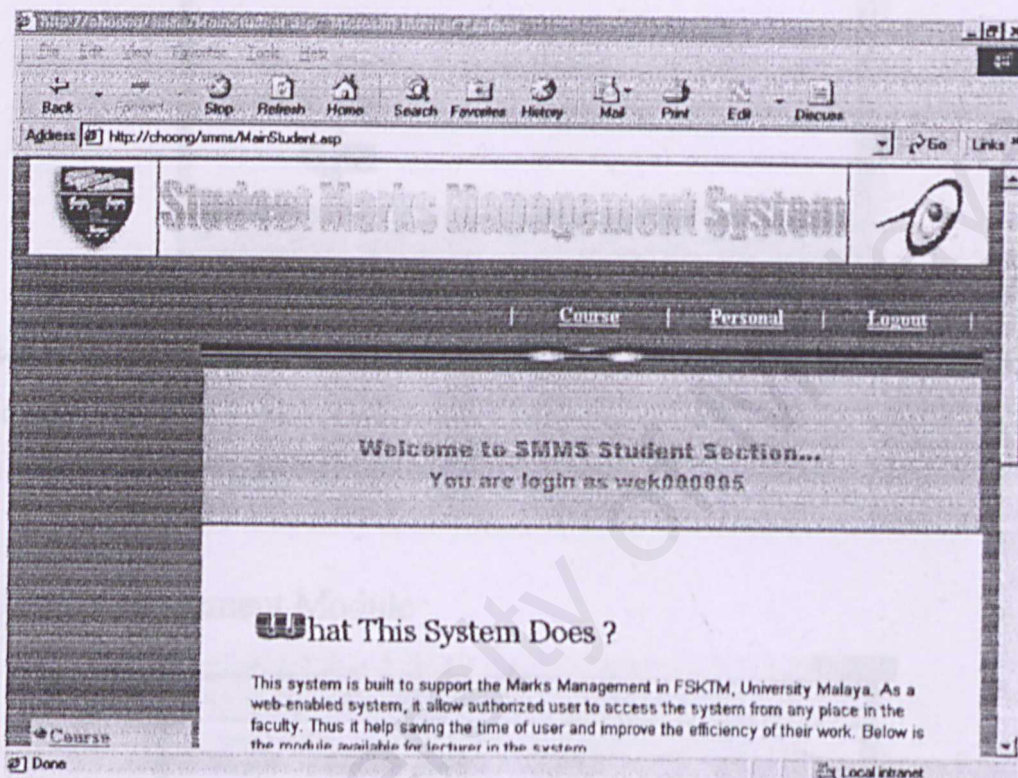


Figure 2.3: Lecturer Section Main Page

Module available to lecturer are Marks, Reminder, Course, Personal, Message and Logout.

## 2.5 Login as tutor

After login successfully, user will be bring to the system main page. In this page, it provides some brief explanation on what the system can do for you. Below is what was seen when user login as tutor.



Figure 2.4: Tutor Section Main Page

Module available to Tutor are Marks, Reminder, Course, Personal, Message and Logout.

## 2.6 Login as student

After login successfully, user will be bring to the system main page. In this page, it provides some brief explanation on what the system can do for you. Below is what was seen when user login as student.



Figure 2.5: Student Section Main Page

Modules available to student are Course, Personal, and Logout.

