DORAISAMY A/L RAMASAMY
WQT 000005

MOTOR FRANCHISE CLAIM SYSTEM (MFCS)

FACULTY OF SCIENCE COMPUTER AND INFORMATION TECHNOLOGY
2003 / 2004

SUPERVISOR: EN. ZAIDI RAZAK
MODERATOR: EN. NOOR ZAILY MOHD NOOR

TABLE OF CONTENT

ABSTRACT

The project that I undertake is called Motor Franchise Claim System (MFCS). The objective and scope of the project is widely explained in the chapter 1. This system is mainly designed for Malaysia Motor Franchise Holders to operate and monitor motor claims involving their workshops spread through nationwide. The MFCS is an online web based system. Hence, reasonable interactive features are expected to be used to make the system dynamic and attractive. The wide range of system requirements which includes the authoring tools, programming languages, scripting languages, web servers are widely discussed in Chapter 2. The rationale to design this system is that, at the present moments, Motor Franchise Holders does not have own a motor claims system. They are still practicing the manual file system which most organization looking for paperless environment. Furthermore, third parties that are benefiting in the expense on the Insurance Companies currently provide the existing claim system.

ACKNOWLEDGMENT

First and foremost, I extend my thanks to The Faculty of Science Computer and Information Technology (FSCIT) of University Malaya for giving a change to further develop my tertiary educational qualification here, which was my dream that I failed to, achieve during my schools days.

This acknowledgment would not complete without thanking the most important person of the course WXES 3182, En. Zaidi Razak. In short period of time, about two months preparations time for the paper works, En. Zaidi had given me the most valuable ideas and guidance throughout the course. I would rather say he is best teaching-friend for me. He has been a great supervisor for me by placing confidence in me to complete the project. Thanks a lot En. Zaidi. In this opportunity, I would like to thanks En. Noor Zaily was being my moderator. He was the indirect man who provided me with guidance and support. His moderation was well-deserved one for me to improve my system development.

My heart felt thanks to all individuals who were with me and guiding, assisting and motivating me during the times of despair. Thank you friends. In the other end, my course mates had been there anytime to answer phone calls and guiding me the necessary. They even sacrificed their valuable time to share my problems. Thank you so much guys.

Finally, my thanks to my family members who were so understood to my pressuring situation and giving me less trouble at home. Also my hometown friends whom despite sacrificing my self for their outing, managed to ask for the project progresses and development.

List of Figures

List of Tables

1.1 Overview

There are many database systems currently available in the market. From a simple stock inventory system to huge financial system, it's all typically depends on a common backbone called Database. To simply describe a database, it is a place to store all the related information of an organization. A completely reliable and dependable database system is so much essential for an organization to meet its departmental goal, which is a stepping-stone for overall organizational goal.

The information is accessible by all those who have been authorized to do so by the organization.

Motor Franchise Claim System (MFCS) is the title proposed for this thesis. This system is a specially designed infrastructure for a Motor Franchise Holder to deal with their own vehicle accident related Insurance claims. This system is accommodating for three parties namely, Administrator, Franchise Head Office (HQ) and Workshop.

This system could allow the Franchise Head Office to monitor all claim done by their workshops nationwide. Workshop and HQ are allowed to create their own records and also sharing, transact some of the information among them online.

In developing the database system for the MFCS, the following was given due consideration based on the notations above:

- ✓ The availability of resources in particular, those information about Motor Claims are secured
- ✓ Legal restrictions in sharing certain information with various organizations
- ✓ Cost-effectiveness, for an on-line systems required minimum monetary fund and over head to have the system run on each parties computer
- ✓ User friendliness, so as to generate a happy working environment to the users

1.2 Objective

The system MFCS is carries some of the objective as listed below:

1.2.1 Streamlining Collision-repair

Focusing in streamlining collision-repair for the franchise holder through Motor Franchise Claims System (MFCS).

1.2.2 Central Monitoring

Motor Franchisees are able to monitor their branch's activities with regards to motor accident claims in certain areas of the claim processes.

1.2.3 Information sharing

Information is very essential for an organization to maintain competitiveness in the market. This system once developed would lead to information sharing among the Franchise Head office and Workshops.

1.2.4 Reducing turnaround time

Turnaround time in completing a claim process would be reduced with capability of the system to be view online.

1.2.5 Locating Claims Records

The database allows as much as information to be stored and they are also retrievable as and when required.

1.2.6 Providing a cost effective database solution in motor claims

MFCS is very much cost effective that as it uses the web ASP based platform. The user only needs to have Internet Explorer and no additional software to be installed onto their machine.

1.2.7 Basic recording of Information

The MFCS system capable of storing very basic but utmost useful information required for a Franchise holder to monitor their accident claims.

1.2.8 Avoiding Third Parties Involvement

The proposed system will be able to eliminate the third parties involvement so called being central party in proving database for handling motor claim, which is currently practiced in the market.

1.2.9 Improving Customer Satisfaction

As service plays vital role in customer satisfaction, MFCS will be able to improve customer satisfaction by providing faster repair to their vehicle.

1.2.10 Management Reporting

System able to produce required report and able to customize franchise holder 's future requirements.

1.3 Project Scope

The MFCS is scoped among three different users; Administrator, Head Office of Franchise (HQ) and Workshops.

However, there are certain limitations to the scope of the project. In view of the existence many Insurance Company in the Industry, we are focusing into one of the companies, i.e. Mayban General Assurance Bhd (MGAB). As for the Workshop, two different workshops are maintained.

For the system development purpose, only Perodua Models of vehicles are taken into consideration. However, the system is always capable to accommodate other make of vehicles.

All these three entities would be accommodated with their own modules as follows: -

1.3.1 Administrator

System Administrator will be the main person designated to administrate the system. The administrator controls the following functions: -

- User Registration
- Assign Access Module
- Change Password

1.3.2 Head Office

Head office is the central coordinator between the workshops and the Insurance companies to deal with accident claims. The following functions are available in this module: -

- Claim Register
- Update Approval from Insurer
- Update Payment
- Reports

Head office is able to print designated reports from the system.

1.3.3 Workshop

Workshop is the place where all the technical inspection of a damage vehicle carried out. In this module, the following functions are available:-

- Prepare Estimation of Repair
- Generating Invoicing
- Reports

Workshop is able to print designated reports from the system.

1.4 Project Schedule

To make certain that this project is completed on time, a project schedule was done. The various stages involved during the project duration are as stated below: -

Stages/ Phase	Duration (Weeks)
Planning	1
Literature Review	4
Analysis	4
Design	4
Implementation	16
Testing	4
Documentation	32

Table 1.1: Phase Duration Schedule.

A Gantt chart is shown to describe in detail the project milestone. The chart is shown below.

Task Name	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Planning								
Literature Review								
Analysis								
Design								
Implementation								
Testing								
Documentation								

Table 1.2: Gantt chart for the Project Milestone

1.5 Expected outcome of the system

Upon completion of the system, it is expected the following would be established: -

- The realization of the project as a whole: a fully implemented running MFCS.
- The system could be able to acquired minimum requirement to store and retrieve claims cases handled by workshops for the management reporting purposes.
- The MFCS is expected to eliminate the file system currently practiced by the Motor Franchise Holders in Malaysia.

1.6 Conclusion

This chapter is providing the overview of the entire proposed Motor Franchise Claim System and it's objectives. Chapter also explains the expectation from the system.

2.1 Introduction

Throughout the MFCS development, research on various aspects of common system, its advantages and disadvantages was conducted. This preliminary study is important in identifying the issues so that a competitive system could be produced.

2.2 Case Study on Similar System in Malaysian Insurance Industry

A deep study was conducted into two similar systems currently available in the market. They are: -

2.2.1 Merimen On-line (Merimen)

2.2.2 Genesis Total Solution (GTS)

In general, Persatuan Insurans Am Malaysia (PIAM) very recently implements these two systems into the Insurance industry with the consensus on the Insurance regulatory body in the Bank Negara Malaysia. The basic idea when these two systems were introduced was that, to provide the Insurance Industry with a central database for the Insurance Companies and the professional Loss Adjusters to obtain the parts prices from a single source called Motordata Research Consortium Sdn Bhd (MRC). MRC is a company whom provides an access to the central database for the spare parts.

The following are the some of the pros and contras of these three parties.

2.2.1 Merimen Online [1]

Merimen On-line is a web based Motor Claim Estimating system originated in Malaysia introduced to the Industry in the year 2001 by PIAM. Its business goal is to streamline collision-repair value chain. Ultimately will lower the cost of auto parts, which is a major component in motor claim. Merimen is using Internet Explorer as the platform to run the infrastructure. Merimen On Line can do most the required function by Insurance Company and workshops.

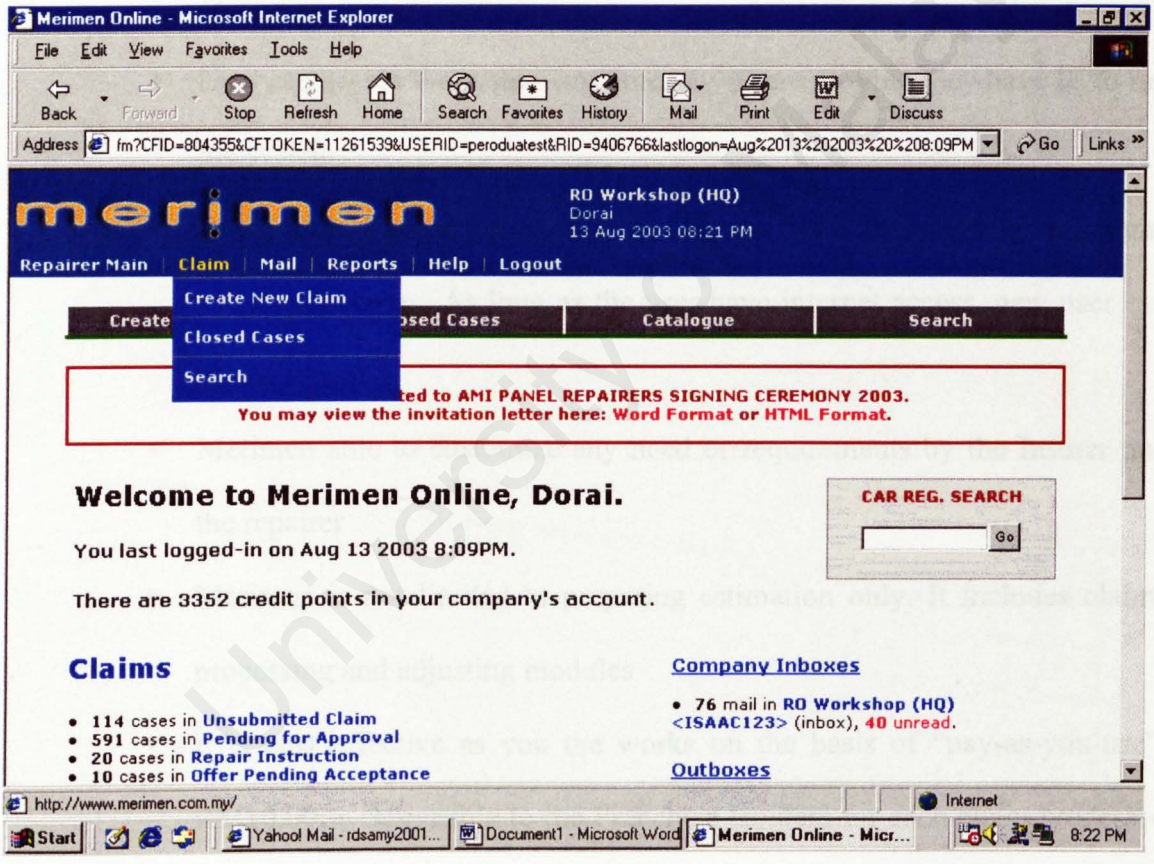


Figure 2.1: Merimen-On-Line Main Screen

2.2.1.1 Advantages of Merimen-On-Line

There are some advantages in using Merimen-On-Line to prepare Insurance Claims. Among them: -

- Easy access to the system. User just need have Internet Explorer (IE) which comes free with every PC running Windows Operating Systems
- No installation fees for the software as Merimen-On-Line is a Internet based systems
- No maintenance fees required as there is software to be installed to the computer
- User can access the system anytime, anywhere proving they have IE to run the system
- Scalability: Can accommodate more users without incurring additional software licenses. As long as the user have internet access, new user can use Merimen
- Merimen able to customize any need or requirements by the Insurer and the repairer
- Merimen is not limited to preparing estimation only. It includes claims processing and adjusting modules
- It is cost effective as you the works on the basis of "pay-as-you-use". RM10.00 is chargeable to the Franchise Holders for each claim processed through Merimen.

- Merimen provides a complete claim processing solution ranging from preparing estimation, adjuster inspection, approval and printing Discharge Vouchers

2.2.1.2 Disadvantages of Merimen-on-Line

Even thought Merimen-on-Line very impressive in terms of monetary for setting up the links, it cannot avoid from several disadvantages, among them: -

- The performance is considerably slow especially in the peak hours due to its web based platform
- Merimen depends on the common centralized database to share the parts pricing. It does not have a independent store for the parts price
- Data transmitted through Merimen in not secured as anyone can easily access to the website
- In bigger volume of claims, Merimen seems to be not economical as you have pay for each case transmitted through. This is especially for the Insurance Company point of view
- There is high possibility for the pay-as-you-use charges be increased in time of inflation

2.2.2 Genesis Total Solution (GTS) [2]

GTS is a Motor Claim Estimation system developed by Concorde Informatics Ltd. United Kingdom. GTS was introduced to Malaysia in the year 1999. GTS is generated

using Thacham labor charges computable system, which is widely used in the UK. GTS is client-based system, which the software must be installed in a desktop environment computer.

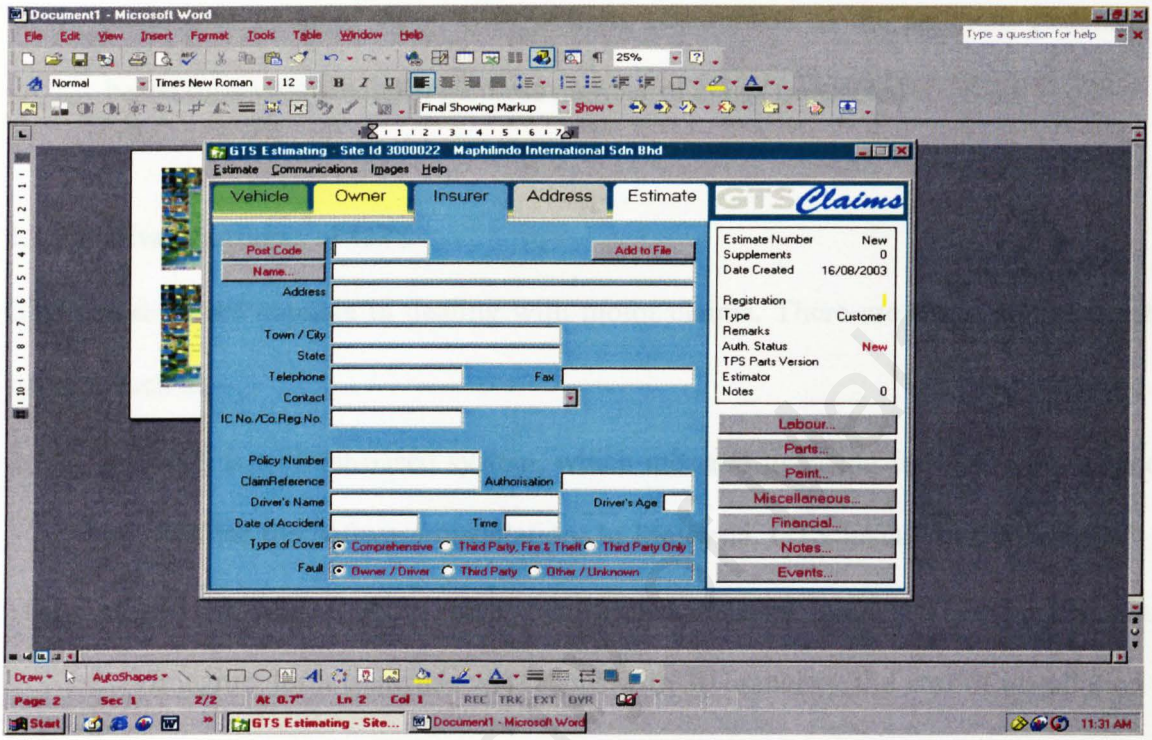


Figure 2.2: Genesis Total Solution Screen (GTS)

2.2.1.1 Advantages of GTS system

- GTS had fast response time compared to web based system due to its client based architecture
- The annual cost for using the system is capped irrespective of the number of repair estimates processed

- The information transmitted through GTS is secured as only the computer installed with the GTS system could have an access to it
- The spare parts prices are uploaded into the hard disk of a computer and accessible through GTS
- In Insurer point of view, GTS is more economical as the payment structure is based on a yearly basis regardless number of claim transacted

2.2.2.2 Disadvantages of GTS

GTS too does not capable in dealing with motor claims. There are some contras to the system, such as: -

- GTS is a client-based system, which incurred licensing fees and maintenance fees for the software installation. In Malaysia, GTS installation for one PC is RM13, 888.00 with yearly maintenance fees of RM4, 180.00 per PC. Just imagine, for a franchise workshops with 30 branches, the cost of installation it self is RM416, 400.00 and the maintenance fees is RM125, 400.00 per year
- As the parts prices are stored in the hard disc of the individual computer, changes in parts prices must be done separately into the individual computer. It's very difficult to say all the computer having the same parts price list at once
- GTS is limited to preparing the claims estimation only. No further claim processes can be done using GTS

- Very tidies to prepare the estimates of repair as GTS has 6 screens just for prepare estimation of repair
- Also maintaining non-franchise parts prices in the system which would effect genuine parts sales for the franchise holders

Table below shows the brief comparison of the Merimen and GTS system.

System Comparison (Technology)	Mermen-On-Line	GTS
Client Platform	Using Internet Explorer (IE) which is comes free with every PC running Win95/Win98/WinNT	Must installed GTS software in the PC
Access Method	Using Internet Explorer	Must dial in to dedicated GTS server. Potential high phone charges if access outstation branches
Application Architecture	Web-based application. Designated for now and the future. Open architecture allows future expansion	Client server application. Still relying on outdated technology. Closed system.
Multi user Access	Multiple users can have access to Merimen-On-Line concurrently through their web browsers with multiple security access level (Branch, Department)	Only one user can have access to the system on the PC with GTS installed
Maintenance	No maintenance needed since no software deployed on the PC	Must provide maintenance since proprietary sofrware is installed on the machine
Monitoring	Head Office can monitor branches office activities in real time	Not available in GTS
User friendliness	Uses 3 screens for Insurer modules and 3 screens for adjuster modules	6 screens just for estimating only

Table 2.1: Comparison between Merimen-On-Line and GTS

2.3 The issue against Motordata Research Consortium (MRC)

Motordata Research Consortium (MRC) is a Malaysia company, designated by Bank Negara Malaysia to act as the central database for the automobile spare parts prices for all Motor Franchise Holders in Malaysia. This inclusive of Edaran Otomobil Nasional Bhd, Perusahaan Otomobil Kedua Sdn Bhd (PERODUA), Cycle & Carriages, Ford Concessionaires, Tan Chong Motors. Etc.

It has been regulated by Bank Negara Malaysia that all Insurance Company and professional Loss Adjusting companies in Malaysia must have 100% of their claims transmitted through MRC. MRC is basically obtaining the spare parts prices from Franchise holders in Malaysia and upload them into their database. Their entire processes of obtaining the parts prices are accommodated free of charge by the franchise holders.

However, MRC has been granted to be a "Toll Collector" among Insurers and Loss Adjusters to use their database to cross check the parts prices. In this manner, MRS is charging RM6.00 for from the adjusting company and RM20.00 from Insurance Company for each case transmitted through MRC. Basically, MRC is benefiting from the scenario in the expense of the franchise holders.

2.4 How could the Motor Franchise Claim System (MFCS) Improve the Current Problem?

MFCS is expected to overcome some of the issues between MRC, GTS and Merimen. Franchise holders are independent in having their vehicles repaired at their own designated workshops. In consideration of the above issues, MFCS is expected to perform the following: -

- Franchise Holder could maintenance their our database for the spare parts prices without supplying them to a third party
- In case of pay-as-use-use system, Franchise Holders should be able to avoid paying RM10.00 to any claims system providers, i.e. Merimen or GTS.
- Over come the non-franchise parts issues in the central database
- Franchise holders can collectively maintain and monitor claims involving their own make of vehicles

In concluding the issues among Mermen, GTS and MRC, I would rather say that these three parties are "purposely Invented" into the Insurance Industry for someone's personal interest. As the Asian Free Trade Area AFTA) is about to take effect by the year 2005 for the motor industry, Malaysian motor Industry is facing it's bad time to compete with foreign car manufacturers. The only way they could stay competitive in the market is by reducing overhead, in form of petty-petty things.

The invention of MFCS is expected to over come some of the issue discussed above and provide a better motor claim solution for the hard fought Malaysian Motor Franchise Holders.

2.5 Introduction to System Development Tools

The main task in this section is to identify suitable programming techniques and languages to develop the system. Vast array of web development tools show that there are many approaches in building a successful web application for deployment or the Internet.

Analysis was done to choose the most suitable programming techniques and languages. Consideration on the availability of the related development tools was also an important factor. The ideal solution for a web-based system is that easy to build, deploy and also possesses the scalability of traditional client-server system. A good Internet application should allow for easy integration with the latest emerging technology.

2.5.1 Scripting Languages

In the planning stage of the MFCS, several scripting languages have been considered. Research was done to identify the suitableness of all possible scripting languages available.

2.5.1.1 Visual Basic Scripting Language (VBScript) [3]

VBScript is the newest member of the Visual Basic family of programming languages, bring active scripting to a wide variety of environment, including web client scripting in Microsoft Internet Explorer version 3.0 and web server scripting in Microsoft Internet Information Server 3.0 (IIS). It is the default scripting languages of ASP.

VB acts as both client-side and server-side programming languages. A client-side programming language is a language that can be interpreted and executed by a browser. On the other hand, a server-side programming language is a language that executes on the server a web site's files.

The advantage of client-side programming language is that browsers do all the work. This places fewer burdens on the server. However, currently the only browser that can understand VBScripts as a client-side language is Microsoft Internet Explorer. The advantages of using VB, as a server-side programming language is that the scripts work regardless of the browser being used.

VBScripts enables author to create scripts using a subset of the Microsoft VB language. It does not include functionality that directly accesses the clients' machine's Operating System or file system. So, it is safe for the World Wide Web (WWW). VB is implemented as a fast, portable interpreter for use in web browsers and applications that use ActiveX Controls, Java applets and OLE Automation Servers.

2.5.1.2 Java Scripting Language [4]

Java is used to create executable content that can be distributed through networks. Used generically, the name Java refers to a set of software tools creating and implementing executable content using Java programming language. Java applet is an application designed to be transmitted over the Internet and dynamically downloaded across the network, just like an image, sound file or video clip. It executes under control of the Java Interpreter in the computer running the browser. With multiple version of Windows, UNIX and the Macintosh Operating Systems, it is becoming increasingly difficult to write software that will run all systems. However, with Java, the application will run on all system, providing the Java Interpreter is available.

2.5.1.3 Active Server Pages (ASP) [5]

Microsoft's Active Saver Pages is a server-side scripting environment, which can be used to create and run dynamic interactive, high-performance web server application. ASP is free and already built into Windows 2000. It is also free for Windows NT4 or Windows95/98 when the NT4 option pack is installed.

The code inside ASP is mixed-in with standard HTML and will not seen by the browser unless the person making the page uses HTML or browser commands out side of the ASP portions.

An ASP is an HTML page that includes one or more scripts (small-embedded programs) that are 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.

ASPs are server-generated pages, which call other programs to do things like access database, serve different pages to different browsers etc. basically it could do anything CGI is capable of doing. 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.

ASP is almost as efficient as writing code directly to the server's application program interface and it is a lot more efficient than CGI because it runs as a service and can take advantages of multi-threaded architecture. According to the Microsoft site, ASP is an open, compile-free application environment in which programmers can combine HTML, scripts and reusable ActiveX server components to create dynamic and powerful web

based business solution. ASP enables server-side scripting for Internet Information Server (IIS) with native support for both VBScript and Java Script.

ASP has evolved into an "Open technology framework" meaning that it is not necessary to use Microsoft products to create code in it Nowadays, developers can create ASP pages using whatever language they want. ASP can also take advantage of COM and DCOM (Component Objective Model and Distributes Component Object Model) objects with minimum effort.

With ASP, the code can be simply written in an HTML page. The HTML tags can be coded side by side. No compiling and no complex interfacing is needed. ASP has made it much quicker and easier to create highly interactive websites. It also makes web pages easer to maintain and update in the future.

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. A person 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. Then, name the HTML file with ".asp" file suffix. The biggest problem with ASP is that it is not a complete Web application development platform by itself.

2.5.1.4 Personal Home Page (PHP)

PHP is mainly focused on server-side scripting, so you can do anything any other CGI program can do, such as collect form data, generate dynamic page content, or send and receive cookies. But PHP can do much more. There are three main fields where PHP scripts are used.

- Server-side scripting. This is the most traditional and main target field for PHP. You need three things to make this work. The PHP parser (CGI or server module), a web server and a web browser. You need to run the web server, with a connected PHP installation. You can access the PHP program output with a web browser, viewing the PHP page through the server.
- Command line scripting. You can make a PHP script to run it without any server or browser. You only need the PHP parser to use it this way. This type of usage is ideal for scripts regularly executed using croon (on *nix or Linux) or Task Scheduler (on Windows). These scripts can also be used for simple text processing tasks. Writing client-side GUI applications. PHP is probably not the very best language to write windowing applications, but if you know PHP very well, and would like to use some advanced PHP features in your client-side applications you can also use PHP-GTK to write such programs. You also have the ability to write cross-platform applications this way. PHP-GTK is an extension to PHP, not available in the main distribution.

- PHP can be used on all major operating systems, including Linux, many Unix variants (including HP-UX, Solaris and OpenBSD), Microsoft Windows, Mac OS X, RISC OS, and probably others. PHP has also support for most of the web servers today. This includes Apache, Microsoft Internet Information Server,
- Personal Web Server, Netscape and iPlanet servers, Oreilly Website Pro server, Caudium, Xitami, OmniHTTPd, and many others. For the majority of the servers PHP have a module, for the others supporting the CGI standard, PHP can work as a CGI processor.

So with PHP, you have the freedom of choosing an operating system and a web server. Furthermore, you also have the choice of using procedural programming or object oriented programming, or a mixture of them. Although not every standard OOP feature is realized in the current version of PHP, many code libraries and large applications (including the PEAR library) are written only using OOP code.

With PHP you are not limited to output HTML. PHP's abilities include outputting images; PDF files and even Flash movies (using libswf and Ming) generated on the fly. You can also output easily any text, such as XHTML and any other XML file. PHP can auto generate these files, and save them in the file system, instead of printing it out, forming a server-side cache for your dynamic content.

One of the strongest and most significant features in PHP is its support for a wide range of databases. Writing a database-enabled web page is incredibly simple. The following databases are currently supported:

Adabas D	Ingres	Oracle (OCI7 and OCI8)
dBase	InterBase	Ovrimos
Empress	FrontBase	PostgreSQL
FilePro (read-only)	MSQL	Solid
Hyperwave	Direct MS-SQL	Sybase
IBM DB2	MySQL	Velocis
Informix	ODBC	Unix dbm

We also have a DBX database abstraction extension allowing you to transparently use any database supported by that extension. Additionally PHP supports ODBC, the Open Database Connection standard, so you can connect to any other database supporting this world standard.

PHP also has support for talking to other services using protocols such as LDAP, IMAP, SNMP, NNTP, POP3, HTTP, COM (on Windows) and countless others. You can also open raw network sockets and interact using any other protocol. PHP has support for the WDDX complex data exchange between virtually all Web programming languages. Talking about interconnection, PHP has support for instantiation of Java objects and using them transparently as PHP objects. You can also use our CORBA extension to access remote objects.

PHP has extremely useful text processing features, from the POSIX Extended or Perl regular expressions to parsing XML documents. For parsing and accessing XML documents, we support the SAX and DOM standards. You can use our XSLT extension to transform XML documents.

While using PHP in the ecommerce field, you'll find the Cyber cash payment, CyberMUT, VeriSign Payflow Pro and CCVS functions useful for your online payment programs.

2.5.1.5 ActiveX

ActiveX is not exactly a scripting language but rather a technology used by developers to write software components that interoperate, regardless of the language to create them. For example, ActiveX applications can be written using C++, Java, Visual Basic and Delphi. The real power of ActiveX comes from its consistent, comprehensive implementation. This means that with the same component based approach, developer can:

- Script objects inside a HTML page.
- Assemble interfaces for Windows Applications.
- Communicate between client and server components.
- Script business rules or web server applications.
- Coordinate transactions across multiple servers.

2.4.1.6 Macromedia Dreamweaver 4.0 [6]

Macromedia Dreamweaver is one of the most popular **WYSIWYG** editors. Dreamweaver enables you to create a web site with little html knowledge, but allows you to edit the source code. Additional features of Dreamweaver include templates to make global changes easily and quickly and JavaScript behaviors, to enable you to create rollover graphics without needing to know how to code scripts.

Why use dreamweaver?

- Templates allow you to easily update the style of the whole site
- Different templates can be applied to different areas of the web site to ensure consistency within sections (color, style etc)
- The templates ensure that some areas (such as the top navigation) which don't need to change can't be edited accidentally
- The templates can contain all the information needed for the page (which style sheet is attached, which side navigation is used etc)
- For large web sites, where several people work on the pages, content owners can edit pages without danger of someone writing over a page they're working on

Dreamweaver shows everybody which users have which files checked out the main benefit to using Dreamweaver is that you can manage your site easily. For example, if you change the name of a folder or file, Dreamweaver scans the site to update any links to the re-named file.

2.6 Operating Systems (OS)

An operating system (OS) is the program that, after being initially loaded into the computer by a boot program, manages all the other programs or applications in a computer. The application programs make use of the operating system by making requests for services through a defined application program interface (API). In addition, users can interact directly with the operating system through a user interface such as a command language or a graphical user interface (GUI).

An operating system performs these services for applications:

- In a multitasking operating system where multiple programs can be running at the same time, the operating system determines which applications should run in what order and how much time should be allowed for each application before giving another application a turn,
- It manages the sharing of internal memory among multiple applications,
- It handles input and output to and from attached hardware devices, such as hard disks, printers, and dial-up ports
- It sends messages to each application or interactive user or to a system operator about the status of operation and any errors that may have occurred,
- It can offload the management of what are called *batch* jobs so that the initiating application is freed from this work,

- On computers that can provide parallel processing, an operating system can manage how to divide the program so that it runs on more than one processor at a time.

2.6.1 Windows NT 4.0

Microsoft Windows NT 4.0 is a multipurpose server operating system. A multipurpose operating system integrates a variety of network services. The services it provides are designed to address customer requirements and are managed in a single way.

Windows NT is the operating system designed for users mainly from businesses and corporations that need advanced and a stable operating system. Windows NT comprise of two components, which are Microsoft NT Workstation and Microsoft NT Server. The NT Workstation is designed for users, especially business users who need fast performance and a system more fail-safe that Windows 95 and Windows 98. The NT Server is designed for the business machines that need to provide services for LAN attached computer.

The server is required together with an Internet Server such as Microsoft Internet Information Server (IIS) or a Windows system that plans to server web pages.

According to Microsoft, two computers having the same amount of Random Access Memory (RAM) will have different performance levels depending on whether the Windows 95/98/ME or Windows NT Workstation operating system was used. Microsoft

reckons that 32-bit applications will run 20 percent faster on the NT Workstation compared to Windows 95. The Workstation has the same desktop user interface as Windows 95 but provide many more security and management features.

2.6.2 Microsoft Windows 2000

Microsoft Windows 2000 is a commercial version of Microsoft's evolving Windows operating system. Previously called Windows NT 5.0, Microsoft emphasizes that Windows 2000 is evolutionary and "Built on NT Technology". Windows 2000 is designed to appeal to small business and professional users as well as to the more technical and larger business market for which the NT was designed. Windows 2000 is reported to be more stable (less apt to crash) than Windows 98/NT systems. A significant new feature is Microsoft's Active Directory, which, among other capabilities, enables a company to set up virtual private networks, to encrypt data locally or on the network, and to give users access to shared files in a consistent way from any network computer.

2.6.3 Microsoft Windows 2000 Professional

Aimed at individuals and businesses of all sizes. It includes security and mobile use enhancements. It's also design to run high-end programs or mission critical application

and come with additional packages such as network monitoring tool, TCP/IP server services, and Internet Information Server (IIS).

2.6.4 Linux

Linux is an UNIX like operating system that was designed to provide personal computer users a free or very low-cost operating system comparable to traditional and usually more expensive UNIX systems. Linux has a reputation as a very efficient and fast-performing system. Torvalds at the University of Helsinki in Finland developed the Linux's Kernel (the central part of the operating system).

Linux is a remarkably complete operating system, including a graphical user interface, an X Window System, TCP/IP, the Emacs editor, and other components usually found in a comprehensive UNIX system. Although various creators of Linux's components hold copyrights, Linux is distributed using the Free Software Foundation's copy left stipulations that mean any modified version that is redistributed must in turn be freely available.

Unlike Windows and other proprietary systems, Linux is publicly open and extendible by contributors. Linux is sometimes suggested as a possible publicly developed alternative to the desktop predominance of Microsoft Windows. Although Linux is popular among users already familiar with UNIX, it remains far behind Windows in numbers of users.

2.7 Web Servers

A Web server is a program that, using the client/server model and the World Wide Web's Hypertext Transfer Protocol (HTTP). It serves the files that form Web pages to Web users, but to make this happen users' computers must contain HTTP clients that forward their requests. Every computer on the Internet that contains a Web site must have a Web server program. Two leading Web servers are Apache, the most widely installed Web server, and Microsoft's Internet Information Server (IIS). Other Web servers include Novell's Web Server for users of its NetWare operating system and IBM's family of Lotus Domino servers, primarily for IBM's OS/390 and AS/400 customers.

Web servers often come as part of a larger package of Internet; and intranet related program for serving e-mail, downloading requests for File Transfer Protocol (FTP) files, and building and publishing Web pages. Considerations in choosing a Web server include how well it works with the operating system and other servers, its ability to handle server-side programming, security characteristics, and publishing, search engine, and site building tools that may come with it.

2.7.1 Apache Server

Apache is a freely available Web server that is distributed under an "open source" license. Version 2.0 runs on most UNIX based operating systems such as Linux, Solaris, Digital UNIX, and AIX, on other UNIX/POSIX-derived systems such as Rhapsody, BeOS, and BS2000/OSD, on AmigaOS, and on Windows 2000. According to the Netcraft Web server survey in February 2001, 60% of all Web sites on the Internet are using Apache

(62% including Apache derivatives), making Apache more widely used than all other Web servers.

Apache complies with the newest level of the Hypertext Transport Protocol, HTTP 1.1. Free support is provided through a bug reporting system and several Usenet newsgroups. Several companies offer priced support.

2.7.2 Internet Information Server (IIS)

IIS or Internet Information Server is a group of Internet servers with additional capabilities for Microsoft's Windows NT and Windows 2000 Server operating systems.

IIS is Microsoft's entry to compete in the Internet server market such as Apache, Sun Microsystems, O'Reilly, and others. With IIS, Microsoft includes a set of programs for building and administering web sites, a search engine, and support for writing web based applications that access databases. Microsoft points out that IIS is tightly integrated with the Windows NT and 2000 Servers in a number of ways, resulting in faster web page serving.

A typical company that buys IIS can create pages for Web sites using Microsoft's Front Page product. Web developers can use Microsoft's Active Server Page (ASP) technology, which means that applications can be imbedded in Web pages that modify the content sent back to users. Developers can also write programs that filter requests and get the correct Web pages for different users by using Microsoft's Internet Server Application Program Interface (ISAPI) interface. ASPs and ISAPI programs run more

efficiently than common gateway interface (CGI) and server-side include (SSI) programs, two current technologies.

Microsoft includes special capabilities for server administrators designed to appeal to Internet service providers (ISPs). It includes a single window from which all services and users can be administered. It's designed to be easy to add components as snap-ins that you didn't initially install. Individual customers can customize the administrative windows for access. However, Microsoft has been criticized for IIS's susceptibility to computer virus attacks such as Code Red and Nimda.

2.7.3 Windows NT Server 4.0

Microsoft Windows NT Server 4.0 is now a better choice than ever. With the new features introduced with the Windows NT 4.0 Option Pack, Windows NT Server is the most complete platform available for building and hosting Web-based applications, and the easiest server operating system available. User will be up and running less than an hour after user takes it out of the box. Its so flexible and compatible user will realize significantly reduced hardware and software costs. User will experience far less downtime thanks to its reliability and easy management.

Following are the Windows NT benefits

- Windows NT Server 4.0 was designed to help developers build and deploy business applications faster than ever before. The Option Pack integrates new

Web, transaction, scripting, component, and message queuing services directly into Windows NT Server 4.0.

- New management tools in Windows NT Server 4.0 and the Option Pack help you set up Web sites, manage content, and analyze usage patterns to improve your site as it evolves.
- Multiple Web sites on a single machine, innovative Web publishing features, customizable tools, and new wizard technologies make Windows NT Server 4.0 the best platform to publish and share information securely over corporate intranets and the Internet.

2.7.4 Netscape Enterprise Server

Netscape Enterprise makes Web development easy. Its excellent content management features can put managing and publishing power in the hands of your users, an unrivaled and forward-thinking feature. Netscape Enterprise combines innovative features and performance meets most users' needs. The most significant features with Netscape's are in workgroup-based content management, Lightweight Directory Access Protocol (LDAP) integration, hardware-based SSL support, and Java servlets. Netscape Enterprise runs on many platforms, including NetWare, five flavors of Unix, and Windows NT. We tested under Windows NT but also did performance testing under Solaris. (We review Novell Netscape Enterprise Server Pro for NetWare separately.)

Netscape Enterprise provides an excellent foundation, offering more programming flexibility than any other server. For application creation, Netscape Enterprise provides several routes for the developer in addition to standard CGI. For higher performance than CGI offers, the Netscape Server API (NSAPI) lets developers write in-process server applications. For Java developers, Netscape Enterprise supports the Sun Java Servlet API for server-based applications.

Netscape Enterprise also comes with the LiveWire runtime environment, which lets applications written using server-side JavaScript tools (such as Netscape's Visual JavaScript) run on the server. LiveWire is a scripting environment--similar to Microsoft's Active Server Pages--that lets developers create simple Web applications using JavaScript, which is easier to learn than Java or C++. LiveWire combines JavaScript scripting with a number of pre-built server objects that automate tasks such as session maintenance, parsing CGI environment variables, and application initialization. LiveWire also provides native connectivity to many databases, including Informix, Oracle, and Sybase, along with ODBC access to other sources.

Most who have large user lists will bypass Server Manager and use the much more useful LDAP capabilities in Netscape Directory Server. Using this bundled product, administrators create LDAP Data Interchange Format (LDIF) files to add large numbers of users and groups. For the Webmaster, Netscape Enterprise's content management features can put a lot of power in users' hands, making the product a good choice for intranet environments.

2.7.5 Personal Web Server (PWS)

Microsoft Personal Web Server (PWS) for Windows 95 turns any Windows 95 computer into a Web server and enables easy publication of personal Web pages. Easy to install and administer, PWS simplifies sharing information on their corporate Intranets or Internet for all users. PWS is ideal for developing, testing and staging Web applications, as well as peer-to-peer publishing with its support for sharing files over HTTP and FTP protocols. Just like Microsoft Internet Information Server (IIS), PWS supports all ISAPI extensions and CGI scripts. PWS has been optimized for interactive workstation use, and does not have the system requirements of a full Web server such as IIS.

It is designed for small-scale peer-to-peer or small Web server usage. As our Web Server needs continue to grow, Microsoft offers a full range of Internet/Intranet Web server products that run on Windows NT Workstation to the powerful enterprise-based solution, Windows NT Server.

The software is fully integrated into the Windows 95 Task Bar and Control Panel, making it easy for users to start and stop HTTP and FTP services whenever they wish. PWS provides all the features you'll need to create and host sophisticated Web pages and applications. However, Microsoft optimized PWS for performance on workstation class machines instead of on servers (requiring fewer system resources) and intended its use as a production, or low-traffic volume, Web server. PWS requires only Windows 95 and less than 1 MB of disk space.

2.8 Database Server

A database is a collection of data that is organized so that its contents can easily be accessed, managed and updated. The most prevalent type of database is the relational database, a tabular database in which data is defined so that it can be reorganized and accessed in different ways. As a distributed database in one that can be dispersed or replicated among different points in a network. An object-oriented programming database in one that is congruent with the data defined in object classes and subclasses.

2.8.1 MySQL

MySQL is an open source relational database management system (RDBMS) that uses Structured Query Language (SQL), the most popular language for adding, accessing, and processing data in a database. Because it is open source, anyone can download MySQL and tailor it to their needs in accordance with the general public license. MySQL is noted mainly for its speed, reliability, and flexibility. Most agree, however, that it works best when managing content and not executing transactions.

The MySQL relational database system was first released in January 1998. It is fully multi-threaded using kernel threads, provides application program interfaces (APIs) for C, C++, Eiffel, Java, Perl, PHP, and Python, allows for many column types, and offers full operator and function support in the SELECT and WHERE parts of queries.

MySQL currently runs on the Linux, UNIX, and Windows platforms. Many Internet startups have been especially interested in MySQL as an alternative to the proprietary database systems from Oracle, IBM, and Informix. Yahoo's news site uses MySQL.

2.8.2 Oracle

Oracle is best known for its sophisticated relational database products such as Oracle9i, which are used in Fortune 1000 corporations and by many of the largest web sites.

Oracle's relational database was the world's first to support the Structured Query Language (SQL), now an industry standard. Oracle targets high-end workstations and minicomputers as the server platforms on which to run its database systems. [4]

2.8.3 Microsoft SQL Server 2000

Microsoft SQL Server is a powerful relational database management system catering to high-end users with advanced needs. Along with Oracle, Microsoft SQL Server is widely regarded as one of the two full-featured database systems on the market today.

Microsoft SQL Server 2000 offers a variety of administrative tools to ease the burdens of database development, maintenance and administration. The most frequently used tools

are: Enterprise Manager, Query Analyzer, SQL Profiler, Service Manager, Data Transformation Services and Books Online.

- **Enterprise Manager** is the main administrative console for SQL Server installation. It provides you with a graphical "birds-eye" view of all of the SQL Server installation on your network.
- **Query Analyzer** offers a quick dirty method for performing queries against any of your SQL: Server Database. It's a great way to quickly pull information out of a database in response to a user request, test queries before implementing them in other applications; create/modify stored procedures and execute administrative tasks.
- **SQL Profiler** provides a window into the inner workings of your database. You can monitor many different events types and observe database performance in real time.
- **Service Manager** is used to control the MSSQL Server (the main SQL Server process), MSDTC (Microsoft Distributed Transaction Coordinator) and SQL-Server-Agent processes.
- **Data Transformation Services (DTS)** provides an extremely flexible method for importing and exporting data between a Microsoft SQL Server and a large variety of other formats.

- **Books Online** is an often-overlooked resource provided with SQL Server that contains answers to a variety of administrative, development and installation issues.

2.9 Web Browser

Web browser is a software application used to locate and display Web pages. The two most popular browsers are Netscape Navigator and Microsoft Internet Explorer. Both of these are graphical browsers, which means that they can display graphics as well as text. In addition, most modern browsers can present multimedia information, including sound and video though they require plug-ins for some formats.

A web browser is technically a client program that uses the Hypertext Transfer Protocol (HTTP) to make request of web server's throughout the Internet on behalf of the browser user. There are many types of browser available at the moment and every one have its features that can accommodate users requirements.

2.9.1 Microsoft Internet Explorer 5.0

Microsoft Internet Explorer is the graphical World Wide Browser that is provided with the Microsoft Windows 95, 98, Me, NT and Windows 2000 operating systems. The Microsoft Internet Explorer browser competes closely with an earlier browser, Netscape Navigator.

Microsoft Internet Explorer 5.0 is an open, integrated suite of Internet software that includes the industry's premier Internet client and basic collaboration solution for ends users, Information Technology Managers and developers.

Microsoft Internet Explorer include standard feature like when casting of sites, auto complete, offline reading, content advisor and many other. Besides that Internet Explorer also support ActiveX.

2.9.2 Netscape Navigator

Netscape Navigator is the other web browser that is considered the most popular browsers. Netscape Navigator is a product by Netscape Communicator, now owned by America Online (AOL). Currently, almost all Internet users use either Netscape's browser or Microsoft Internet Explorer browser, and many users use both. Although

Netscape Navigator was initially the predominant product in terms of usability and number of users see them as roughly equivalent and has taken a slight lead in usage.

Netscape browser is called Navigator and is packaged in a suite of software called communicator.

2.10 Common Gateway Interface (CGI)

CGI is the traditional definition of how server and browser interact. CGI is an interface specification. It does note define how a web server works or how a program is expected

to produce results. But it established a set of guidelines that both must follow in order to interoperate. For example, a vendor has a product database on his system that he would like users on the web to use, but the web server does not understand the database internal. Using a CGI program must link both the web server and database. This last functionality works only because the web server and the program have established rules for communication between the two. The rules make them able to interface called the CGI.

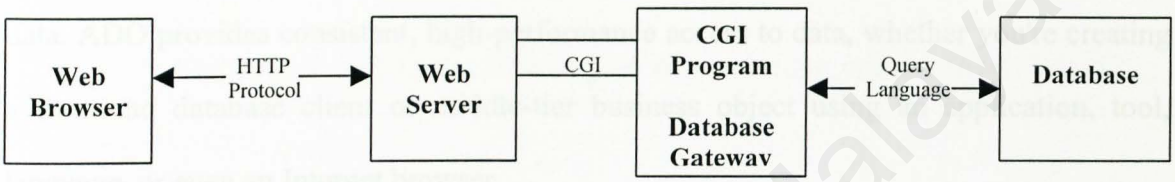


Figure 2.3: Common Gateway Interface

2.11 Database Connectivity

Both ActiveX Data Object (ADO) and Remote Data Services (RDS) are not programming languages. They are Microsoft new programming data access interface to allow web application particularly to access and manipulate data in database server and other data stored through any OLE database provider.

2.11.1 ActiveX Data Objects (ADO)

The ActiveX Data Objects (ADO) programming model represents the best of the existing Microsoft data access programming models. If you are familiar with Data Access Objects (DAO) or Remote Data Objects (RDO), you will recognize the interfaces and will be able

to work with them very quickly. You will also notice considerable improvements in the model, and tasks that were awkward in previous models have either been fixed or eliminated from the ADO model.

The ADO objects provide you with the fastest, easiest and most productive means for accessing all kinds of data sources. The ADO model strives to expose everything that the underlying data provider can do, while still adding value by giving you shortcuts for common operations. ADO is Microsoft's strategic, high-level interface to all kinds of data. ADO provides consistent, high-performance access to data, whether you're creating a front-end database client or middle-tier business object using an application, tool, language, or even an Internet browser.

ADO is the single data interface you need to know for 1- to n-tier client/server and Web-based data-driven solution development. ADO is designed as an easy-to-use application level interface to Microsoft's newest and most powerful data access paradigm, OLE DB. OLE DB provides high-performance access to any data source, including relational and non-relational databases, email and file systems, text and graphics, custom business objects, and more. ADO is implemented with a small footprint, minimal network traffic in key Internet scenarios, and a minimal number of layers between the front-end and data source-all to provide a lightweight, high-performance interface. ADO is easy to use because it is called using a familiar metaphor - the OLE Automation interface, available from just about any tool and language on the market today. And since ADO was designed to combine the best features of, and eventually replace RDO and DAO, it uses similar conventions with simplified semantics to make it easy to learn for today's developers.