## 2.7 Record Viewing Module



Figure 2.6: Record Viewing Module

The administrator can find a user record in the SMMS database through this module by enter a user id that he want to find. If the administrator didn't enter a user id, all records in the tables will be displayed.
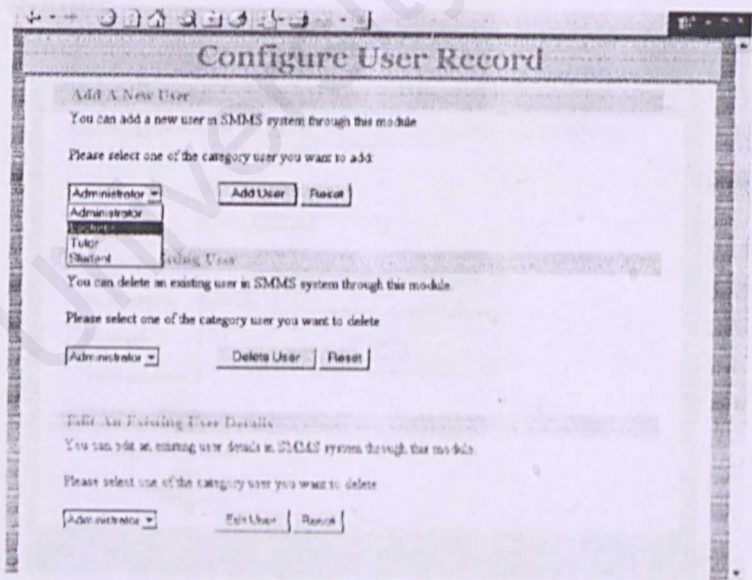
## 2.8 Users Management Module



Figure 2.7: User Management Module

The administrator can add, edit or delete the user id through this module. User have to select the user group in the combo box before perform the function.
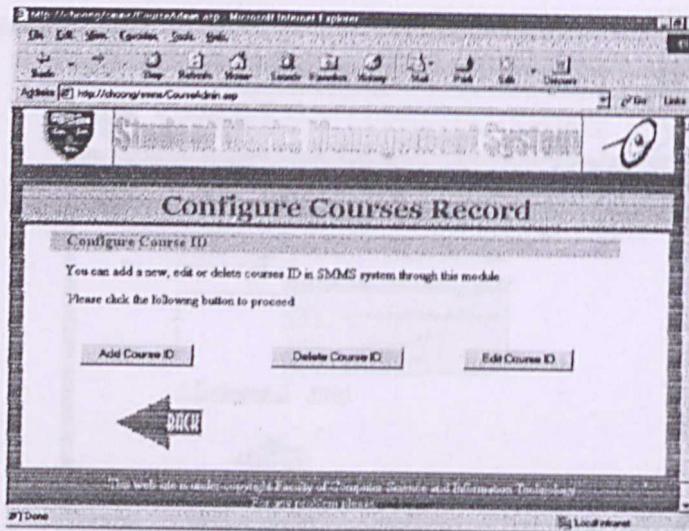
## 2.9 Courses Information Module



Figure 2.8: Courses Management Module

The administrator can add, edit or delete the course id through this module. User just only needs to click one of the following buttons to perform the function. User should enter both course id and course name to add course id into system. For edit and delete course id function, user have to select the course id from combo box that provided.
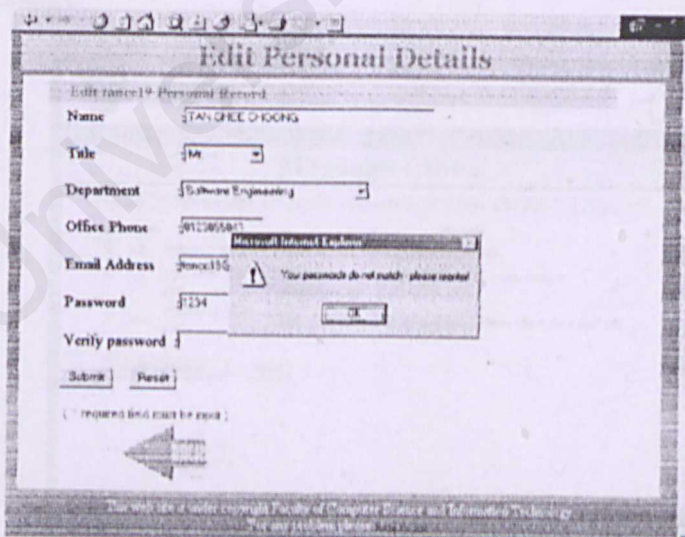
## 2.10 Personal Module



Figure 2.9: Personal Module

User can change any his personal details such as name, title, department, etc through this module. User have to fill up all the require fields and reenter the password before click the submit button. If not a error control message box will displayed at the screen just like figure 2.8.

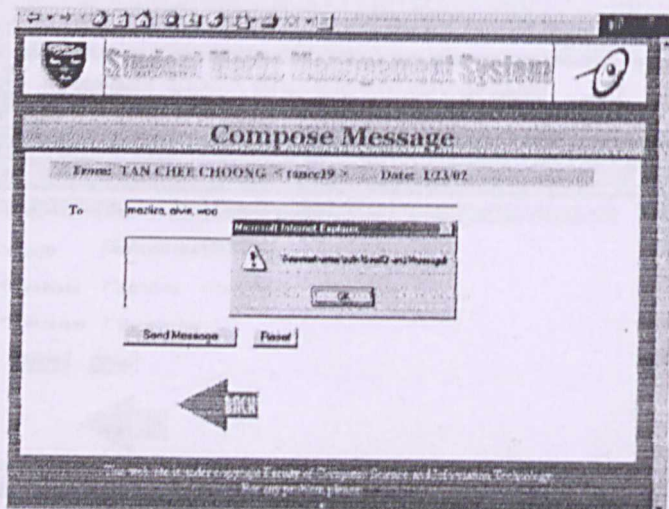## 2.11 Communication Module

- **Send Message**



Figure 2.10: Send Message Function

User can send message through this module by click the "Send Message" image button in the main page section. They have to input both user id and message content, if not the system will pop up a error control message to inform the user to do that. This message function allow user to send message to more than one user id.
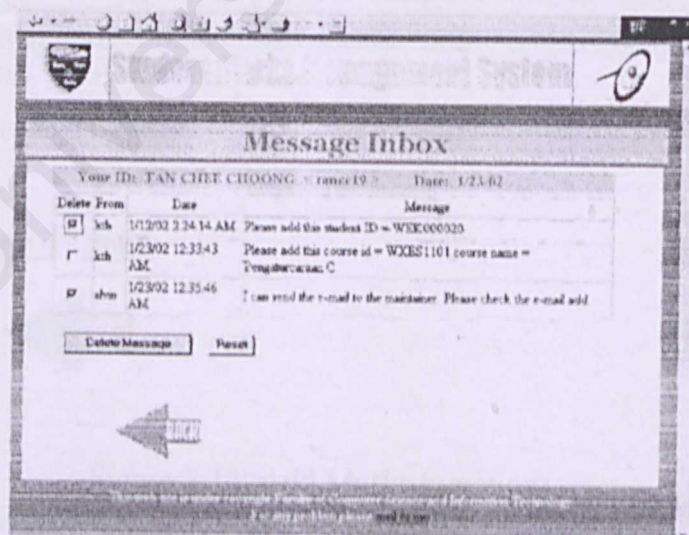
- **Inbox Message**



Figure 2.11: Inbox Message Function

User can check their message by click the "Inbox" image button in the main page section. The message content and the date are showing in a table format. User can delete those messages from their inbox by check the small check box beside the message and click the "Delete Message" button.
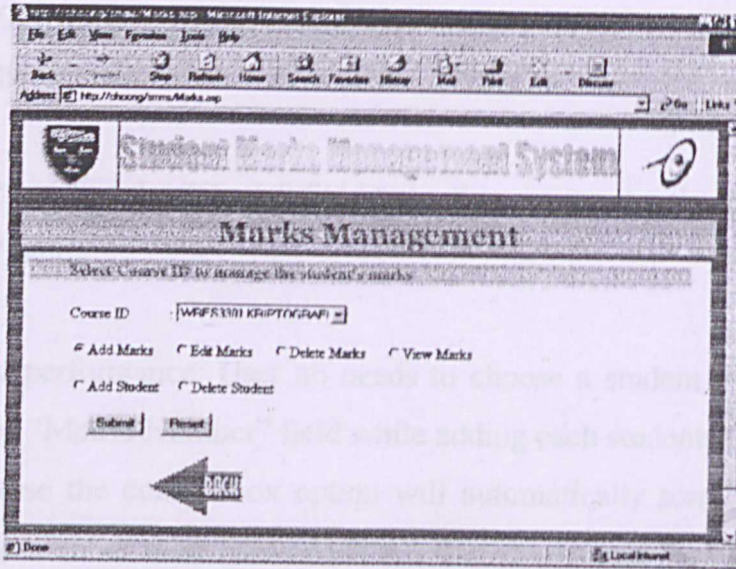
## 2.12 Marks Management Module