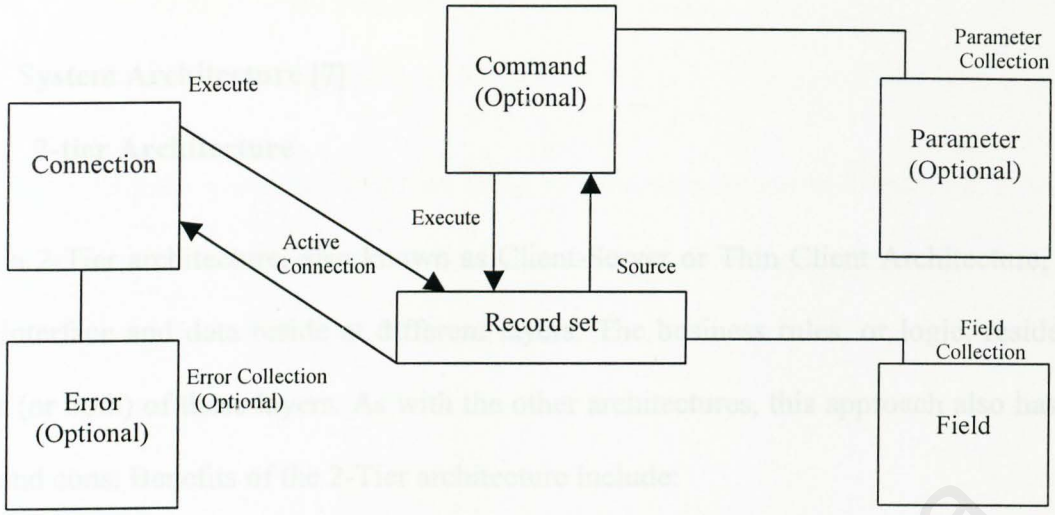


Figure 2.4: ADO Objects and how they relate to one another

2.11.2 Remote Data Services (RDS)

Remote Data Services (RDS) is a feature of ADO. RDS delivers a new web data access technology that allows developers to create data-centric application within ActiveX enabled browsers such as Microsoft Internet Explorer.

RDS goes beyond the current generation of web data access tools by bringing high performance data connectivity to web-based application. It allows user access and update data from any OLE DB provider, including ODBC compliant database management system, client side caching and integration with data-ware ActiceX controls.

2.12 System Architecture [7]

2.12.1 2-tier Architecture

With a 2-Tier architecture, also known as Client-Server or Thin Client Architecture, the user interface and data reside at different layers. The business rules, or logic, reside in either (or both) of these layers. As with the other architectures, this approach also has its pros and cons. Benefits of the 2-Tier architecture include:

- Good scalability characteristics
- Solid performance above 50,000 records
- Dedicated database engine
- multiple location capability via replication
- robust security capabilities

The 2-Tier approach is an excellent choice for medium to large applications requiring more than 15 concurrent users. This is also a great choice if you expect to have more than 100,000 records in your tables. Almost every large corporation today develops database applications using a 2 or n-Tier approach. But the 2-Tier architecture isn't suitable for every situation. Drawbacks of the 2-Tier architecture include:

- more expensive to develop than 1-Tier
- longer development time
- Average performance for small applications

- requires dedicated database server
- more technical support intensive

Depending on your particular situation, these drawbacks may not be important. If you plan on having more than 15 concurrent users and your tables are going to grow past 100,000 records, the 2-Tier approach may be a fine choice for your organization. Of course, if you require additional flexibility and scalability, n-Tier architecture might make the most sense.

2.12.2 3-tier Architecture

The 3-tier (also referred to as the multi-tier architecture) emerged to overcome the limitations of the 2-tier architecture. In the 3-tier architecture, a middle tier was added and the database management server environment. The middle tier can perform queuing application executive and database staging.

By breaking down an application into 3 distinct and separate tiers (or layers) - the presentation tier, the business logic tier and the data access tier - you gain advantages in several areas, such as: -

- Scalability and deployment flexibility - component roles are specialized, improving maintainability, networking, and I/O overheads. An application constructed using the 3-Tier software architecture is an ideal candidate for being deployed on 3 layers of hardware.

- Component roles are clearly defined within a 3-tier framework. This provides a good basis for component-based development and reusability. Components in the business layer can be shared by any number of components in the presentation layer.

- Stateless communication between components in the presentation tier and those in the business logic tier is ensured using XML.

- Infrastructure independence is enhanced by the use of a 3-tier architecture. This is because presentation and data access - areas that are often infrastructure-dependent are separated from the application's business logic.

- A specific set of skills is required for the development of each tier, so tiers can be developed independently of each other. For example, the thin presentation tier allows front-end experts to do their work without being affected by developments taking place in the business logic tier.

2.13 Expected benefits from the Motor Franchise Claim System (MFCS)

As you can see, the current similar system GTS and Merimen Online are the independent companies which benefiting in the expense of the franchise holder. MRC for example, influenced franchise holders to provide spare parts prices to upload them to their system where all Insurance company and Loss Adjusting companies must access the system to obtain the parts prices. MFCS is expected to be beneficial to the Motor Franchise Holders as follows: -

- Franchise holders could develop their own database system to monitor the accident claims created by their various workshops
- Eliminate the Involvement of GTS, Merimen Online and Motordata Research Consortium (MRC)'s intervention by developing and maintaining MFCS's own database for spare parts prices.
- Increasing genuine parts sales as the database is loaded with genuine parts prices not as MRC whereby non-franchise parts are available
- Increase customer satisfaction as usage of genuine parts will increase the life span of the vehicle
- MFCS is expected to reduce the time taken to complete the whole cycle of a claim process. Submitting online information to the Insurer, which is catered in MFCS, can do this.

- Designated report from MFCS could de used for management reporting. This will help franchise holders to study on the causes of accident, which could be resulted from mechanical failure. This will help them to improve the safety features on their vehicles.

2.13 Conclusion

Literature review plays a vital part in studying the current systems and identifying the problem with them. Also, the considerable development tools were comprehensively discussed in this chapter.

3.1 System Methodology [8]

A System Development Life Cycle methodology is a structured approach for systems development from systems planning and design through implementation and support. A methodology is a proven series of steps and tasks systems developers can follow to build a quality system faster, at lower costs and with lesser risk.

The methodology outlined in the following sections describes the key steps and tasks of a system development effort. Many widely accepted methodologies exist, but the basic concepts and practices of the following methodology provide a solid system development foundation. The exact methodology used to develop or maintain a system should be appropriate to the size, type and scope of the project. Agencies should use the following methodology as a guideline in creating or selecting a specific methodology, which applies to their agency's requirements.

3.2 The Waterfall Model

The Waterfall Model is the earliest method of structured system development. Although it has come under attack in recent years for being too rigid and unrealistic when it comes to quickly meeting customer's needs, the Waterfall Model is still widely used. It is attributed with providing the theoretical basis for other Process Models, because it most closely resembles a "generic" model for software development.

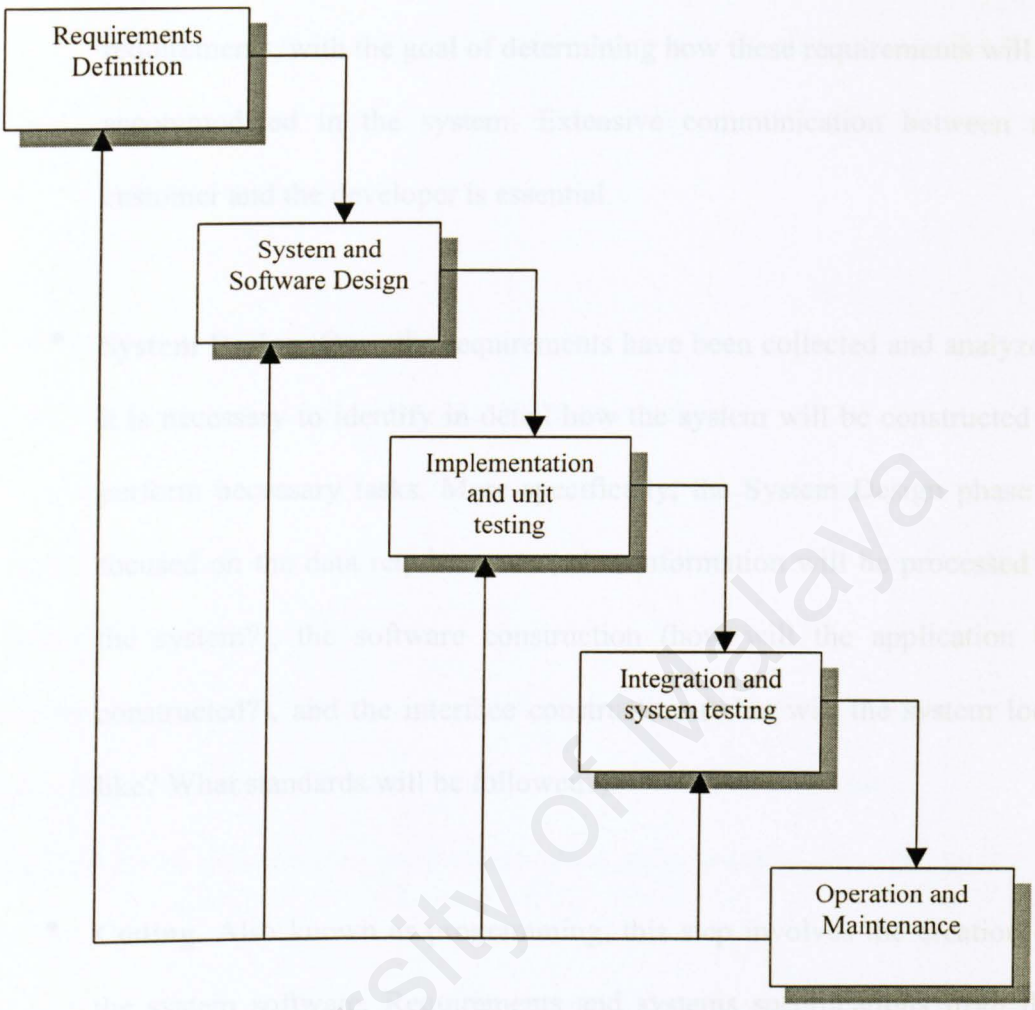


Figure 3.1: Waterfall Model

The Water Fall Model consists of the following steps:

- **System Conceptualization.** System Conceptualization refers to the consideration of all aspects of the targeted business function or process, with the goals of determining how each of those aspects relates with one another, and which aspects will be incorporated into the system.

- **Systems Analysis.** This step refers to the gathering of system requirements, with the goal of determining how these requirements will be accommodated in the system. Extensive communication between the customer and the developer is essential.

- **System Design.** Once the requirements have been collected and analyzed, it is necessary to identify in detail how the system will be constructed to perform necessary tasks. More specifically, the System Design phase is focused on the data requirements (what information will be processed in the system?), the software construction (how will the application be constructed?), and the interface construction (what will the system look like? What standards will be followed?).

- **Coding.** Also known as programming, this step involves the creation of the system software. Requirements and systems specifications from the System Design step are translated into machine-readable computer code.

- **Testing.** As the software is created and added to the developing system, testing is performed to ensure that it is working correctly and efficiently. Testing is generally focused on two areas: internal efficiency and external effectiveness. The goal of external effectiveness testing is to verify that the software is functioning according to system design, and that it is

performing all necessary functions or sub-functions. The goal of internal testing is to make sure that the computer code is efficient, standardized, and well documented. Testing can be a labor-intensive process, due to its iterative nature.

3.2.1 Advantages of Waterfall Model

- It allows for departmentalization and managerial control
- A schedule can be set with deadlines for each stage of development and product can be proceed through the development process like a car in a car wash and theoretically be delivered on time
- Development moves from concept, through design, implementation, testing, installation, troubleshooting and ends up at operation and maintenance
- Each phase of development proceeds in strict order without any overlapping or iterative steps.
- It gives a software developer a high level view during the process development

3.2.2 Problems/Challenges Associated with the Waterfall Model

Although the Waterfall Model has been used extensively over the years in the production of many quality systems, it is not without its problems. In recent years it has come under attack, due to its rigid design and inflexible procedure. Criticisms fall into the following categories:

- Real projects rarely follow the sequential flow that the model proposes.

- At the beginning of most projects there is often a great deal of uncertainty about requirements and goals, and it is therefore difficult for customers to identify these criteria on a detailed level. The model does not accommodate this natural uncertainty very well.

- Developing a system using the Waterfall Model can be a long, painstaking process that does not yield a working version of the system until late in the process.

3.3 Prototyping Model

The Prototyping Model was developed on the assumption that it is often difficult to know all of your requirements at the beginning of a project. Typically, users know many of the objectives that they wish to address with a system, but they do not know all the nuances of the data, nor do they know the details of the system features and capabilities. The Prototyping Model allows for these conditions, and offers a development approach that yields results without first requiring all information up-front.

When using the Prototyping Model, the developer builds a simplified version of the proposed system and presents it to the customer for consideration as part of the development process. The customer in turn provides feedback to the developer, who goes back to refine the system requirements to incorporate the additional information. Often, the prototype code is thrown away and entirely new programs are developed once requirements are identified.

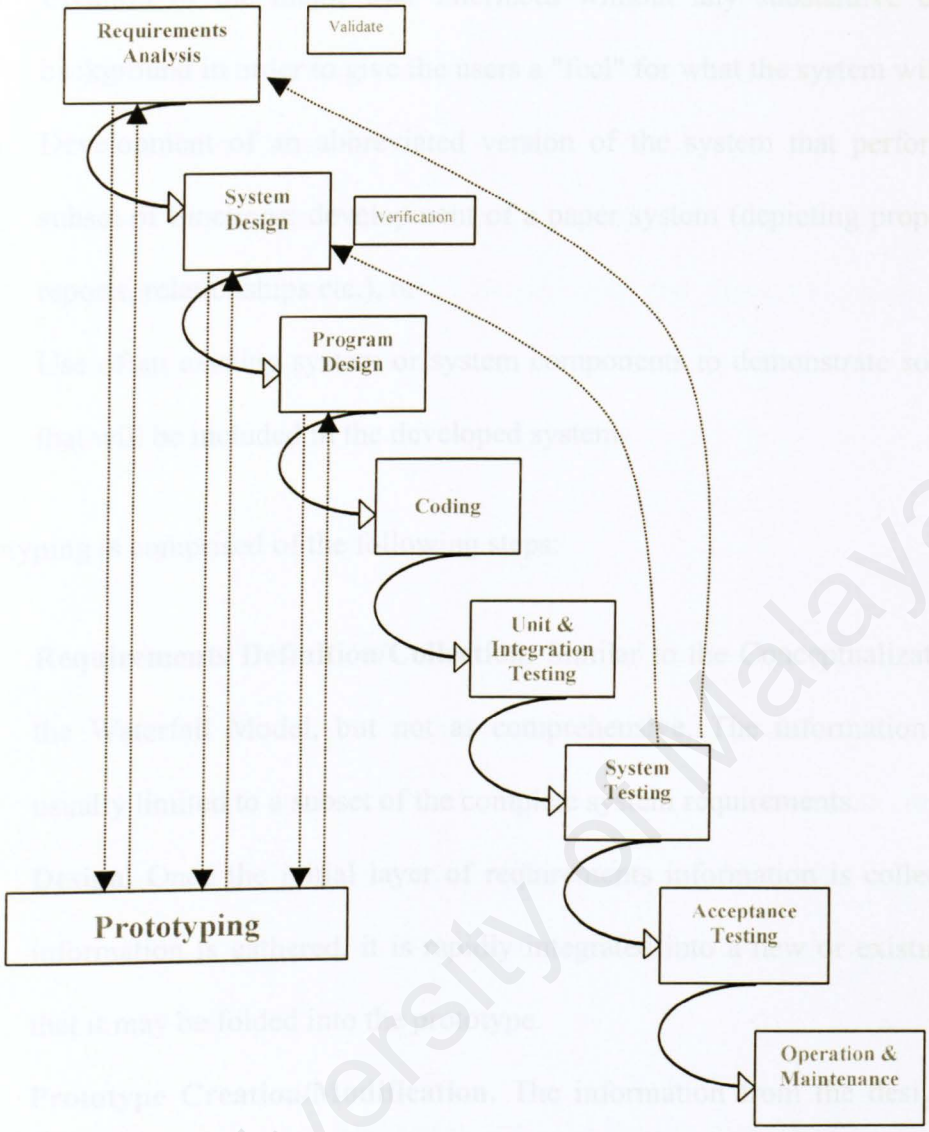


Figure 3.2: Waterfall Model with Prototyping

There are a few different approaches that may be followed when using the Prototyping Model:

- Creation of the major user interfaces without any substantive coding in the background in order to give the users a "feel" for what the system will look like,
- Development of an abbreviated version of the system that performs a limited subset of functions; development of a paper system (depicting proposed screens, reports, relationships etc.), or
- Use of an existing system or system components to demonstrate some functions that will be included in the developed system.

Prototyping is comprised of the following steps:

- **Requirements Definition/Collection.** Similar to the Conceptualization phase of the Waterfall Model, but not as comprehensive. The information collected is usually limited to a subset of the complete system requirements.
- **Design.** Once the initial layer of requirements information is collected, or new information is gathered, it is rapidly integrated into a new or existing design so that it may be folded into the prototype.
- **Prototype Creation/Modification.** The information from the design is rapidly rolled into a prototype. This may mean the creation/modification of paper information, new coding, or modifications to existing coding.
- **Assessment.** The prototype is presented to the customer for review. Comments and suggestions are collected from the customer.

- **Prototype Refinement.** Information collected from the customer is digested and the prototype is refined. The developer revises the prototype to make it more effective and efficient.
- **System Implementation.** In most cases, the system is rewritten once requirements are understood. Sometimes, the Iterative process eventually produces a working system that can be the cornerstone for the fully functional system.

3.3.1 Advantages of Prototyping

- The prototype of the system in the early stage helps the understanding of the problem before the implementation of the project
- The risk and uncertainty is reduced tremendously as prototype was developed in the early part of the system development
- The prototyping involves the user heavily in the early stage of the system development

3.3.2 Problems/Challenges Associated with the Prototyping Model

Criticisms of the Prototyping Model generally fall into the following categories:

- **Prototyping can lead to false expectations.** Prototyping often creates a situation where the customer mistakenly believes that the system is "finished" when in fact it is not. More specifically, when using the Prototyping Model, the pre-implementation versions of a system are really nothing more than one-dimensional structures. The necessary, behind-the-scenes work such as database

normalization, documentation, testing, and reviews for efficiency have not been done. Thus the necessary underpinnings for the system are not in place.

- **Prototyping can lead to poorly designed systems.** Because the primary goal of Prototyping is rapid development, the design of the system can sometimes suffer because the system is built in a series of "layers" without a global consideration of the integration of all other components. While initial software development is often built to be a "throwaway, " attempting to retroactively produce a solid system design can sometimes be problematic.

3.3 The Spiral Model

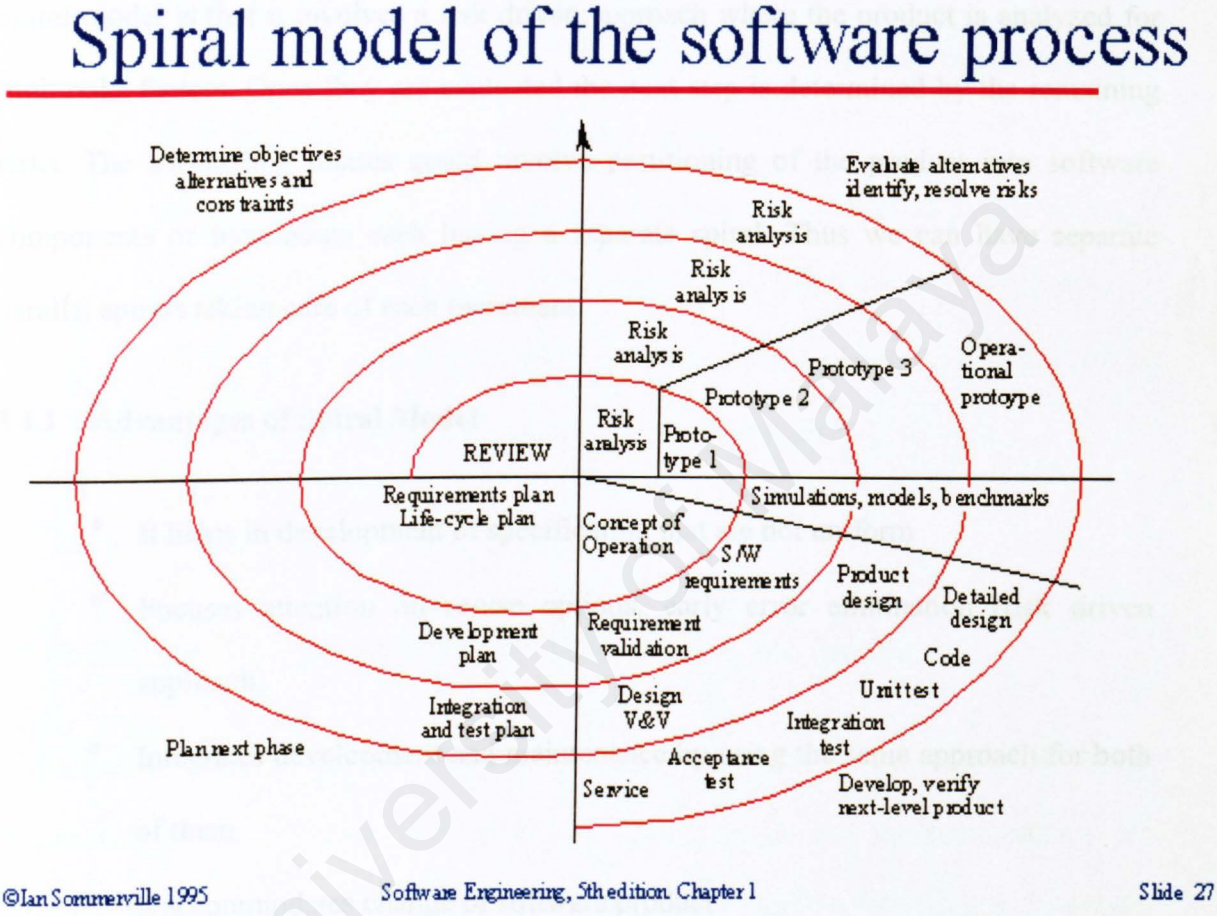


Figure 3.3: Spiral Model

The spiral model is a risk-driven model providing a new framework for guiding software process. It can accommodate most previous models as special cases. It tries to best-fit different models at different stages of software development. The entire system is not defined in detail at first. The most primary people concerned with the project review each cycle and only define the highest priority features. This gives rise to the first spiral. These features are implemented and feedback from users/customers is taken. This feedback

distinguishes "evolutionary" from "incremental" development. This knowledge leads to the definition and implementation of more features in smaller chunks. A spiral thus gets started by the hypothesis that a particular operational mission could be improved by software effort. It the hypothesis fails the spiral is terminated. The main feature of the spiral model is that it involves a risk driven approach where the product is analyzed for high-risks factors. Once they are evaluated the next step is determined by the remaining risks. The succeeding phases could involve partitioning of the product into software components or increments each having a separate spiral. Thus we can have separate parallel spirals taking care of each increment.

3.4.1 Advantages of Spiral Model

- It helps in development of specification that are not uniform
- Focuses attention on re-use options, early error elimination (risk driven approach)
- Integrates development and maintenance by using the same approach for both of them
- It accommodates change of software product
- It answers the key question "How much is enough?"
- It uses the same approach for software development and maintenance.
- It is useful in integrating hardware-software systems.

3.4.2 Disadvantages of Spiral Model

- Requires a lot of flexibility and freedom
- Depends on software managers ability to identify and manage sources of project risk
- A risk driven specification is also people-dependant (requires highly experienced and skilled software engineers)
- Proper reviewing of the spiral hypothesis is essential. If an expert produces the model with non-experts cannot use less documentation and the model.
- For large scale use in situations where there are people with different levels of experience large amount of elaboration of the spiral is required.

3.5 Justification for combining Waterfall Model and Spiral Model

In the earlier stage of the development of MFCS, Waterfall Model was used, as the system requirement was not fully specified. After a while and the requirements are specified, Spiral Model is used as the processing model for the later stages. Insurance Industry is keeps on changing in terms of new procedures and claims handling guidelines. By using the Spiral Model, we don't have to lock on the original version. Spiral Model is very flexible is accommodating changes or revision to it.

Furthermore, the MFCS development period is very short and scope of project relatively small. Spiral Model is the appropriate processing model to facilitate such a small and frequently changing requirement.

The use of Spiral Model would avoid the need for going through the whole cycle process of developing this system should there be need for changes to the requirements in the further.