Figure 2.12: Marks Management Module

There are 6 options in this module. There are add marks, edit marks, delete marks, view marks, add student and delete student. User must select one of the options to perform that function.

• **Add Marks**



Figure 2.13: Add Marks Function

User must choose the "Marks Type" and "Session" before add students' marks to database system. "Marks" is a required field and must be fill up before send this page. Grade is an optional field. An error message box will pop up from the page if the user didn't fill up the "Marks" field.

If the "Marks Type" option is Attendance, user just only can enter either '1' = present or '0' = absent. If user enters other than '1' or '0', an error message box will display on the screen.

If user want to input the "Grade" field only, they must enter the dash character '-' in the "Marks" field.

Tips for fast performance: User no needs to choose a student metric number each time from the "Metric Number" field while adding each students' marks into system. This is because the combo box option will automatically scroll down to the next option/metric number after user added the first marks into system. The option will move around back to the first option and if the user had reentered the marks for the added student, a warning statement will display to the user.

- **Delete Marks**



Figure 2.14: Delete Marks Function

User can perform delete marks at through this page. System have prepared two options to perform the marks delete function, there are delete marks for a session of a marks type. For example user can delete all the 'Tutorial 1' or 'Tutorial 2' marks in WRES3301 by click the "Delete Marks" button. Another deletes marks function is delete marks according the marks type select by user. For example user can delete the entire 'Tutorial' marks in WRES3301 by click the "Delete All Marks" button. User must be careful while delete marks from the system, because this system didn't provide the undo function. After click the delete marks button, all the selected marks will be permanently deleted from the system.

- **Marks Viewing**

**WRES3301 KRIPTOGRAFI     Date: 1/23/02**

You can view any Marks Type or find the Student Matric Number related to the course through this module.

Select the Marks Type Number you want to view:          : ☐ Tutorial    ☐ Attendance

Select the student Metric Number to find:          : [                  ▼]

[ Find Record ]    [ Clear ]

Figure 2.15: Marks Viewing Function

User can view all the students' marks in a table format through the function provided in this page. The exist marks type for each course will automatically displayed as a check box in this page. What user needs to do is check the marks type box they want to view and click the "Find Record" button.

Tips for fast performance: User can find one of the student marks record by select the student metric number from combo box there. If the user didn't choose any metric number from the combo box, all the students' marks will be displayed.

- **Add Student**

| LEE CHEE CHENG | WEK990024 |
| GAN HONG FEE | WEK990040 |
| LOO CHEE KEONG | WEK990042 |
| LEE TUCK KHAI | WEK990045 |
| DAVID GAN CHYE ONG | WEK990068 |

Select the student Metric Number to add student:
(Hole down the "Ctrl" button to perform multiple selection)

```
WEK000005 ▲
WEK97097
WEK990059
WEK990061
WEK990072
WEK990077
WEK990084
WEK990086
WEK990131
WEK990173 ▼
```

[ Add Student ]    [ Clear ]