3.6 System Consideration

System consideration is a preliminary explanation as to why the proposed Motor Franchise Claim System is being developed. After a deep study was conducted into the current existing system in chapter 2, the MFCS was considered by looking into two areas as follows: -

3.6.1 Derived from existing system comparison

3.6.2 Personal expertise in the Motor Claim environment

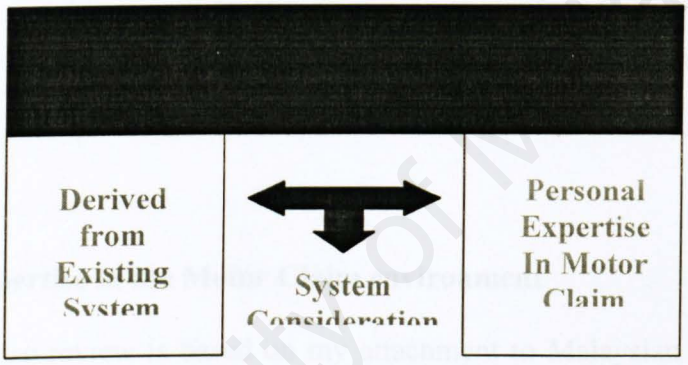


Figure 3.4: System Consideration Structure

3.6.1 Derived from existing system comparison

Merimen Online and Genesis Total Solution (GTS) are the two existing system that were compared in the Literature Review. Both the system have it's own strength and weaknesses to consider.

- Both the system are provided by independent companies and not within the Motor Franchise Industry it self.

- These two companies are also depending on one source of spare parts database called Motordata Research Consortium (MRC).
- Motor Franchise Holders are being charged for the usage of the system which considerable not necessary for Franchise holder to depend on a third party system provider.
- GTS for example is client based system and the licensing fee is very expensive i.e. RM13, 888.00 per PC installation. Also, RM4180.00 per year being charged as the maintenance fee per PC.
- Parts prices provided by the MRC is mixed up with franchise and non-franchise prices, which is directly resulting in slow down in genuine parts sales.

3.6.2 Personal expertise in the Motor Claim environment

The personal expertise review is based on my attachment to Malaysian second national car manufacturing company i.e. Perusahaan Otomobil Kedua Sdn Bhd (PERODUA). As a personal dealing with motor claim for the company for the last 7 years, I have strong believe that MFCS would help the Motor Franchise Holders in Malaysia by proving a better platform for motor claim solution as append below: -

- Current physical file system are very tedious as Motor Claim needs extensive document compilation
- Currently Malaysia Motor Franchise holders do not have their own claim system. They need a database solution to facilitate their motor claim

- Very long turn around time being faced to transmit information between HQ and workshops nationwide.
- Progress stages for each claim is very difficult to identify and the claim volume increases day by day
- Manual Management reporting with regards to claims matter is seems to be obsolete

3.7 How the system could help the Motor Franchise Holder

In view of the above consideration, MFCS would assist by providing the following assistance: -

- Implementing database solution not only for the spare parts prices but for the entire claim process
- Avoiding paying additional cost unnecessarily to third party service providers
- Maximizing claims return by reducing overhead expenses such as postal, transportation etc.

3.8 System Consideration Conclusion

Motor Claim is very profiting business for a Motor Franchise Holder. It contributes a substantial amount of income annually to the company. Information must travel as fastest as possible so that action could be taken without delay. By providing a total database solution for the claims system, it would definitely enhance the profiting area.

In addition, Motor Franchise Holders could maximize the usage of current Vehicle Sales System by integrating with the proposed Motor Franchise Claim System.

The above explanation would clearly gives and impression that, Motor Franchise Claim System would be very successful once it is implemented.

3.9 Conclusion

Mainly, this chapter concludes the software process models and the system consideration. MFCS is expected to be beneficial for the Motor Franchise Holders in Malaysia when it is fully developed. This is based on the system consideration studies presented herein.

4.1 System Analysis and Design

System analysis and requirement is a systematic approach to identifying problems, opportunities and the objective of the system. It helps to analyze the information flows in organizations and to design computerized information system to solve a problem. As information proliferates a systematic, planned approach to the introduction, modification, and maintenance of information systems is essential.

Eventually in this chapter the various aspects of the system, such as data gathering, functional and non-functional requirements, chosen development tools for the system, analysis on the survey which was carried out and research on other similar courseware will be put forth to provide the needed data and information to build and implement a complete and competent system.

4.2 Data Gathering

There are many types of data gathering methods. However only few methods are commonly used in data gathering such as search engine, collecting hard data like written documents, journals or reports, interviewing, questionnaires, observation and brainstorming.

4.2.1 Search engine

Search engines such as www.msn.com, www.yahoo.com, and www.google.com provide relevant sites to reach and obtain information using queries function. Search engines are very important in identifying the existing system for analysis.

4.2.2 Manual Researh

Books, Journals, Articles and other resources are tapped into at this stage. Though it seems arbitrary with the advent of the net, it does provide one with vital information which may not be available elsewhere. Research on past cases,updates in the software as well as the hardware market also contribute to the analysis.

4.3 Functional Requirements

A requirement is a feature of the system or a description of something the system must to do in order to achieve the objectives of the system. The functional requirements are the real essence of a requirement specification. They state what the system should do.

4.3.1 Display/Menu of system

The system has to be equipped with a proper menu of contents. The user must be able to comprehend fully on what is offered (the scope) of the system. Needless to say, the interface must be attractive, clear and concise in order to capture user's attention.

4.3.2 Login

In this section, each user will be able to login to the system by using individual User ID and Password. The system should be able to prompt error massage should an unauthorized user attempting to access the system.

4.3.3 Head Office Level

User at Head Office should be able to view and monitor all claims transactions created by various workshops. Printing any designated report must be accommodated by the systems to the user.

4.3.4 Workshop Level

User at Workshop must be prompted with suitable alert as and when Head Office Register a claim. This will help the Workshop to act immediately to prepare the estimate of repair.

4.4 Non-Functional Requirements

Non-functional requirements are the features that are important to develop a system with full functionality and constraints under which the system must operate and the standards which must be met by the delivered system. The non-functional requirements for MFCS are:

4.4.1 Reliability

A reliable system is a system that function as in program specification and does not produce costly failures when it is used in a reasonable manner. This is a reliable system as all the possible failure and errors that would occur are taken into considerations. Furthermore, the system is equipped with a backup facility, which enable backup to be made to recover the data lost when there is a disaster. Security and integrity of data is another factor as the system is equipped with user login and administrator login to ensure that no unauthorized person can access the system's database or unregistered user can log on.

4.4.2 Robustness

Robustness refers to the quality that causes a system to be able to handle or at least avoid the disaster in the case of unexpected circumstances such as input of improper data. This system supports robustness by developing a programmed logic to process error in the input, such as testing for the presence of the numeric data that was accidentally key-in into an alphabetic field. When such errors are detected, an error message will be displayed to acknowledge the user to re-enter data so that further correction can be taken.

4.4.3 Efficiency

The system is also equipped with efficiency feature where a process or procedure can be called or accessed unlimited times to produce similar outcomes or output at a creditable speed.

4.4.4 Modularity

The program coding is done using modular approach where a complex large routine is broken down into smaller modules. This approach is used as it enhances maintainability, reusability of the program code and improves the readability of the program code.

4.4.5 Flexibility

The system enables user to enquire information pertaining to claims records and history and generate report as a hard copy or display on the screen. Forms are displayed for the users to input data and view report generated. Graphical user interface (GUI) enables the users to interact with the system in flexible manner.

4.4.6 User-friendliness

Even if a system can perform valuable functions, it is not favored if it is not a user-friendly system. MFCS system is a menu driven system with attractive GUI features where user can perform various tasks by choosing a specific option from different levels of menu by using arrow keys or mouse. Prompts and messages are displayed to guide the user along the system operation.

4.4.7 Maintainability

The system is also enhanced with maintainability feature where the program can be understood, corrected if an error is encountered, adapted if its environment changes or enhanced if the user desires change in requirements.

4.4.8 Availability

MFCS is able to handle user inquiries and produce reports at a timely basis. When queries are made, the system is able to fetch data and display the result after manipulation.

4.5 Consideration on Development Tools for the System

Analysis into a wide range of programming and development tools technology which will guide to choose the most suitable combination technologies to implement the proposed system. The factor such as the availability, reliability, robustness, efficiently, user-friendliness, ease of use and learning curve of development tools for programming technology considered to come up with the compatible technology for this system development. A conscientious analysis, which has been carried out in chapter 2, provides an insight look at all the strength and weakness of the technologies.

4.5.1 Active Server Pages (ASP)

ASP is chosen as the programming language for the development of MFCS. ASP is chosen as a web page development tool because it can provides dynamic web page development. It is tightly integrated with Microsoft Internet Information Server (IIS).

4.5.2 Dreamweaver 4.0

Dreamweaver 4.0 is chosen because it is quite easy to use and has more functionalities than FrontPage. The functions are easy to manipulate and you don't have to know the coding /language to design dynamic web pages and documents.

4.5.3 Visual Basic (VBScript)

VBScript is used as the scripting language for the development of the MFCS. VBScript is tightly integrated with ASP in designing dynamic web pages.

4.6 Requirement Specification for Hardware and Software

In this section, all the related hardware and software for the development of MFCS will be specified.

4.6.1 Hardware requirement

Hardware requirement is divided into two that is Server Side and Client Side.

4.6.1.1 Server Side Hardware Requirement

- Windows 2000
- Pentium III Processor
- 256 MB of RAM
- Network Interface Card (NIC) with bandwidth of 10 Mbps or higher

4.6.1.2 Client Side Hardware requirement

- Client side hardware requirement is quite legible; any PC with Internet connection would be able to operate the system

4.6.2 Software Requirement

Software requirements are focusing on several criteria, which are requirements for database, web server and technology.

4.6.2.1 Database Requirement

- Microsoft SQL
- A separate Open Database Connection (ODBC) is required to allow data access interface

4.6.2.2 Web Server Requirement

- Internet Information Server (IIS)

4.6.2.3 Technology requirement

- Web browser – Internet Explorer (IE)

4.7 Software and Hardware Requirement Table

Table below shows the Hardware and Software requirements to develop the MFCS.

No	Item	Requirement
1	Programming Language	- ASP - VBScript
2	Software requirement	- Internet Information Server (IIS) - MS SQL 2000 - Windows 2000 Server - Internet Explorer (IE) 6.0 & above
3	Hardware requirement	- Pentium III Processor - 256 MB RAM - Windows 200 Server - MS SQL
4	Server Requirement	- IIS - MS SQL - Internet Connection
5	Database requirement	- MS SQL

Table 4.1: Hardware and Software Requirements

4.8 System Design

The design phase builds on the knowledge obtained from the analysis phase. It uses the requirement to design a system that will meet the users needs. Design focuses both on the logical and physical or technical aspects of the system. The design will include database, function or process and other dynamic aspects of the system. The design will also specify hoe the various functions will be integrated as well as the input/output design and interface design.

The design phases are focus on user interface design, data storing and system structure. At the same time, to make this system more interesting and attractive, its content graphics, pictures, suitable page layout, fonts, color and other elements make the system more interesting and attractive.

4.8.1 MFCS System Structure

Basically, MFCS is divided into three main components that are Administration, Franchise Head Office and Workshop.

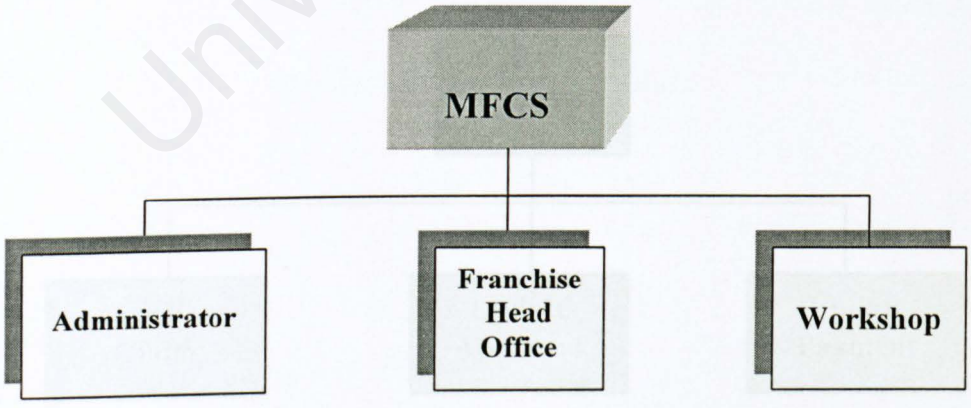


Figure 4.1: Structure of the Motor Franchise Claim System (MFCS)

4.8.1.1 Administrator Module

In admistration section, only authorized user can access. In this section login ID and password is required as well. The overall maintenance of the system will be done in this section.

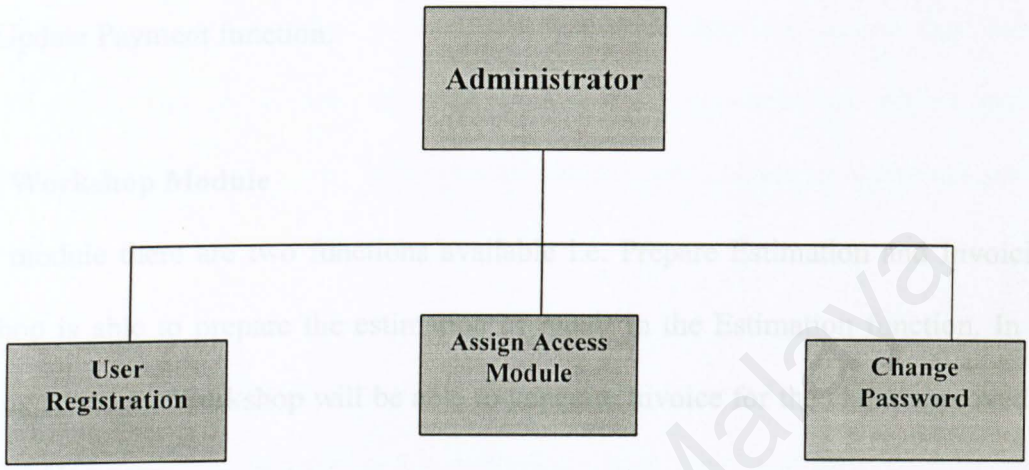


Figure 4.2: Administrator Module

4.8.1.2 Head Office Module

Head Office Subsystem is where the initial claim process begins. In this module, three main functions are available as follows: -

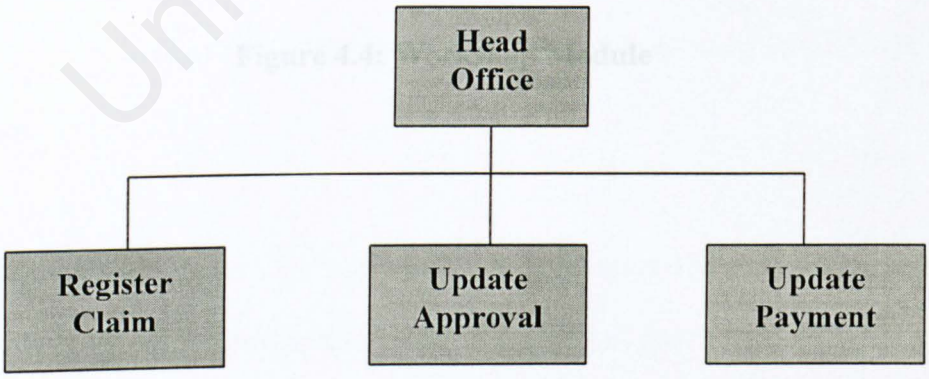


Figure 4.3: Head Office Module

In the Claim Register function, HQ will register new claim upon getting notification of accident from the vehicle owner. Update Approval function is where the HQ will update the approval details from Insurance Company. Upon getting the payment from Insurance Company, HQ will update the payment details i.e. cheque no., date received and amount in the Update Payment function.

4.8.1.3 Workshop Module

In this module there are two functions available i.e. Prepare Estimation and Invoicing. Workshop is able to prepare the estimation of repair in the Estimation function. In the Invoicing function, Workshop will be able to generate Invoice for the claim approved by Insurance Company.

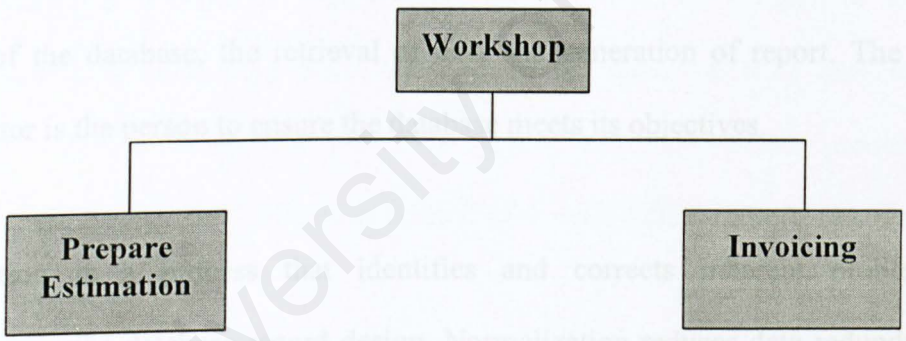


Figure 4.4: Workshop Module

4.8.2 Database Design [9]

A database is a collection of data that is organized so that its contents can easily be accessed, managed and updated. The most prevalent type of database is the relational database, a tabular database in which data is defined so that it can be recognized and accessed in a number of different ways. A distributed database is one that can be dispersed or replicated among different points in a network. An object-oriented programming database is one that is congruent with the data defined in object classes and subclasses.

Typically, a database manager provides users the capabilities of controlling read/write access, specifying report generation and analyzing usage. The heart of a database is the DBMS (database management system), which allows the creation, modification and updating of the database, the retrieval of data and generation of report. The database administrator is the person to ensure the database meets its objectives.

Normalization is a process that identifies and corrects inherent problems and complexities in the database record design. Normalization reduces data redundancy and by extension, helps to eliminate data anomalies that result from those redundancies called normal forms.

In the database design of the MFCS, the tables are normalized to the third normal form. The following gives a brief description on the objectives of the first (1NF), second (2NF) and third (3NF) forms used in the database design of MFCS.

- 1NF is to reduce redundancy
- 2NF is to eliminate partial dependencies
- 3NF is to eliminate transitive dependencies

These 3 states of normalization are sufficient for the design of MFCS providing an acceptable level of redundancy while at the same time maintaining efficiency.

The following section will concentrate on the database design and data dictionary.

4.8.2.1 Data Dictionary

Data Dictionary is a Database Management System (DBMS) component for storing metadata, which is everything about the data in the database. It is used to collect, documents, and sorts every fact about the system including entities, processes, data storage and data flow. MFCS database consist of 6 main tables. The database structures are listed below:

4.8.2.1.1 Category Table

Field Name	Data Type
ID	Int [4]
Description	Varchar [50]

Table 4.2: Data Structure of Category Table

4.8.2.1.2 Claim Table

Field Name	Data Type
ID	Varchar [50]
vehicle	Varchar [50]
Workshop	Int [4]
DTNotified	Varchar [50]
DTAccident	Varchar [50]
Driver	Varchar [50]
Place	Varchar [50]
Report	Varchar [50]
Status	Varchar [50]
Hqview	Bit [1]
Workshopview	Bit [1]
Isestimated	Bit [1]
Dtestimated	Smalldate [4]
Isapproved	Bit [1]
Dtapproved	Smalldate [4]
Isfix	Bit [1]
Dtfixed	Smalldate [4]
Isclosed	Bit [1]
Invoice	Varchar [50]
Amount	Money [8]

Table 4.3: Data Structure of Claim Table

4.8.2.1.3 Claimhistory Table

Field Name	Data Type
ID	int [4]
Vehicle	Varchar [50]
ClaimID	Char [10]
DT	datetime [8]
Status	Varchar [50]

Table 4.4: Data Structure of Claimhistory Table

4.8.2.1.4 Estimate_labour Table

Field Name	Data Type
ID	int [4]
Labourtype	int [4]
ClaimID	Varchar [50]
Duration	int [4]
Approved	int [4]

Table 4.5: Data Structure of Estimate_labour Table

4.8.2.1.5 Estimate_parts Table

Field Name	Data Type
ID	int [4]
Part	int [4]
ClaimID	Varchar [50]
Quantity	int [4]
Approved	int [4]

Table 4.6: Data Structure of Estimate_parts Table

4.8.2.1.6 Insurance Table

Field Name	Data Type
Vehicle	Varchar [50]
Name	Varchar [50]
Number	Varchar [50]
DTFrom	Varchar [50]
Dtto	Varchar [50]

Table 4.7: Data Structure of Insurance Table

4.8.2.1.7 Invoice Table

Field Name	Data Type
ID	int [4]
Invoice	Varchar [50]
Workshop	int [4]
ClaimID	Varchar [50]
Amount	Money [8]
DTInvoice	Smalldate [4]

Table 4.8: Data Structure of Invoice Table

4.8.2.1.8 Labour Table

Field Name	Data Type
ID	int [4]
Name	Varchar [50]
Description	Varchar [50]
Rate	Money [8]

Table4.9: Data Structure of Labour Table

4.8.2.1.9 Login Table

Field Name	Data Type
ID	int [4]
Username	Varchar [15]
Password	varchar [15]
Fullname	Varchar [50]
Category	int [4]
Workshop	int [4]

Table 4.10: Data Structure of Login Table

4.8.2.1.10 Model Table

Field Name	Data Type
ID	int [4]
Description	Varchar [50]

Table 4.11: Data Structure of Model Table

4.8.2.1.11 Part Table

Field Name	Data Type
ID	int [4]
Model	int [4]
Name	varchar [50]
Decsription	Varchar [50]
Price	Money [8]

Table 4.12: Data Structure of Part Table

4.8.2.1.12 Payment Table

Field Name	Data Type
ID	int [4]
ClaimID	varchar [50]
Invoice	varchar [50]
Dtpayment	smalldate [4]
Amount	Money [8]
Checkno	varchar [50]
Note	varchar [255]

Table 4.13: Data Structure of Payment Table

4.8.2.1.13 Variables Table

Field Name	Data Type
ID	int [4]
Length	int [4]
Sequence	varchar [50]
Description	varchar [50]

Table 4.14: Data Structure of Variables Table

4.8.2.1.14 Vehicle Table

Field Name	Data Type
Registration	varchar [50]
Model	int [4]
Chasis	varchar [50]
Engine	varchar [50]
Owner	varchar [50]
IC	varchar [50]
ADD1	varchar [50]
ADD2	varchar [50]
Postcode	varchar [50]
State	varchar [50]
Phone	varchar [50]

Table 4.15: Data Structure of Vehicle Table

4.8.2.1.15 Workshop Table

Field Name	Data Type
ID	int [4]
Name	varchar [50]
ADD1	varchar [50]
ADD2	varchar [50]
Postcode	varchar [50]
State	varchar [50]
Phone	varchar [50]
Invoice	varchar [50]

Table 4.16: Data Structure of Workshop Table

4.6.2.1 Entity Relationship Diagram (E-R)

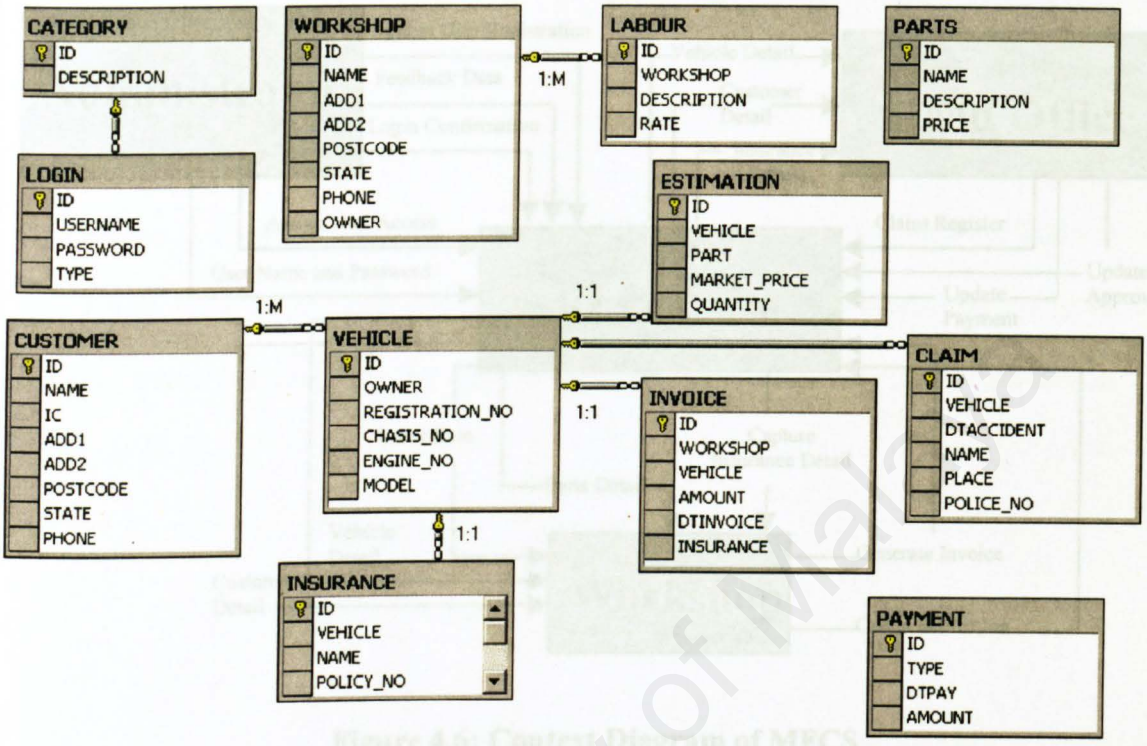


Figure 4.5: Entity-Relationship Diagram

Entity-Relationship Diagram is a visual illustration to show the binary relationship between entities and attributes.

4.9 Context Diagram

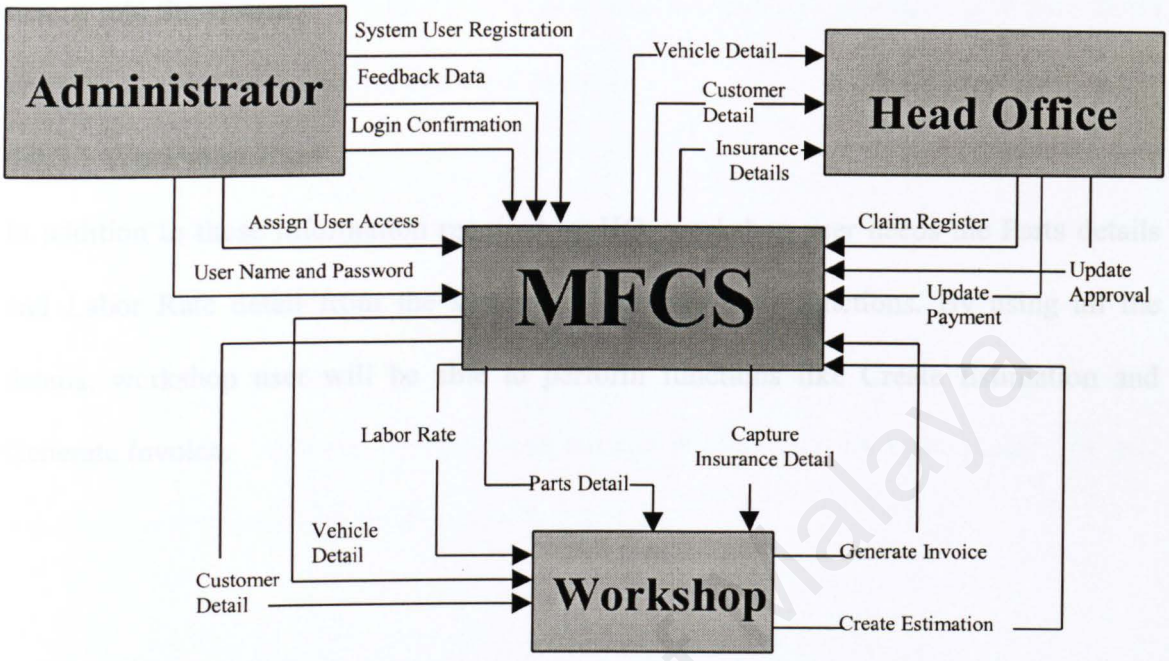


Figure 4.6: Context Diagram of MFCS

4.9.1 Administrator

Administrator will update user profile into the system. All users must register into the system to gain access to it. After which, administrator will create the Assign User Access for the new user. Password and Username will be provided for each user.

4.9.2 Head Office User

Head office will retrieve information such as Vehicle detail, Insurance details and customer detail from the system. Using that information, HQ will register each and every claim notified to them.

Using that information also, HQ will also update approval detail and update payment details into the system.

4.9.3 Workshop User

In addition to those information required by HQ, workshop user needs the Parts details and Labor Rate detail from the system to facilitate their functions. By using all the details, workshop user will be able to perform functions like Create Estimation and Generate Invoice.

4.10 Data Flow Diagram (DFD)

Data Flow Diagram (DFD) is a graphical characterization to illustrate how data flows receiving input and delivering output in a system.

Generally, most data flow modeling methods use four types of symbols to represent four types of system components, which are processes, data flows, data stores, and entities. Each element is represent by different shape. Here, entity is depicted by named rectangles, circles represent process, data storage is illustrated by open rectangles, and data flows are written beside the line with arrow.

4.10.1 Administrator Module

4.10.1.1 Administrator Password Authentication

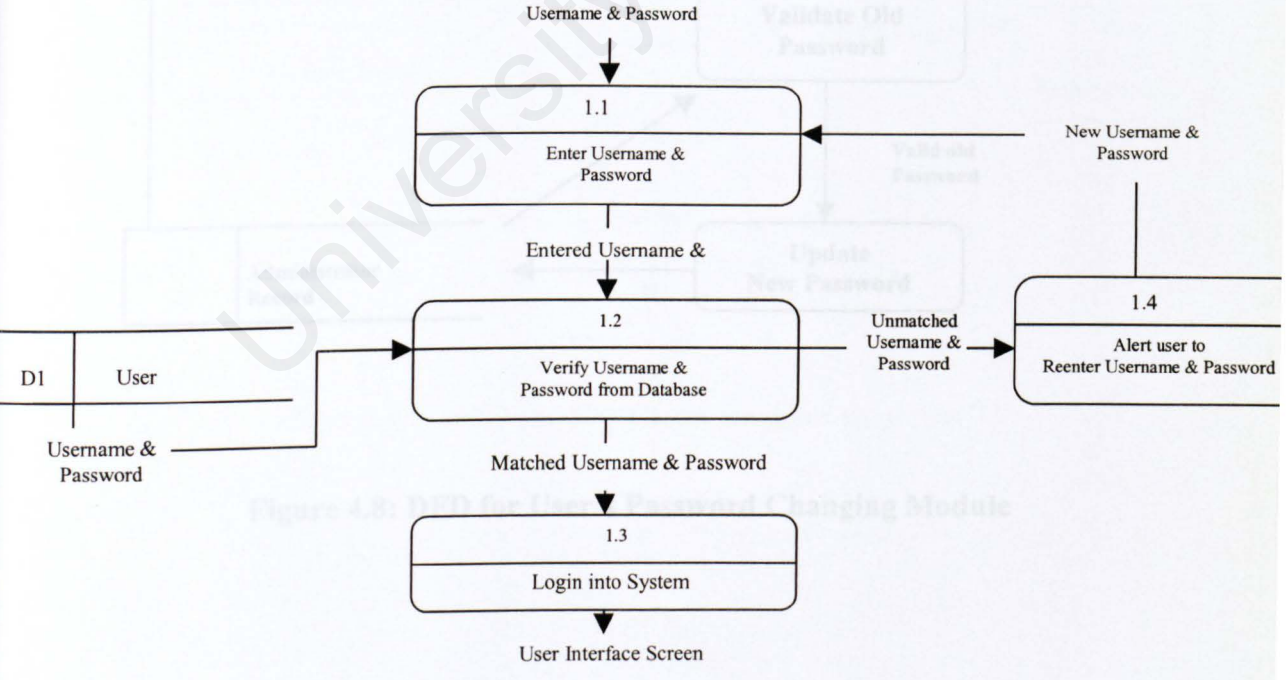


Figure 4.7: Administrator Password Authentication

4.10.1.2 User's Password Change

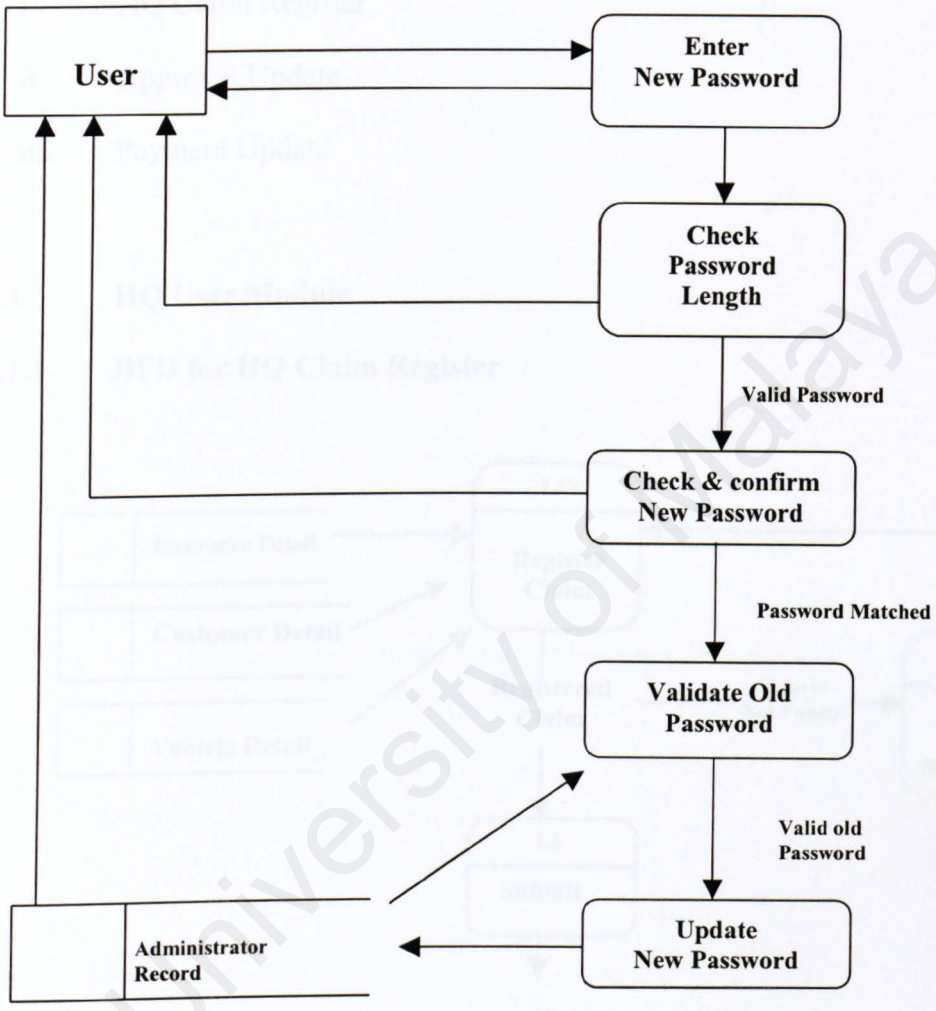


Figure 4.8: DFD for User's Password Changing Module

4.10.2 User Module

There are HQ User and Workshop User falls under this module. In HQ user, there are three functions involved as follows: -

i. HQ Claim Register

ii. Approval Update

iii. Payment Update

4.10.2.1 HQ User Module

4.10.2.1.1 DFD for HQ Claim Register

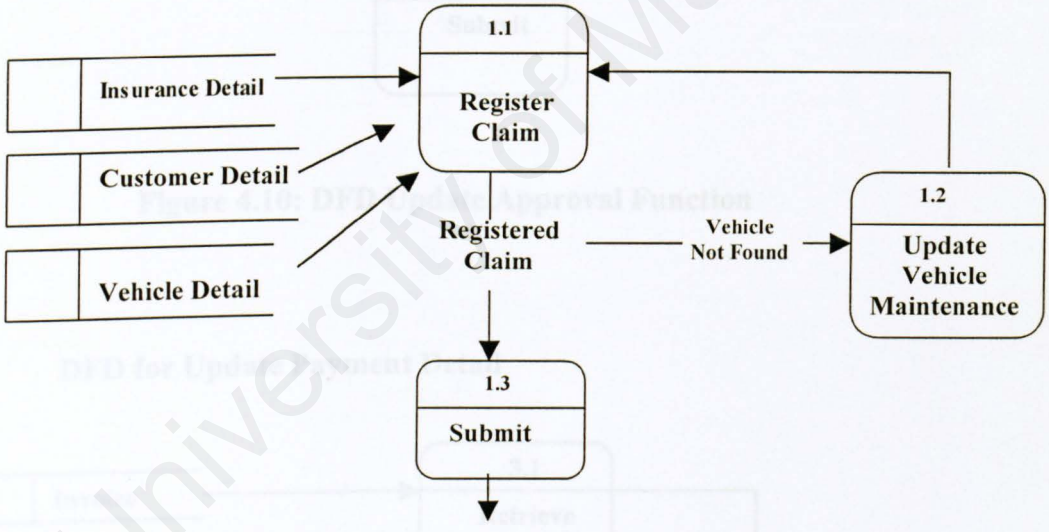


Figure 4.9: DFD for HQ Claim Register Function

4.10.2.1.2 DFD for Update Approval

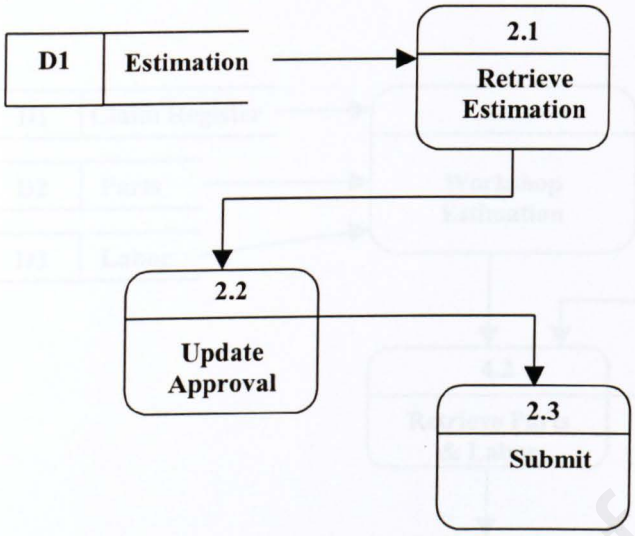


Figure 4.10: DFD Update Approval Function

4.10.2.1.3 DFD for Update Payment Detail

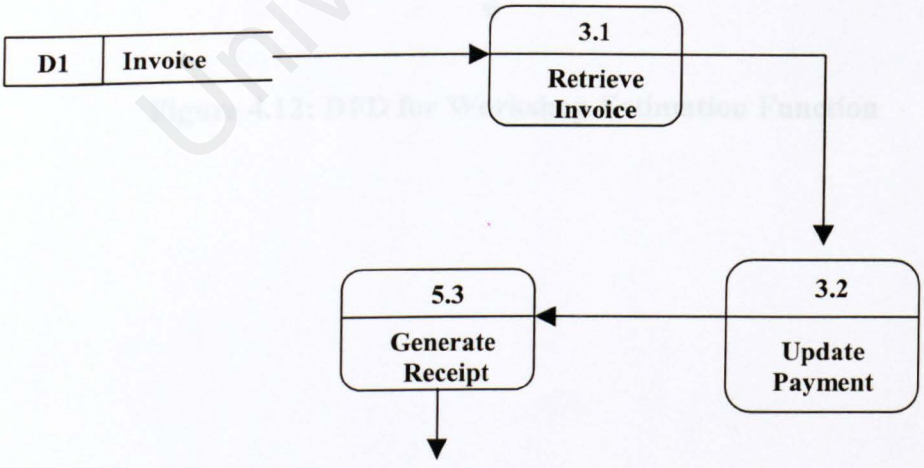


Figure 4.11: DFD for Update Payment Function

4.10.2.2 Workshop User Module

4.10.2.2.1 DFD for Workshop Estimation

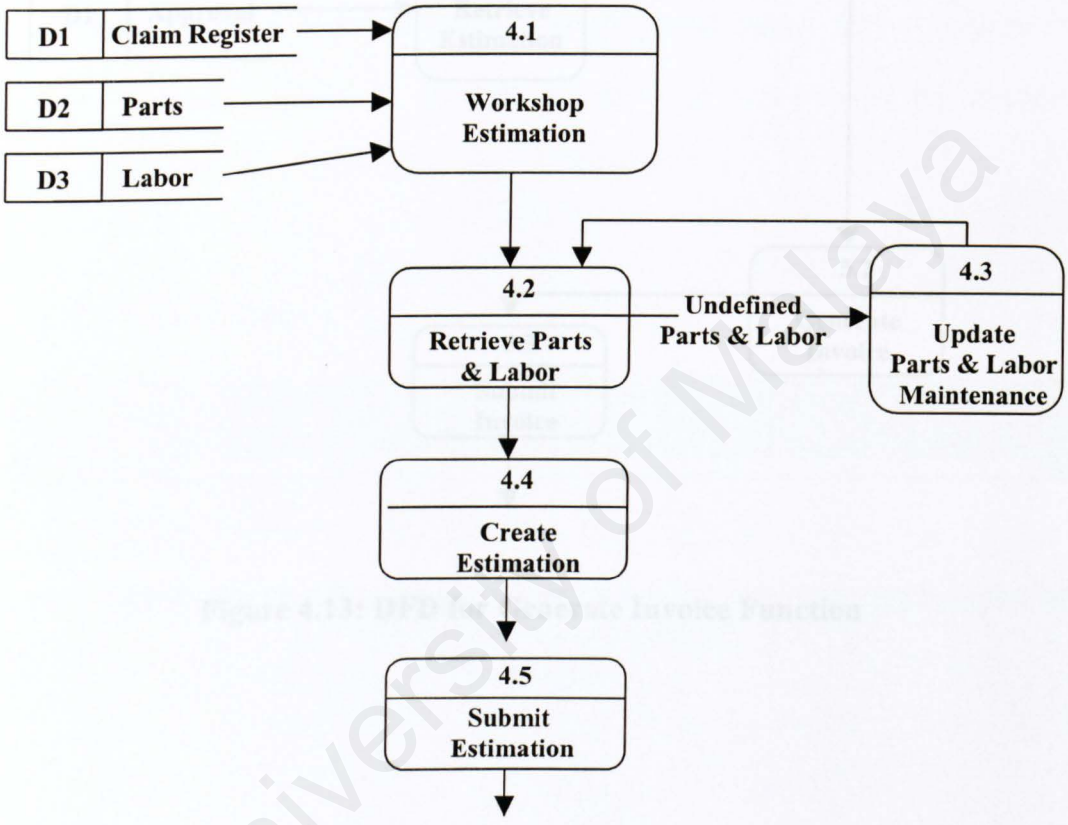


Figure 4.12: DFD for Workshop Estimation Function

4.10.2.2.2 DFD for Generating Invoice

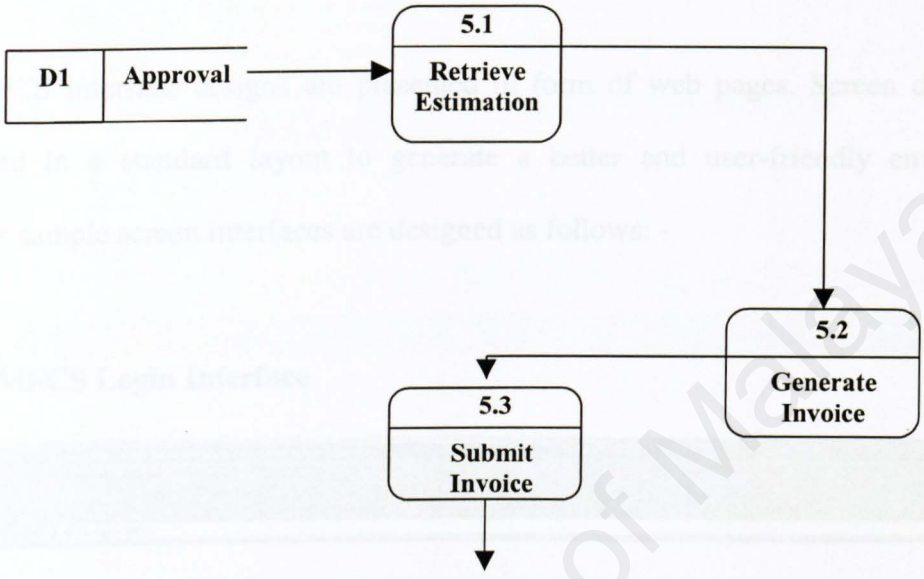


Figure 4.13: DFD for Generate Invoice Function

4.10 User Interface Design

User Interface Design plays an important role in system development. Developer should consider an interactive and user friendly interface so that to enable users to interact with the system functions more efficiently.

The MFCS interface designs are presented in form of web pages. Screen designs are formatted in a standard layout to generate a better and user-friendly environment. MFCS's sample screen interfaces are designed as follows: -