Figure 2.16: Add Student Function

Lecturers or tutors can add the student name list for a course by themselves through this function. All the faculty student metric number will display in the list box (Figure 2.15) and user can select multiple metric numbers by hold down the 'Ctrl' button while doing the selection. After user clicks the "Add Student" button, the updated name list will be display in the table format.
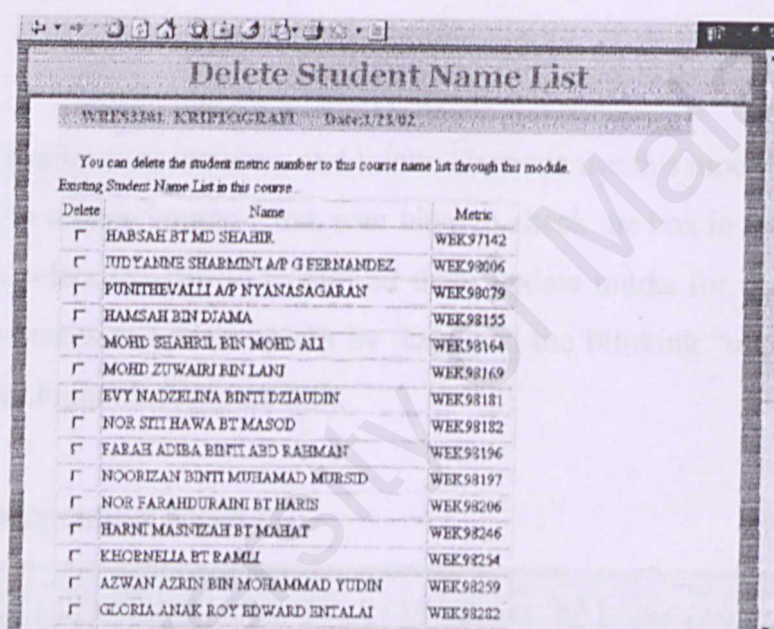
- **Delete Student**



Figure 2.17: Delete Student Function

User can use this function to delete or remove students name from the list. They just only have to check the small box beside each of the student name in the table and click the "Delete Student" button. The new or updated name list will be display after user clicks that button.

## 2.13 Reminder Module



Figure 2.18: Reminder Module

This module only available to lecturers and tutors. User can use this module to perform a reminder function to certain course. First, user have to check the box in left hand side of the table and then select the period to remind them update marks for that course. The system will remind users to update marks by displayed the blinking "update" image in the main page (refer Figure 2.3, Figure 2.2).

## 2.14 Course Management Module



Figure 2.19: Course Management Module for Lecturer Section

These modules are available to Lecturer, Tutor and Student section. For tutor and student section, user only can see "Add Course ID" and "Delete Course ID" button. Only lecturer section has the "Accessibility Setting" button.

- **Add Course**

**Add Course to your account**

Course ID    : | WRES3301 ▾ |        | Add Course |    | Reset |

Figure 2.20: Add Course Function

Lecturer, tutor and student can use this function to add course into their account. A combo box with course id is provided to let user select the course they want to add and then click the "Add Course" button to perform add the selected course.

- **Delete Course**

**Delete Course ID from your account**

Course ID    : | WRES3301 ▾ |        | Delete Course |    | Reset |

Figure 2.21: Delete Course Function

Lecturer, tutor and student can use this function to delete or remove course from their account. All the courses from their account will display in a combo box and users only have to select it and click the "Delete Course" button to delete that course.

- **Accessibility Setting**

**Accessibility Course Setting**

You can restrict the Tutor and Student accessibility to related course through this module. Please check the box to perform the restriction.

| / | Course | Accessibility | Setting |
|---|---|---|---|
| ☐ WRES3301 KRIPTOGRAFI | | ☑ Tutor | ☑ Student |
| ☐ WXES1101 PENGATURCARAAN C | | ☐ Tutor | ☐ Student |

| Change Setting |    | Clear |

Figure 2.22: Accessibility Setting Function

This function only provided to lecturer section. User can use this function to set or restrict the access for each course in their account. Example: if user checks the "Tutor" box, so this course id would not be available for tutor section.