4.11.1 MFCS Login Interface

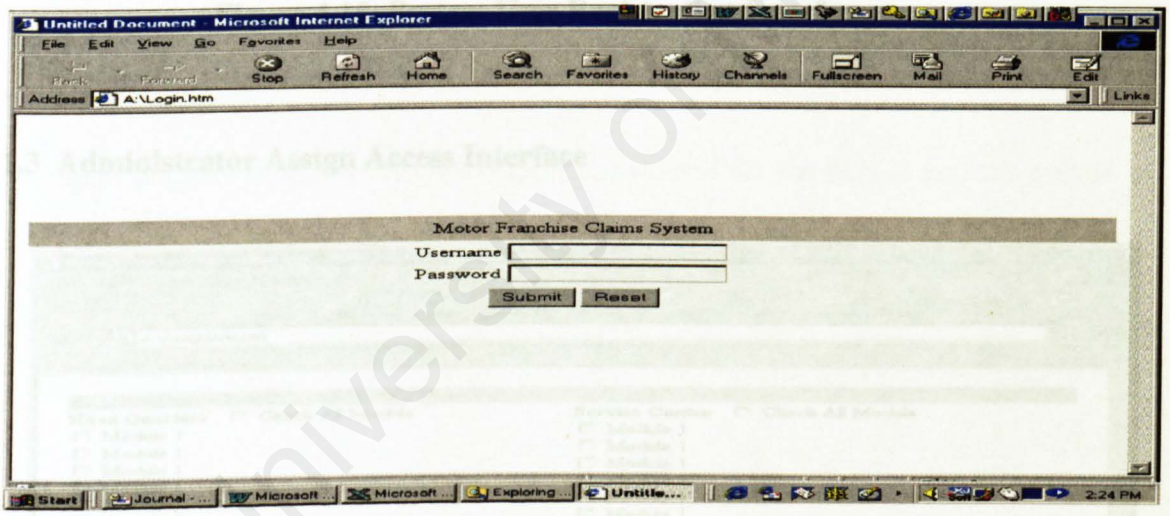


Figure 4.14: Interface Design for Login

4.11.2 System User Registration Interface

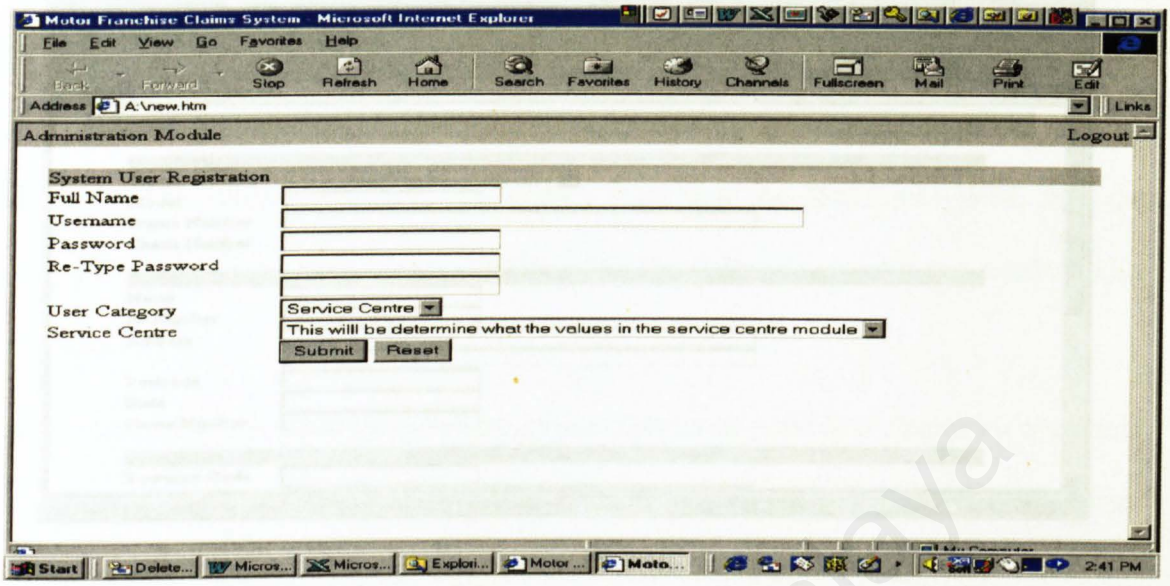


Figure 4.15: System User Registration Interface

4.11.3 Administrator Assign Access Interface

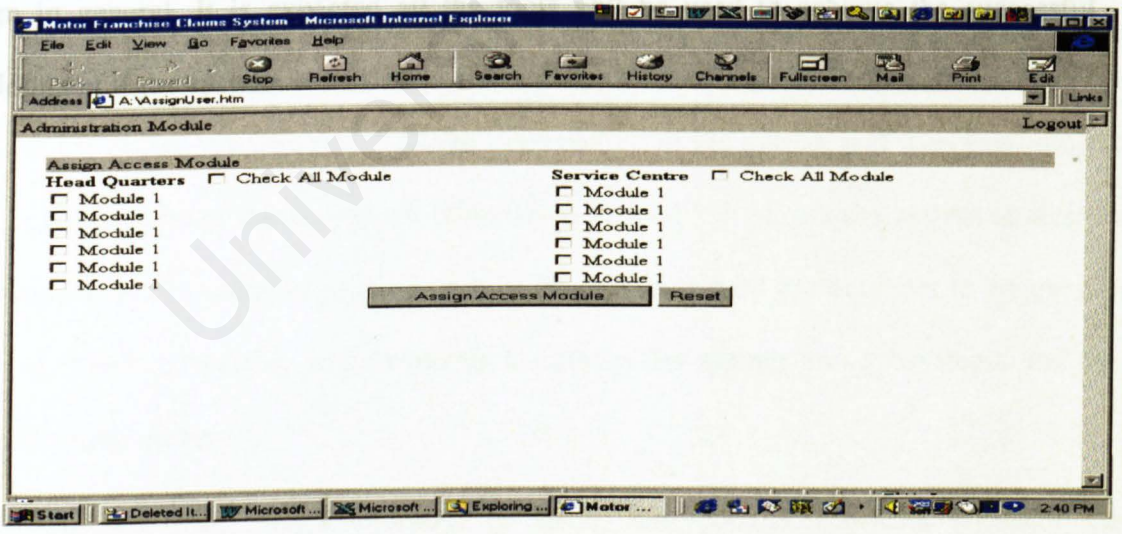


Figure 4.16: Administrator Assign Access Interface

4.11.4 Head Office Claim Registration Interface

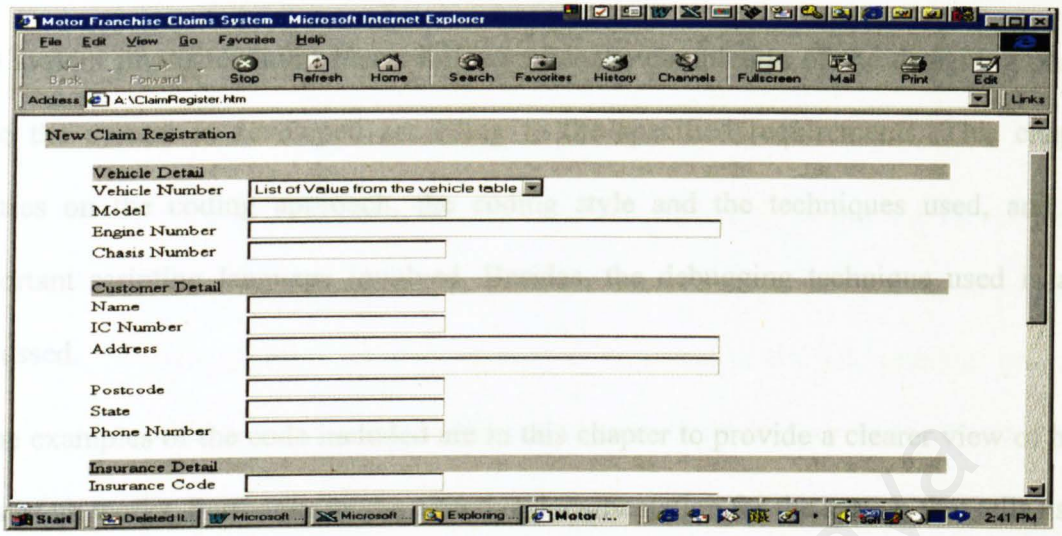


Figure 4.17: HQ Claim Registration Interface

4.11 Conclusion

This chapter consists of the development tools considered for the MFCS and it's system design in general. It is expected all the tools will be used to achieve the successful development if the system.

5.1 System Development and Implementation

The system implementation phase follows after the completion of the designing phase. Here the system is developed according to the specified requirements. This chapter focuses on the coding approach, the coding style and the techniques used, and the important scripting language involved. Besides, the debugging technique used is also discussed.

Some examples of the code included are in this chapter to provide a clearer view of how the system works. Furthermore, the effective documentation for the system that tells users how the system works such as the help file is also developed in this phase.

5.2 Coding Approach

This selection for coding approach is essential for aiding in quality assurance of the system projects. The top-down approach and the modular approach are selected for the coding purpose.

Top-down design means looking at the large picture of the system and then exploding it into smaller parts of the subsystem (Kendall & Kendall). It allows the system analyst to ascertain overall system objectives first, as well as how they are best met in an overall system. Then the system analyst moves to divides the system into subsystems and the system requirements.

Once the top-down design approach is taken, the modular approach is useful in programming. This approach involves breaking the programming into logical, manageable modules. It works well with top-down design because it emphasizes the

interfaces between modules and does not neglect them until later in the system development. Each individual module should be functionally cohesive, so that it is charged with accomplishing only one function.

The top-down design is selected because it avoids the chaos of attempting to design system all at once. Besides, it also prevents the system analyst from getting so mired in details that he loses sight of what the system is supposed to do. The modular program design makes modules easier to write and debug because they are virtually self-contained.

Tracing an error in a module is less complicated, since a problem in one module will not cause problems in others. Modules are also easier to maintain since modification usually will be limited to a few modules and will not spread over the entire program. Modules are also easier to grasp, since they are self-contained subsystems. This means that a reader can pick up a code listing of any module and understand its function as shown in Figure 5.1.

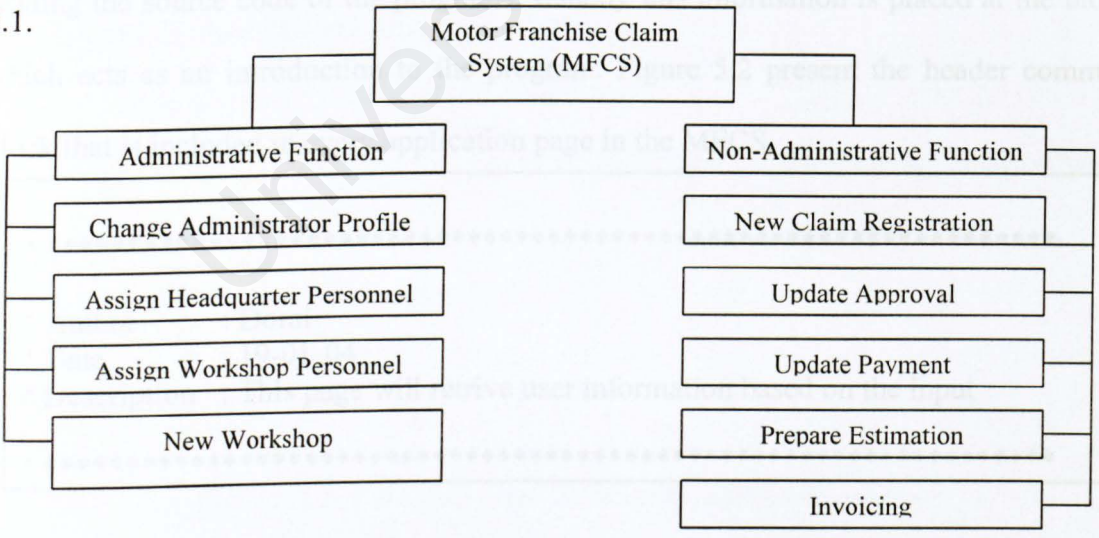


Figure 5.1: Top Down Structure of MFCS

Top-down design for MFCS is divided into two main parts that is Administrative Function and Non-Administrative Function. In the Administrative Function, all Administrators functions are included. Whereas for non-administrative function, all functions in Headquarters and Workshop module are listed.

5.3 Programming Style

The programming styles are important to increase the code maintainability and readability. Good programming styles serves as the documentation for codes with the comments added.

5.3.1 Internal Documentation

The internal documentation contains information directed at someone who will be reading the source code of the programs. Usually this information is placed at the block, which acts as an introduction to the program. Figure 5.2 present the header comment block that is included in every application page in the MFCS.

```
' ************************************************************

' Author      : Dorai
' Date        : 19-01-04
' Description : This page will retrive user information based on the input

' ************************************************************
```

Figure 5.2: Header Comment Block

Additional comments enlighten readers as they read through the program, helping them to understand the code. This is to help for future enhancements as well. With comments, understanding of codes is at ease.

5.3.2 Meaningful Variables and Statement Labels

Meaningful variables names and statement labels were chosen to reflect the names use and meaning. For instance, setting the variable name to "UserName" would make more sense that using "a". With the meaningful variables, certain codes of the coding methodology will make much more sense and it will be much easier when debugging.

5.4 Data Manipulation

Data in the MFCS is manipulated by using the Structured Query Language (SQL). Appended below are the basic SQL statements

5.4.1 Fetching User Information from Database

```
Set rs = Server.CreateObject("ADODB.Recordset")
rs.ActiveConnection = MM_sql_STRING
rs.Source = "SELECT * FROM dbo.LOGIN WHERE ID = " + Replace(rs__MMColParam,
"'", "''") + ""
rs.CursorType = 0
rs.CursorLocation = 2
rs.LockType = 1
rs.Open()

rs_numRows = 0
```

Figure 5.3: Fetching User Information from Database

5.4.2 Inserting New Headquaters Personnel Into the System

```
<!--#include virtual="/Connections/sql.asp" -->
<%

dim username
dim password
dim fullname
dim category
dim workshop
dim strsql
username=Request.Form("username")
password=Request.Form("password1")
fullname=Request.Form("fullname")
category=Request.Form("category")
workshop="0"
Set rs = Server.CreateObject("ADODB.Recordset")
rs.ActiveConnection = MM_sql_STRING
rs.Source = "Select * from login where username='" + username + "'"
rs.CursorType = 0
rs.CursorLocation = 2
rs.LockType = 1
rs.Open()
' search if there is an exsisting user with similiar username
if rs.eof then
        strsql = "insert into
login(USERNAME,PASSWORD,FULLNAME,CATEGORY,WORKSHOP) values ("
        strsql = strsql + "'" + username + "','" + password + "','" + fullname + "'," +
category + ","
        strsql = strsql + workshop + ")"
        set rs1 = Server.CreateObject("ADODB.Command")
        rs1.ActiveConnection = MM_sql_STRING
        rs1.CommandText = strsql
        rs1.Execute()
        Response.Redirect("list.asp")
else
        Response.Write("The username that you've entered has been taken, please hit
the back button and re-enter the username")
end if
' close the object
rs.close()
set rs=nothing
%>
```

Figure 5.4: Inserting New Headquarters Personnel Into the System

5.4.3 Deleting Selected User from the Database

```
<%@LANGUAGE="VBSCRIPT" CODEPAGE="1252"%>
<!--#include virtual="/Connections/sql.asp" -->
<%
dim id
dim strdescription
dim rate
dim strSQL
id=Request.QueryString("id")

' construct an SQL query based on the input

strSQL= "delete from login where id=" + id
set rs = Server.CreateObject("ADODB.Command")
rs.ActiveConnection = MM_sql_STRING
rs.CommandText = strSQL
rs.CommandType = 1
rs.CommandTimeout = 0
rs.Prepared = true
rs.Execute()

' Redirected page back to listing page

Response.Redirect("list.asp")
%>
```

Figure 5.5: Deleting Selected User from the Database

5.5 Scripting Language

The scripting language used in the programming in MFCS application is VBScript, JavaScript and Active Server Pages (ASP). VBScript is used as the scripting language for client side validation. For the server side validation, ASP was used. This could reduce the response time and redundant between client and server. Some of the validation scripting is shown below:

5.5.1 Validating User Information based on the Requested User

```
<script language="JavaScript" type="text/JavaScript">
<!--
function validate() {
        // validation rule
        if (document.forms[0].fullname.value=="") {
        // required field
                alert("You must supply the Full Name!")
                document.forms[0].fullname.focus()
      return false
        } else
        if (document.forms[0].username.value=="") {
        // required field
                alert("You must supply the username!")
                document.forms[0].username.focus()
      return false
   } else
        if ((document.forms[0].password1.value=="") ||
(document.forms[0].password2.value="")) {
        // required field
                alert("You must supply password!")
                document.forms[0].password1.focus()
      return false
   } else
        if (document.forms[0].password1.value!=document.forms[0].password2.value) {
        // required field
                alert("Your password did not match, please try again!")
                document.forms[0].password1.value=""
                document.forms[0].password2.value=""
                document.forms[0].password1.focus()
     return false
   } else
        return true
}
function MM_goToURL() { //v3.0
  var i, args=MM_goToURL.arguments; document.MM_returnValue = false;
  for (i=0; i<(args.length-1); i+=2) eval(args[i]+".location='"+args[i+1]+"'");
}
//-->
</script>
```

5.5.2 Validating User Information

```
<script language="JavaScript" type="text/JavaScript">
<!--
function MM_goToURL() { //v3.0
  var i, args=MM_goToURL.arguments; document.MM_returnValue = false;
  for (i=0; i<(args.length-1); i+=2) eval(args[i]+".location='"+args[i+1]+"'");
}
function validate() {
        // validation rule upon saving the information
        if (document.forms[0].fullname.value=="") {
        // required field
                alert("You must supply the Full Name!")
                document.forms[0].fullname.focus()
      return false
        } else
        if (document.forms[0].username.value=="") {
        // required field
                alert("You must supply the username!")
                document.forms[0].username.focus()
      return false
   } else
        if ((document.forms[0].password1.value=="") ||
(document.forms[0].password2.value="")) {
        // required field
                alert("You must supply password!")
                document.forms[0].password1.focus()
      return false
   } else
        if (document.forms[0].password1.value!=document.forms[0].password2.value) {
        // required field
                alert("Your password did not match, please try again!")
                document.forms[0].password1.value=""
                document.forms[0].password2.value=""
                document.forms[0].password1.focus()
     return false
   } else
        return true
}
//-->
</script>
```

5.8 Debugging Techniques

Dreamweaver provides a clear view of debugging option to user. Therefore, errors encountered can be easily traced by checking at the debugging option provided. It shows where the error occurs and shows some tips of rectifying the error.

For example, by typing the following sentence below the coding page, the error will be identified when running the application: -

```
Response.Write (strSQL)

Response.End()
```

The following error message will appear after running the application: -

```
Error Type:
Microsoft VBScript compilation (0x800A0409)
Unterminated string constant
/administration/user/headquarter/insert.asp, line 33, column 31
strsql = strsql + workshop + ")
---------------------------^
```

MS SQL will show the following error message after pursing the error message in SQL Query Analyzer

```
strsql = strsql + workshop + ")

Server: Msg 170, Level 15, State 1, Line 1
Line 1: Incorrect syntax near '='.
Server: Msg 105, Level 15, State 1, Line 1
Unclosed quotation mark before the character string ') '.
```

6.1 System Testing

System testing is required to ensure that the system runs smoothly and is according o the specifications. Testing is necessary to ensure that the final system delivered is in line with the user's requirements and expectations.

In general, the MFCS underwent three general steps of testing, which is the component testing, integration testing and the user testing. These three stages consist of five types of tests.

Testing takes place throughout the process of the system implementation. Although testing is tedious, it is essential series of steps that help to ensure the quality of the eventual system. Testing is done on many different levels at various intervals.

First, unit testing or module testing is carried out in which each program component is tested on its own, isolated from the other components in the system.

When selections of components have been unit tested, the next step is to ensure that the interfaces among the components are defined and handled properly. Integration testing is the process of verifying that the system components work together as they described in the system and program specifications. Finally the system is tested to assure that it has the desired functionality.

6.2 Unit Testing

Individual components in the Motor Franchise Claim System (MFCS) were tested, such as single procedure of functions are tested to ensure that they operate correctly in a

module. Unit testing focuses the verification efforts on the smallest unit of software design. Each component is tested independently without other system components.

Unit testing verifies that the components functions properly with the types of input expected form studying the component's design. The internal data structure logic, and boundary conditions for the input and output data are also tested.

To test a component, input data and conditions were chosen to show the component to manipulate the data and the output is observed. The input is selected so that the output demonstrates something about the behavior of the code. Both valid and invalid data were created to test data. These data are then run to see if it base on routines work and also to catch errors. Created data are also tested to show the possible maximum and minimum values, as well, as variations in formats and codes. Throughout the process, the output is checked for errors.

For example, the new Headquarters or Workshop User registration form: the username, password and verify password. Password and verify password fields does not allow for space and special character. If the User Name or the Password has been user earlier, then the system should return alert message to the user to change the User Name and Password.

Test data with wrong format is created to test whether the units can detect the fault data. Some of the form fields are left empty when submitting the form and to check whether the system can detect the empty fields.

Two important features in the new User Registration form are no duplication username and the matching of the user password and verify password. In this unit testing, these two

features are tested by using test data connection of unit to other pages of link is also tested here. Upon completing the new member registration form, the data is submitted and if the registration success, users will be directed to the registration successful acknowledgement page. This is test by using a set of test data that is no fault.

6.2.1 Administrator Module

In the Administrator Module, there are two main functions, User Maintenance and Workshop Maintenance.

There are three functions in the User Maintenance section. They are Change Administrator Profile, Headquarters Personnel and Workshop Personnel. As for the Workshop Maintenance, New Workshop Registration is the main function.

Entering same Headquarters or Workshop Personnel's name to register individually tests each function. If the user name is already existing, the following error message will appear: -

> ***"The username that you have entered has been taken, please hit the back button and re-enter the username"***

6.2.2 Headquarters Module

In the Headquarters Module, there four main functions, New Claim Registration, New Vehicle Registration, Update Approval and Update Payment.

New Claim Registration is providing function for the Headquarters personnel to register any new coming claims. Function in this module was tested to avoid duplication of claim and found it works accurately.

Similarly, New Vehicle Registration allows the Headquarters personnel to update new vehicle information in the database. New vehicle are also when through the process of validation whereby the system should return error message as and when a same vehicle is being registered.

Functions like Update Approval and Update Payment are also tested to find out if they are working accurately. These two functions are basically updating information that is received manually. However, these two functions were tested to avoid confusion on the dates of each process. It found working well by recognizing the dates according to the specification.

6.3 Integration Testing

When individual components are working correctly and by meeting their objectives, they are combining into a working system. Integration is the process of verifying that the system components work together as described in the system and program design specification.

Take the example of the Estimation Function in Workshop Module and Update Approval in Headquarters Module. After submitting the estimation to Headquarters, the estimation must be viewable in Headquarters screen. When these units are tested successfully, they were integrated and tested. The top-down approach is selected for the integration testing.

In this approach, the controlling components will be the top-level and usually it is tested by itself. Then all components called by the tested components are combined and tested on a large unit. This approach is reapplied until all components are incorporated.

6.4 System Testing

Once information passed among components in accordance with the design, the system is tested as a whole, to assure that it has the desired functionality. Three tests involved in the system testing, the function test, performance test and the user acceptance test.

When the system passes all the tests, it is ready for installation and the installation test will take place.

6.4.1 Function Testing

A function test checks that the integrated system performs its functions as specified in the requirements. The function test in MFCS verifies that the application allows Administrator to register new user, login, search, create claim while maintenance for the vehicle, parts and labour are done at headquarters level.

6.4.1.1 MFCS User Registration

Test if this function allows administrator to registers new user and verifying the password and username.

6.4.1.2 Search Functions

Test if the function has the quick search and display the results accordingly.

6.4.1.3 Claim Registration

Test if the function allows the user to register a new claim while avoiding duplication of claim.

6.4.1.4 Vehicle, Parts and Labour Maintenance

Test if the headquarters personnel could maintain new vehicle, parts and labour charges.

6.4.2 Function Testing

Once the function work as specified the performance test compares the integrated components with the non-functional system requirements. The non-functional requirements are learnability, speed, reliability, robustness, interoperability, usability, modularity, maintability, accuracy, correctness, and security, constraint all the way, in which the system functions are performed.

6.4.2.1 Learnability

Test the ease of use of the system and make sure level of the understanding of users is high once using the system.

6.4.2.2 Speed

Test the speed of the processing of the data by checking the response time in the debugging options provided by the MS SQL Server to enable high performance of the system.

6.4.2.3 Reliability

Test the time for a system to function normal after a failure.

6.4.2.4 Robustness

Test if the system is able to retain operating when fault data is inserted and return error message to user before the data is sent to server for processing.

6.4.2.5 Interoperability

Test if the system is able to interact with other existing system. This is for future enhancements.

6.4.2.6 Usability

Test if the system provides a user-friendly interface, smooth flow of data between pages, complete user manual and display appropriate message throughout the process.

6.4.2.7 Modularity

Test if the appropriate programming style approach is used.

6.4.2.8 Maintainability

Test if the site can be easily maintained and managed by administrators

6.4.2.9 Accuracy

Test if the system provides the correct calculation of the system.

6.4.2.10 Correctness

Test if the system matches the user requirements, objectives and the system specifications.

6.4.2.11 Security

Test the accessibility of different users in different pages.

6.5 User Acceptance Test

Acceptance testing, or sometimes called as alpha testing is the final stage of testing Acceptance testing reveals errors and omissions in the system requirements definition because the acceptance testing involves testing from the user. During the acceptance test, the functionality of the system is demonstrated to the users as the users may experience the system hands on. This test is carried out by end users, in which they will try out the system.

A benchmark test is carried out to evaluate the system. A set of test case is prepared that represent typical conditions under which the system operates when actually installed.

This stage of testing helps to reveal the requirement problems that exists where the functions provided by the system do not really meet the user's need or requirement testing. Users will evaluate the system's performance for each test use.

However, due to the time constraint before the final presentation, the user acceptance test result is limited to three testers only. The results are available in attachment.

7.1 System Evaluation

The objective of this chapter is to identify the various problems faced during the implementation of the Motor Franchise Claim System (MFCS) and also to evaluate the MFCS as a whole. System evaluation is done by assessing the strength, the weaknesses and to assess which feature could be enhanced in the future.

This system evaluation is elaborated in detail in this chapter. This phase is carried out when the implementation and testing phase end. Here, the system is evaluated as a whole. The problems encountered when developing and implementing are explained. The solutions to the problems are also discussed here. This chapter also discuss about the system evaluation by end users.

The system strengths, and constraints and the future enhancements of the system are also discussed. Finally, the knowledge and experiences gained from this project is included in this chapter.

7.2 Problems and solutions

Various problems were encountered and methods of sorts were tried to resolve them. Among them are:

7.2.1 Determining The Project Scope

I found it rather tough trying to incorporate the vast amount of features and effects available into the system, given the time frame. This by no means degrade the integrity of the system for the effects I mean are to merely augment the interface and does not influence the contents of the system. Therefore, only limited but apt effects (images, bullets) are displayed in accordance with the theme of the interface. Besides that, the

system lives up to prior expectations. Also, availability of tools was also considered in determining the project scope.

7.2.2 Lack of time in research

As I am a part time student, I had very limited time between my office work, course studies and preparation for examination. Even though research was conducted via the Internet and comparing existing systems, the time constraint was immense for I had to distribute my time to concentrate on other courses. Though research was done, it was limited and this contributed as a major problem in design and implementation.

7.2.3 Wide Area of Studies

In order to successfully develop and implement MFCS, researches have to be done. Furthermore, various technologies and tools had to be explored in order to choose the right tools. The Internet was a great help in helping to obtain necessary information. Research papers published by academic institution and other organizations were studied. Other similar systems were also studied. Besides, knowledge was also obtained from reading of printed materials.

7.2.4 Problems and Solution During System Implementation and Testing

As there is no prior knowledge in programming in a web-based environment, a lot of studies need to be done to familiarize with the concept of web programming. Programming languages and various web development tools seed to be learnt within a short time span. Choosing ASP as the programming language was a wise decision due to its short learning curve. Discussion with course-mates, seeking advice from the Internet and self-studies also helped resolved the problems faced.

7.2.5 Unfamiliar Programming Languages.

It was difficult to learn few programming languages such as ASP and scripting languages such as JavaScript in this short period. Most of the reference books provide guidance in using data control to connect to the database. However the data control method is rather

limited in its functionality and therefore was not considered a viable option. Help was sought from friends in using alternatives methods to connect to the database.

7.2.6 Database & Setup Problems.

After the system was finished, some of the database retrieval functions are not working. The main problem is the edit/delete function in my admin module. I faced problems in transferring all the files to the computers in lab and thus publish it from there itself. Testing has been done few times to ensure that the system functionality is working accurate.

7.3 System Strengths

7.3.1 Web enabled

The MFCS implementation is based on web technology. This means that the current implementation can be displayed over the Internet. Employing a client server approach allows loads to be shared between the client and the server, thus reducing the burden on the server and allowing it to provide better service and faster throughput.

7.3.2 User friendly

MFCS was developed to be as user friendly as possible user are provided with instructions what do to .The flow of the pages was designed in accordance with the topics. Users will also familiar with the interfaces as most of the pages have a standard look.

7.3.3 Complete Validation

MFCS provides complete validation against admin user input from the user. For example when the admin user enter their password wrongly, message would prompt the use for any corrections.

7.3.4 Precise Data and Information

The system's data and information pertaining grammar and so on are precise and concise. The entire search for term and meaning using this system is capable of achieving optimum status. All the data are relevant and widely used in the current syllabus.

7.3.5 Minimal User Intervention.

In certain parts users do not have to type in text for a certain action. Select list was used where users can just select from the options given. This will also minimize errors created by users while typing in input strings.

7.4 System Limitations

7.4.1 Browser Conflict.

The Internet Browser recommended for MFCS is Internet Explorer. All development products that were used are Microsoft products, and Internet Explorer is also Microsoft product Therefore it is only logical that an integrated browser (IE) will be able to display the proper layout of the site. Chances are, certain properties that are recognized in IE might not be recognized in other browsers. This takes on the form of an inhibition.

7.4.2 Difficulty in Finding Suitable Images

There are loads of images and effects on the net, but only a few were suitable for my site. Moreover, if simply paste the images just for the sake of filling up space, the whole interface will look stuffy. The apparent lack of images is an interface limitation but does not impoverish the site.

7.4.3 Speed Limitations

As a web based system, problems with system speed may arise under conditions of heavy traffic.

7.4.4 No Printing Capability

There is no printing facility provided in the application. Administrator cannot generate listings for offline viewing. Though printing through the browser works well, a more powerful printing feature should be integrated into the application.

7.4.5 Limited Menu Driven Screen

Even though MFCS was proposed using the menu driven format, some limitation was experienced during the development process. To avoid too much navigation by the user, the functions such as Prepare Estimation, Issue Invoice, Update Payment and Update Approval was reflected as an image file by providing the function name upon pointing the icon.

However, the entire proposed functions were well established in the system.

7.5 System Achievement

System achievement refers to the degree of achievement of the Motor Franchise Claim System compared to the specification stipulated in the system designing stage. It is an experience when developing a system that to meet the entire specification requirement. The fully developed MFCS has a significant achievement when comparing the specification elaborated in the designing stage.

The MFCS has managed to incorporate the software and hardware specified in the earlier chapters. All the software and hardware are very helpful in developing the system.

While maintaining the design as per the specification, some changes had to be made, as they are unavoidable. Due to time constraint, the proposed e-mail notification of claim

and image transfer facilities is not available in the system. However, these two items has been considered for the future enhancement of the system.

I have also faced difficulties in developing the User Access Control in the Administrator Module. Even so, the user of the system will be pre-defined in the Administrator User Registration function. This function also serve the purpose of the User Access Control as proposed earlier.

In general, the fundamental objectives of the Motor Franchise Claim System (MFCS) have been achieved. With the complete database system to provide the vehicle model, parts and labour details, MFCS is expected to meet the priceless need for a centralized database system for Motor Claim processing of the national carmakers.

7.6 Knowledge and Experience Gained

Upon completion of this project, lots of knowledge and experience were gained. From the beginning till the end of the project, a student is exposed to the seven phases involved in bringing out the system.

Students had learned about the process of analysing, designing, implementing, testing and evaluating a system. These experiences are very useful and helpful in future when handling a project.

Furthermore, when developing the system, students can improve knowledge towards in using tests when the programming languages, the scripting language, the databases and the designing tools.

Students also learned the technique and skill in developing a project, the input manner of documenting the system, and the right way to implement a code and system. The evaluation towards the system including the problems faced and the solutions to the system, the system evaluation by end users, system strengths, system constraints, future enhancements and the knowledge and experienced gained.

The system strengths indicate the positive values of the MFCS while the system constraints show the limitations. However the system constraints can be improved in the future with the enhancements to the system.

Finally upon completion of this project, student has gained lots of knowledge and experience. A student has gained to develop a web application fully and get to be in so many position, like database designer, interface designer, programmer, tester and as a whole project developer. This is an important experience and knowledge, which is very useful in dealing with similar projects in the near future.

8.1 Future Enhancement

The Motor Franchise Claim System (MFCS) has a potential area of development and enhancement in the future. Various areas are identified for the future development. Among them: -

8.1.1 Security

To further enhance the security level, the MFCS must be equipped with sophisticated security mechanisms, such as IP authentication of each users machine.

8.1.2 Widen Target Market

The current MFCS could be further widen the scope by introducing more Motor Franchise Holders into the system. For example, Proton, Toyota, Honda, Hyundai, Naza Motors, Nissan and KIA. Adding the respective parts and vehicle model in the database system of MFCS could do this.

8.1.3 Expend Product Line

As the basic of claim infrastructure is available in the MFCS, it has a bright future for enhancement by adding Non-Motor Modules into the system.

8.1.4 Integration with Internal Systems

To further strengthen and widen the scope of the MFCS, is can be integrated with the Motor Franchise Holders internal system such as e-Daftar (electronic vehicle registration

with the Road Transport Department, RTD), Vehicle Sales Order System (VSO), Vehicle Service System (VSS) and Vehicle Distribution & Allocation System (DNA). The integration to the system mentioned above would reduce the entire cycle process of identifying a valid vehicle during the registration of a claim in MFCS, while maintaining better data accuracy.

8.1.5 More User by Adding more Modules

Adding Insurance Company Module and Loss Adjuster Module into the system could further enhance the MFCS. These additional modules would complete a comprehensive online accident claim-processing infrastructure.

8.1.6 Adding More features

To avoid on site adjuster inspection of an accident vehicle, the MFCS could be improved by providing image transfer facilities online. In addition to that, the e-mail notification to the intended parties could be accommodated into the system.

8.2 Conclusion

MFCS is an electronic Motor Claim processing system. The objective of MFCS is to provide a complete online motor claim-processing platform for Malaysia Motor Franchise Holders.

MFCS functions are the Administrator Module, Headquarters Module and Workshop Module. Besides the functional requirements, MFCS also has the non-functional requirements: Learnability, speed, reliability, robustness, interoperability, usability, modularity, maintainability, accuracy, correctness, and security.

The development of MFCS involves eight phases feasibility studies, requirements definitions, requirements analysis, requirements design, report and documentation, coding, system documentation, system testing and review.

Wide researches have been carried out to develop MFCS, these include researching the existing system, the tools, the functional and non-functional requirements, the methodology, the coding approach and programming styles, and the testing approach. The system was designed based on the results of the researches.

E-Bookstore is built using the Dreamweaver as the core language and the ASP and Javascript and VBScript are embedded within the code. The SQL Server 2000 has serves as the database and the Internet Information Server has serves as the web server.

In the end of the development, it is expected that every modules in MFCS will function according to the specification and the system can function like a real application.

The Motor Franchise Claim System (MFCS) is a dream come true for me. During the system design phase, it was just a rough idea of a motor claim system. The system requirements were not clear then.

REFERENCES

[1] www.merimen.com

[2] Genesis Total Solution Claim Manual and Presentation Notes

[3] http://www.w3schools.com/vbscript/

[4] Ed Tittel & Bill Brodgen, "Discover Java", IDG Books Worldwide, 1997

[5] An Overview of ASP [Online] - http://www.asp101.com

[6] Dreamweaver Ultra Dev: http://www.macromedia.com/software/dreamweaver/

[7] Client/Server software architecture – http://www.sei.cmu.edu/str/descriptions/clientserver_body.html

[8] Brooks Jr. F.P. The Mythical Man-Month. Essays on Software Engineering, Anniversary Edition, Reading, MA: Addision-Wesley, 1995

[9] Thomas Connolly, Carolyn Begg, Anne Strachan, University of Peisley, "Database Systems; A Practical Approach to Design, Implementation and Management".

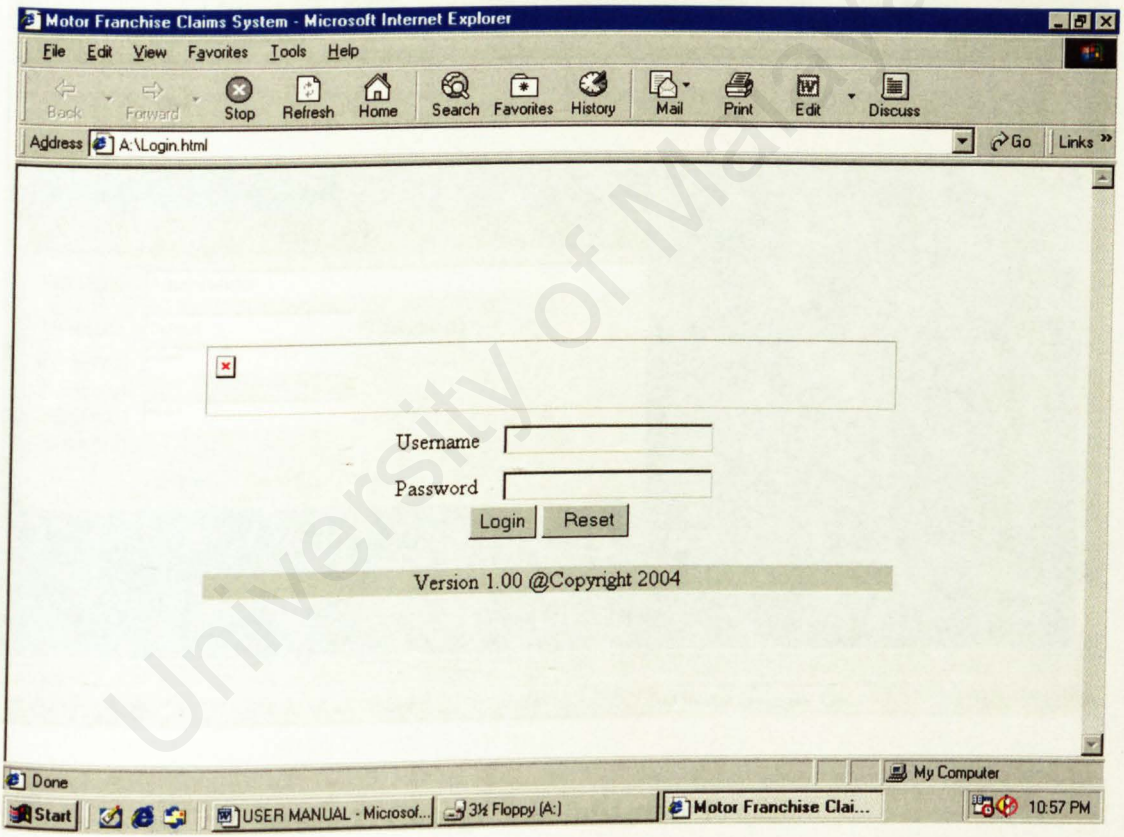
USER MANUAL

1. LOGIN

1.1 Login Screen

This screen is the standard login screen for all Motor Franchise Claim System users. User has to type in the User Name and Password.

The User Name has been predefined by the system Administrator and is not changeable. Only the Password is changeable by the individual user.

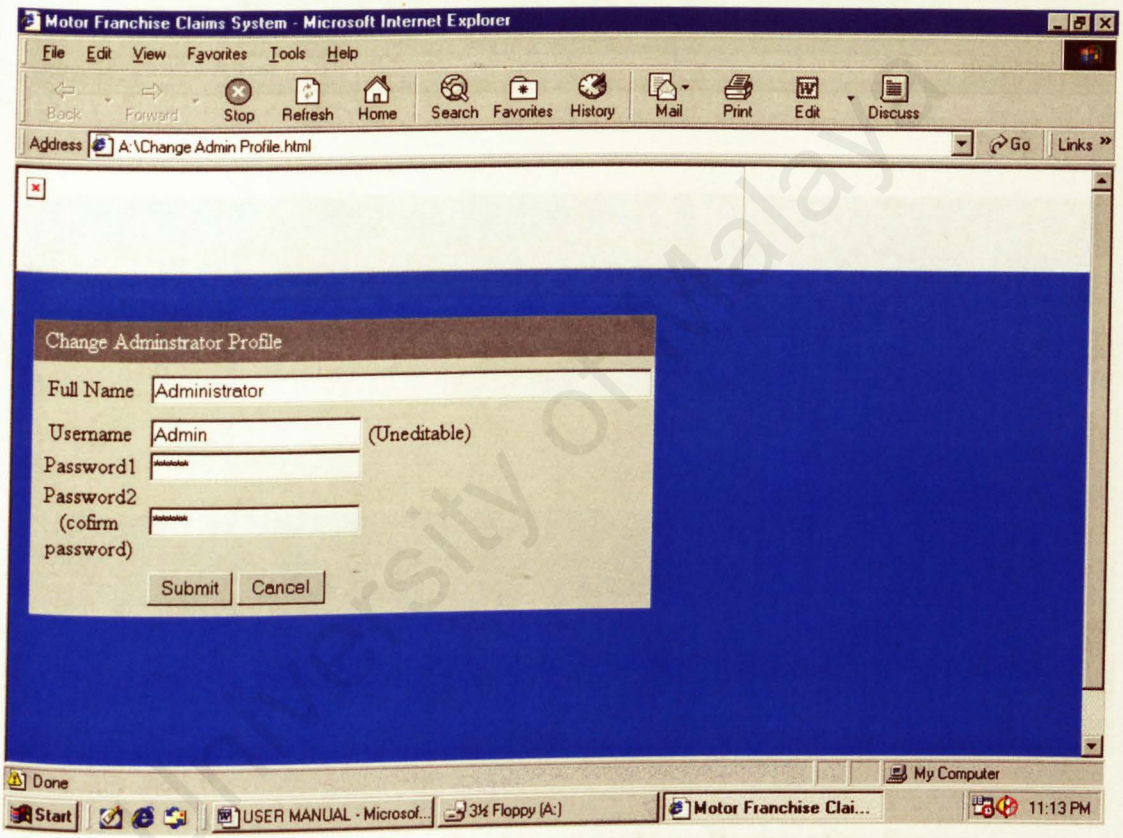


Screen 1: MFCS Login Screen

2. ADMINISTARTOR MODULE

2.1 Change Administrator Profile

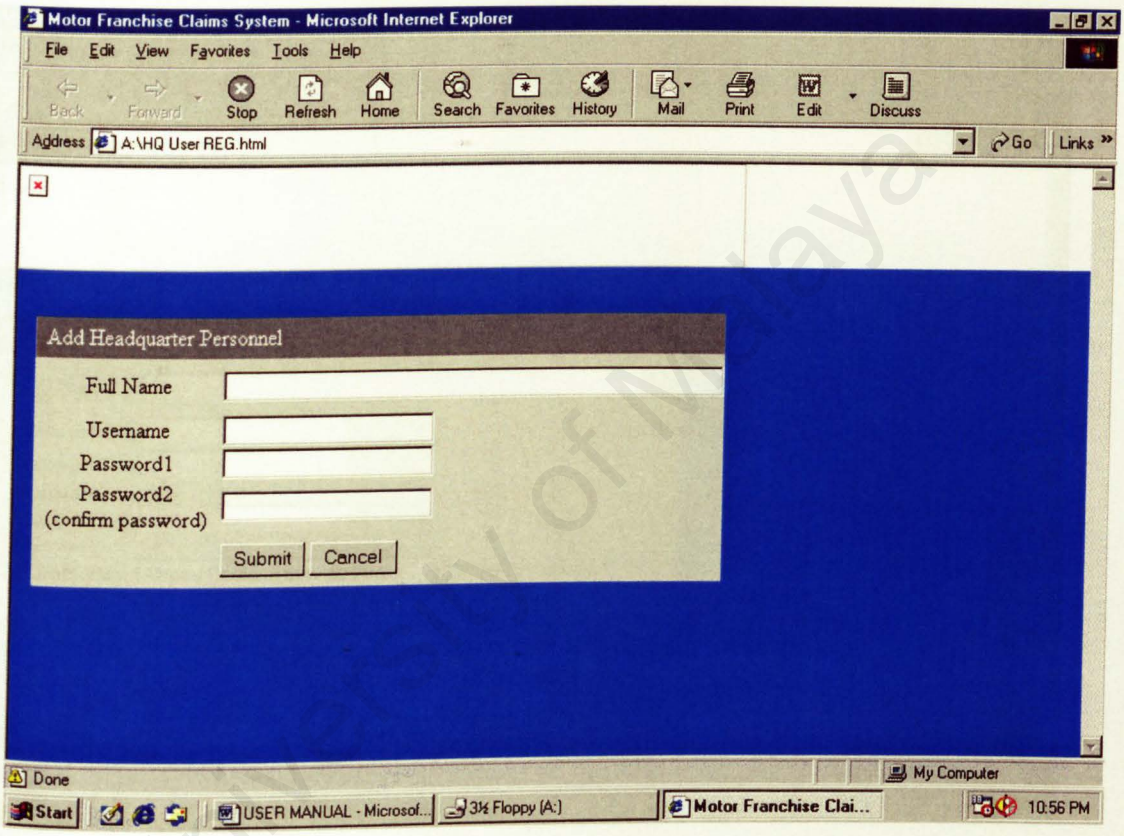
In this screen, Administrator is allowed to change his/her password.



Screen 2: Change Administrator Profile

2.2 Administrator Headquarters User Registration

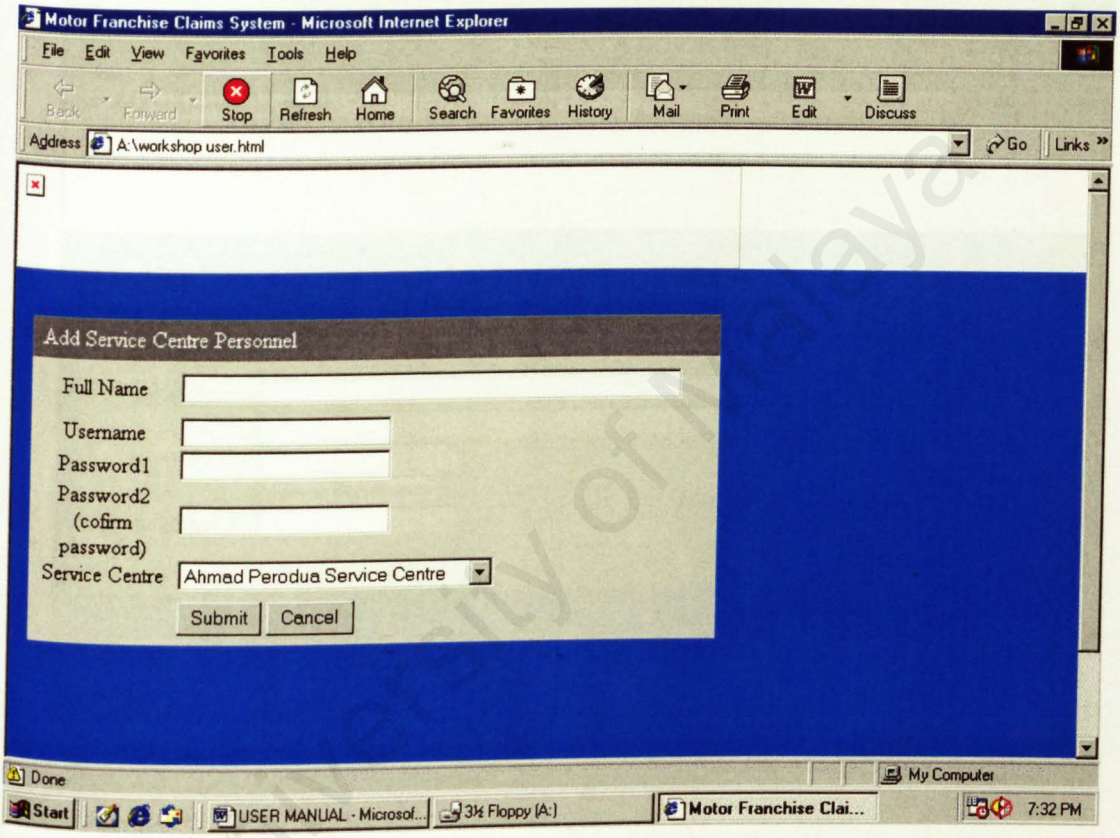
This screen is serving the purpose of registering Headquarters Personnel. Administrator will enter the User Name and Password in this screen. User Name is not changeable. Password is allowed to change by the Headquarters User.



Screen 2: Administrator Headquarters User Registration Screen

2.3 Administrator Workshop User Registration

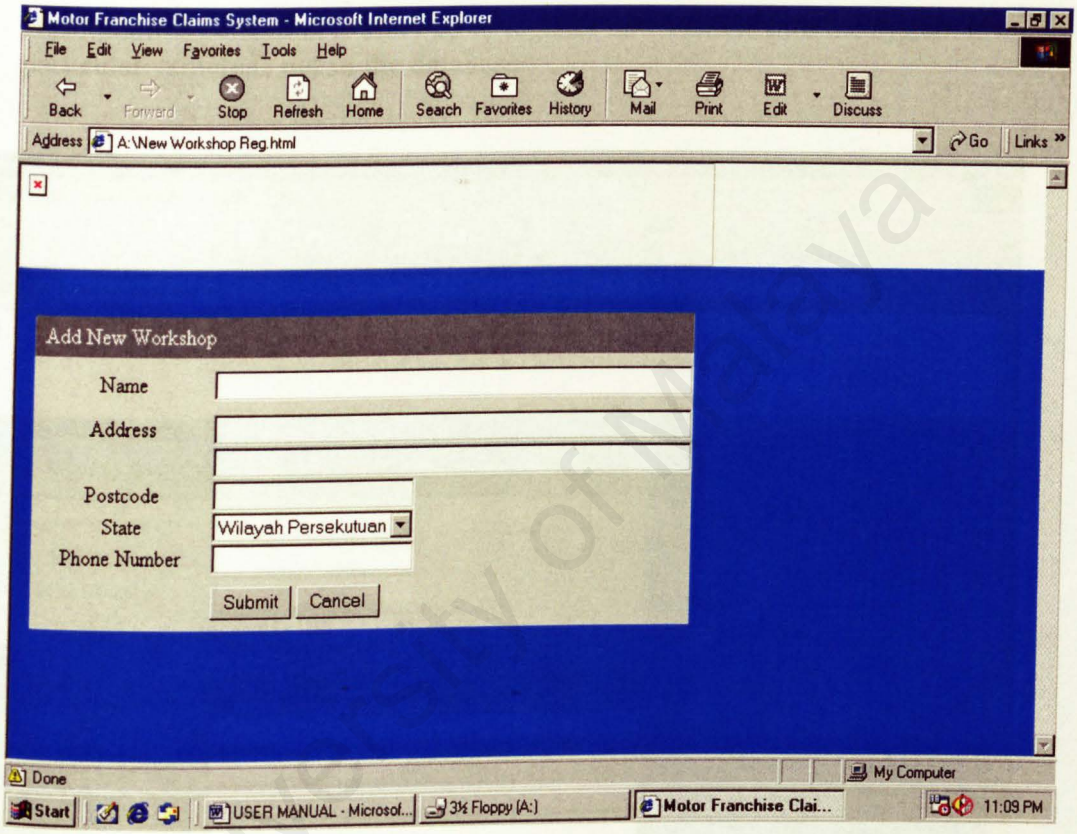
This screen is serving the purpose of registering Workshop User. Administrator will enter the User Name and Password in this screen. User Name is not changeable. Password is allowed to change by the Workshop User.



Screen 3: Administrator Workshop User Registration Screen

2.4 Administrator New Workshop Registration

In this screen, Administrator will update new Workshop into the system.

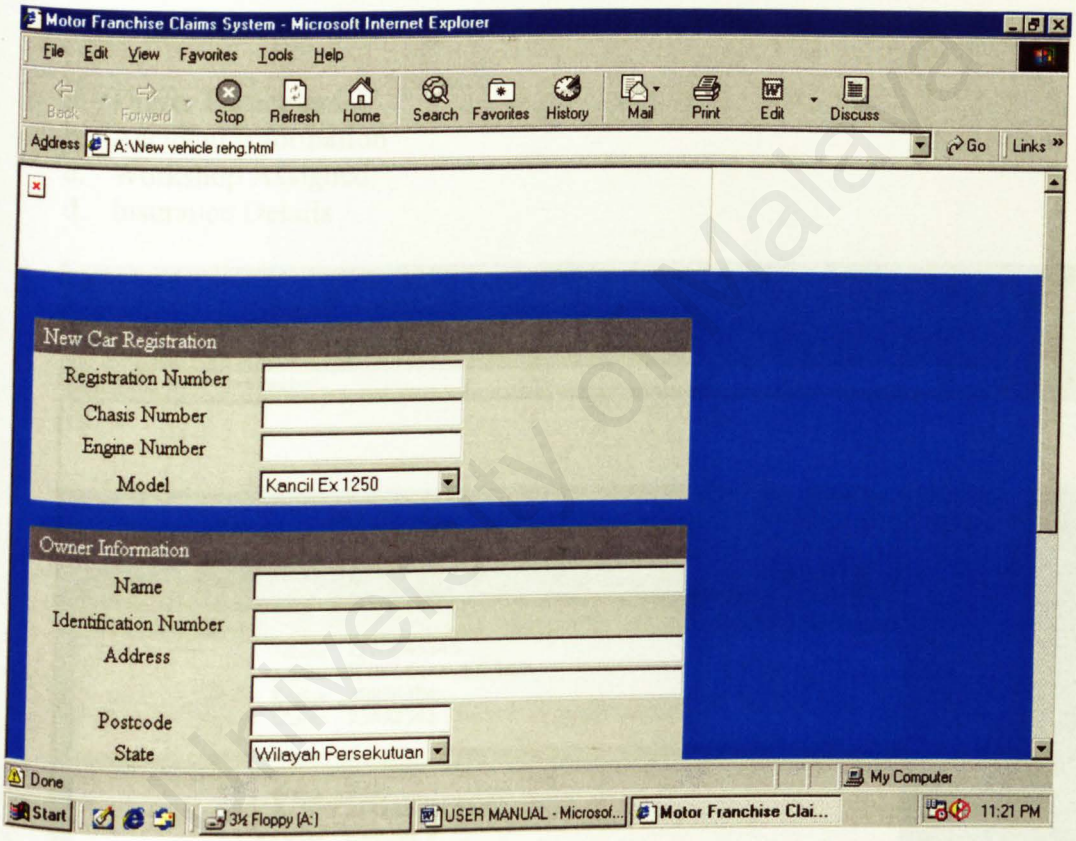


Screen 4: Administrator New Workshop Registration

3. HEAD QUARTERS MODULE

3.1 New Vehicle Registration

Headquarters personnel is allowed to register new vehicle into the system if the particular vehicle is not in the database.



Screen 5: Headquarters New Vehicle Registration

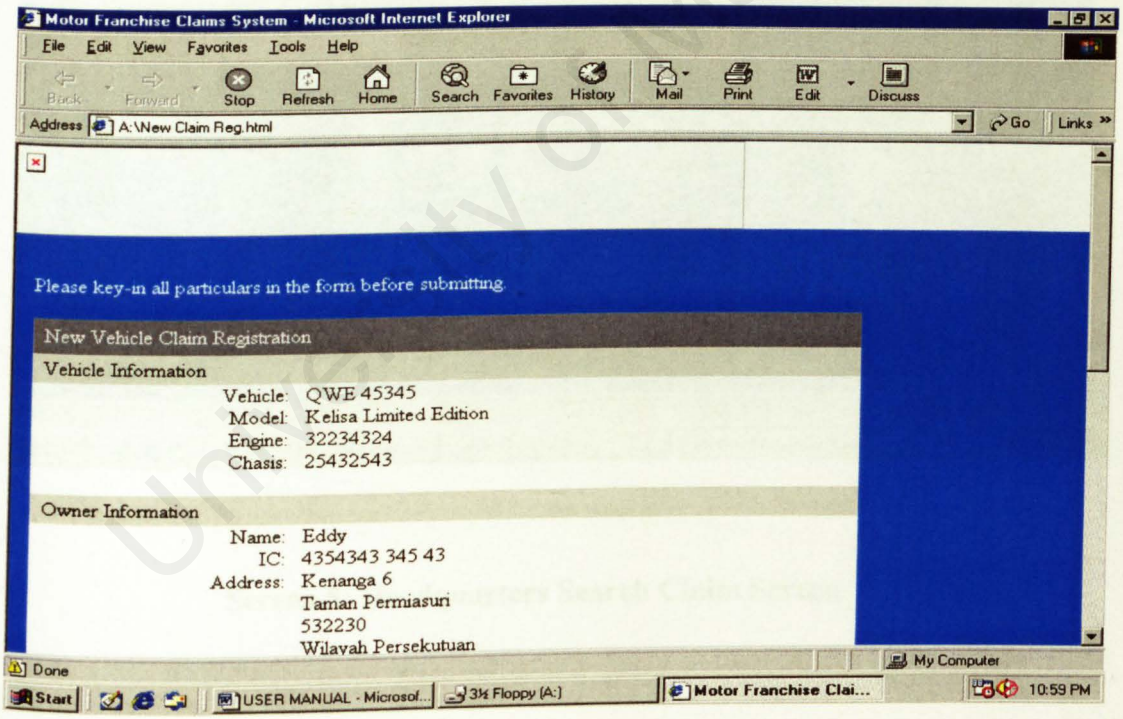
3.2 New Claim Registration

3.2.1 Claim Registration

Headquarters personnel are allowed to register new claim in this screen. By choosing the Vehicle Registration No. from the list, Vehicle information will be automatically appear in this screen. User can either search the vehicle they need to register or select the vehicle from the list provided.

User must enter the following information in the fields provided:

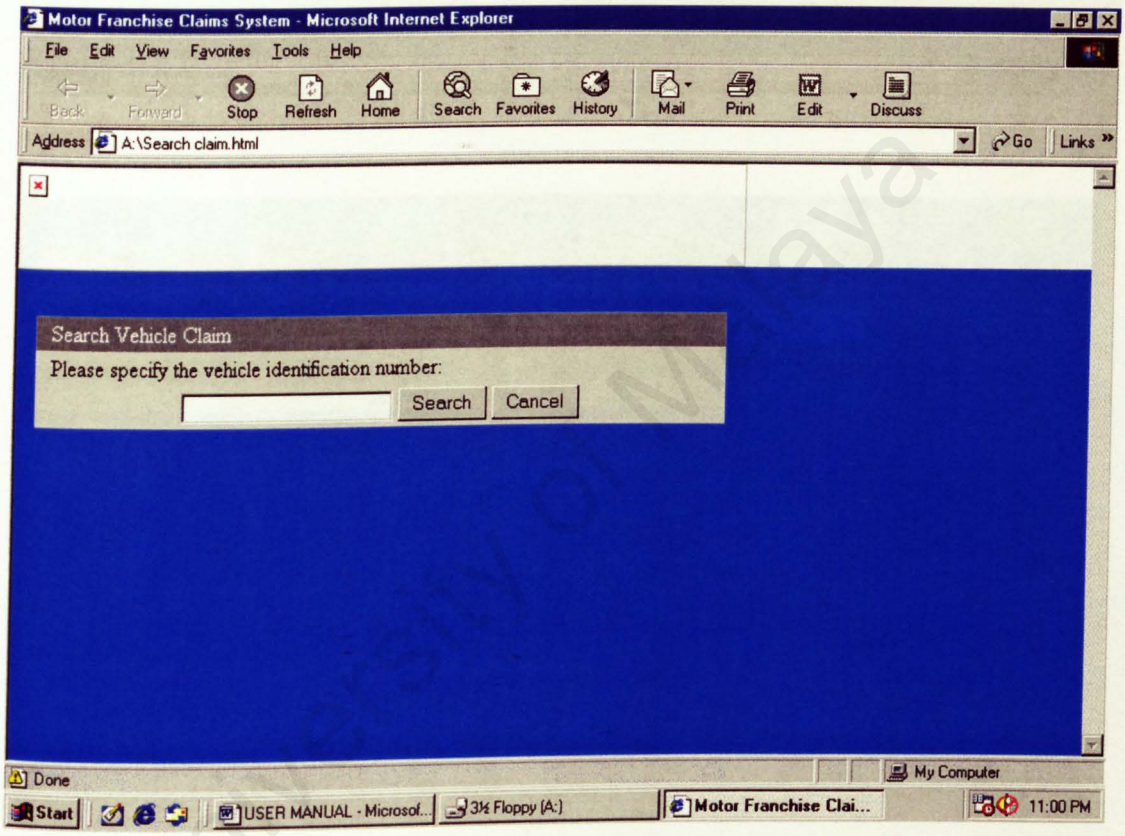
a. Driver Particulars
b. Accident Information
c. Workshop Assigned
d. Insurance Details



Screen 4: Headquarters New Claim Registration

3.2.2 Search Claim

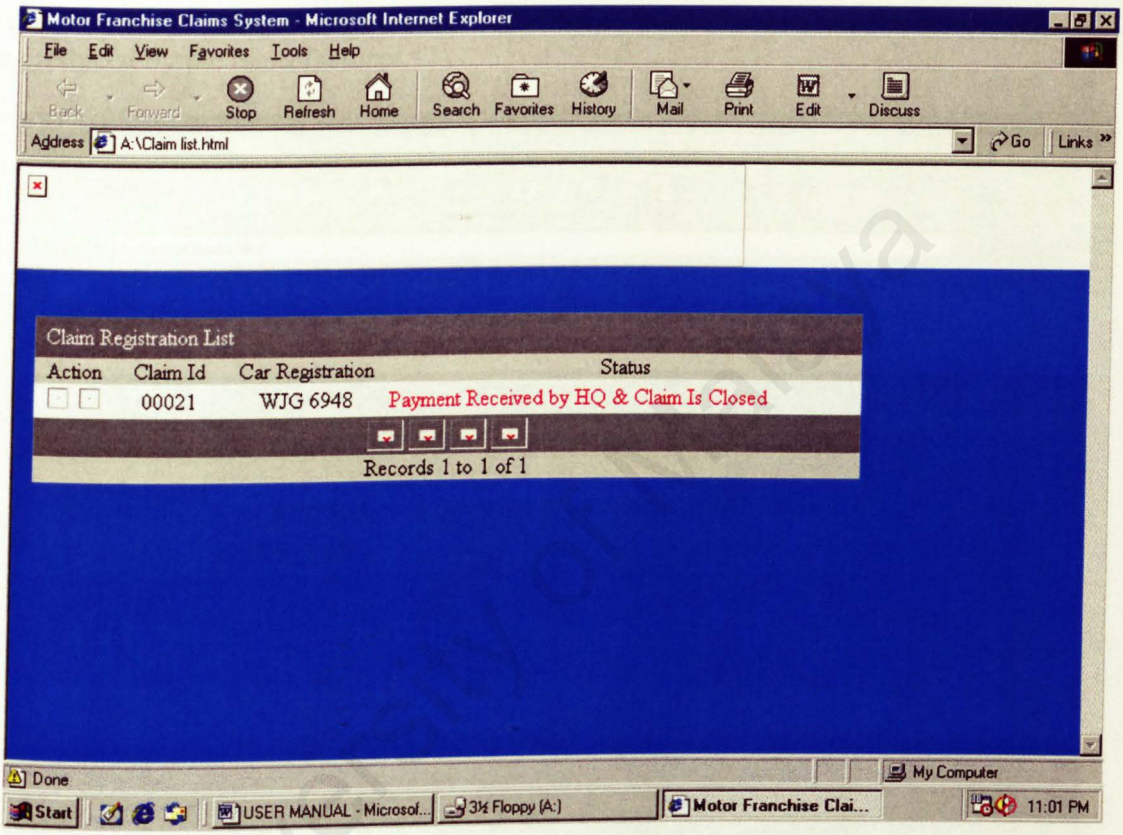
Search Claim function allow the Headquarters User to search a claim that was registered. User needs to enter the Vehicle Registration No. to find the details.



Screen 5: Headquarters Search Claim Screen

3.2.3 List Claim

This function allows the Headquarters Personnel to see the list of all registered claim.

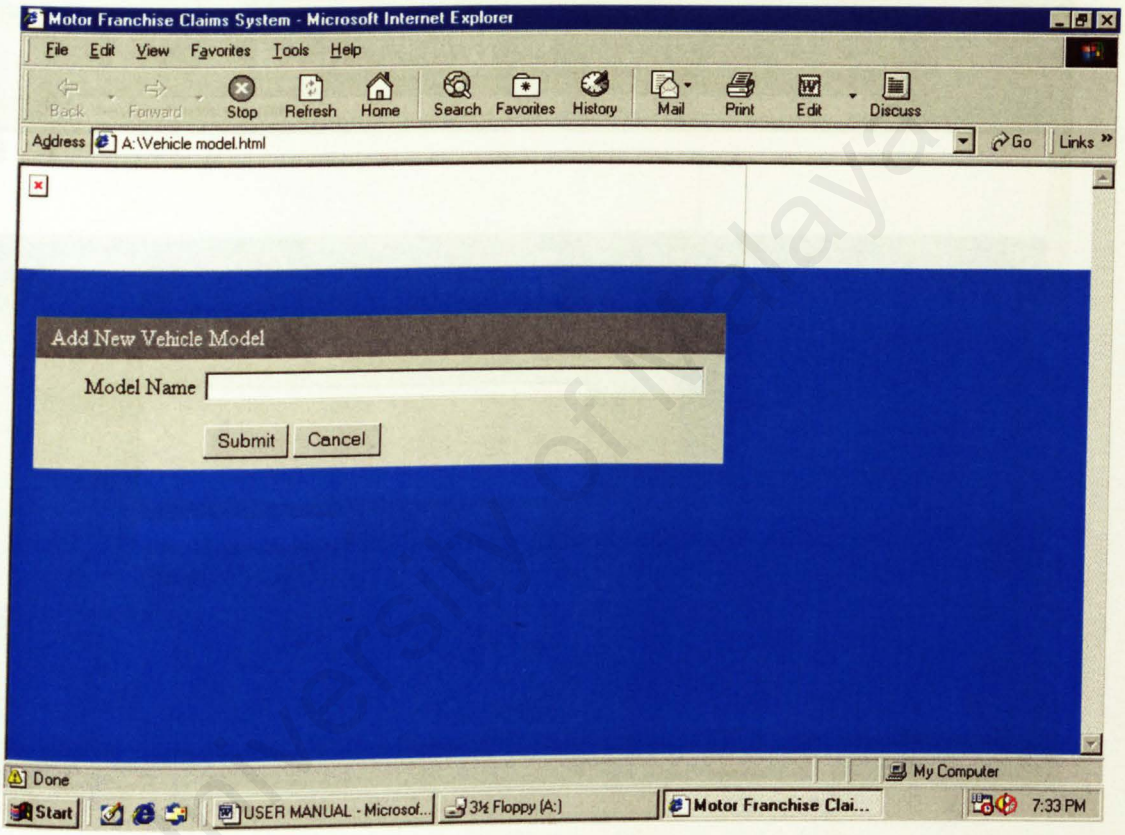


Screen 6: Headquarters Registered Claim List

3.3 Maintenance Function

3.2.1 Vehicle Model Maintenance

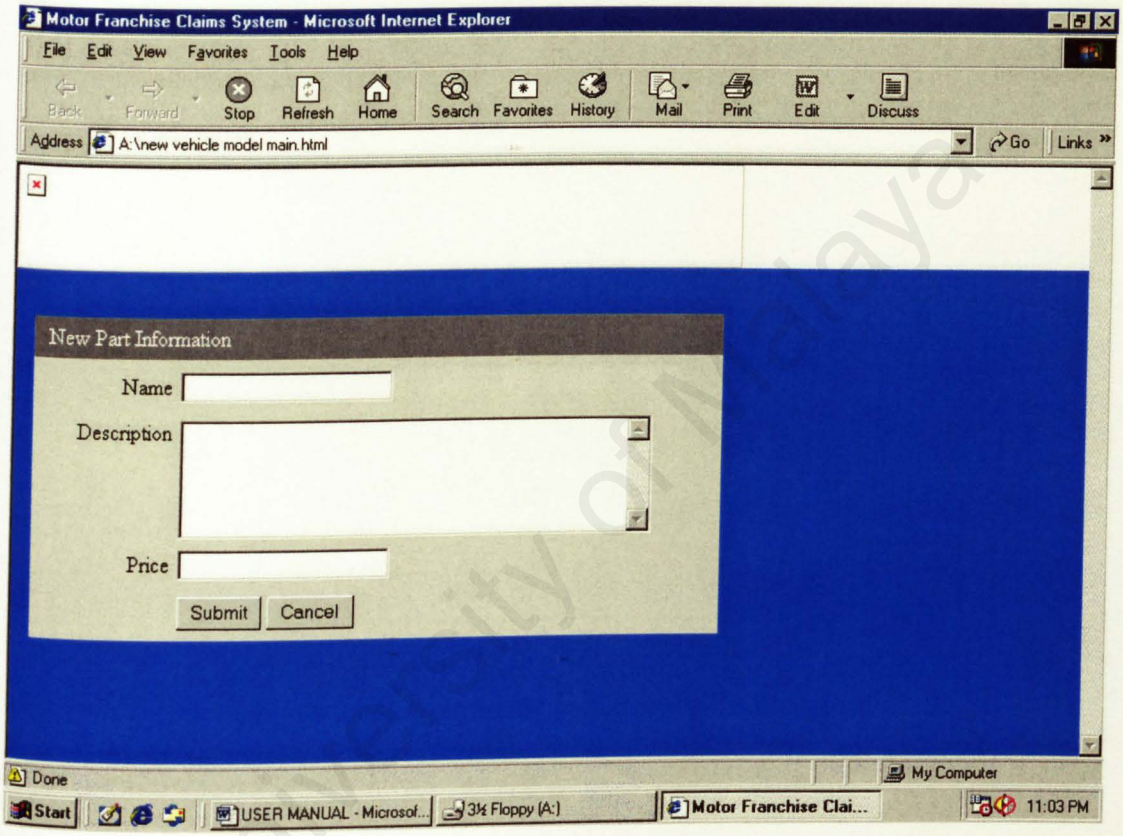
In this function, Headquarters Personnel is allowed to update new vehicle model that are produced by the manufacturer.



Screen 7: Headquarters Vehicle Model Maintenance Screen

3.2.2 Parts Maintenance

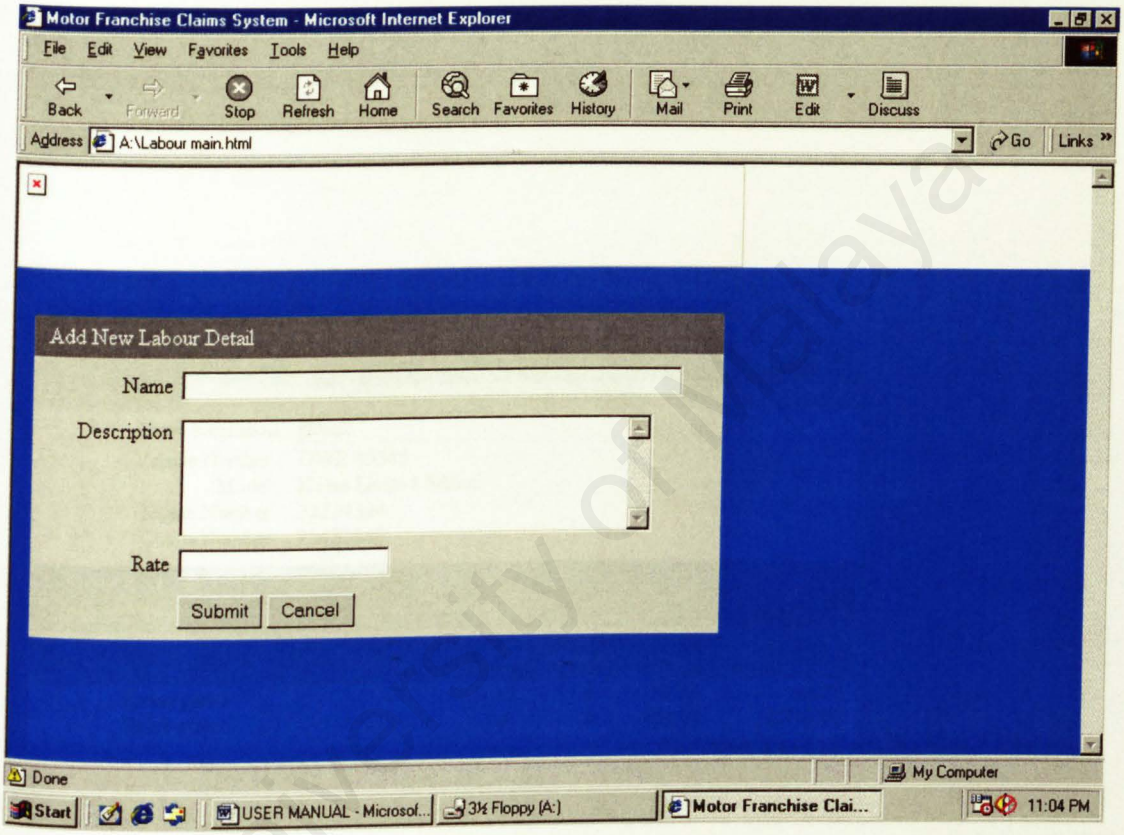
In this function, Headquarters Personnel is allowed to update new parts that are produced by the manufacturer.



Screen 8: Headquarters Parts Maintenance Screen

3.2.3 Labour Rate Maintenance

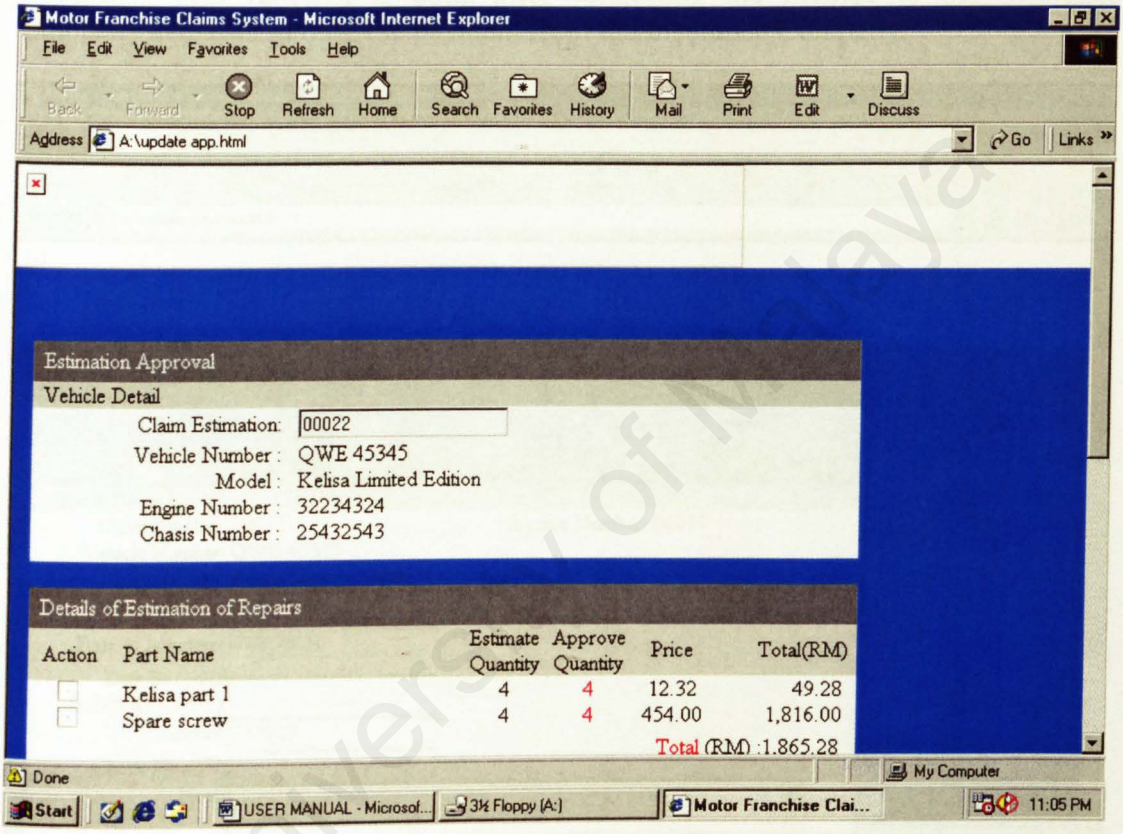
In this function, Headquarters Personnel is allowed to insert new labour rate for an accident repair.



Screen 9: Headquarters Labour Rate Maintenance Screen

3.3 Update Approval Function

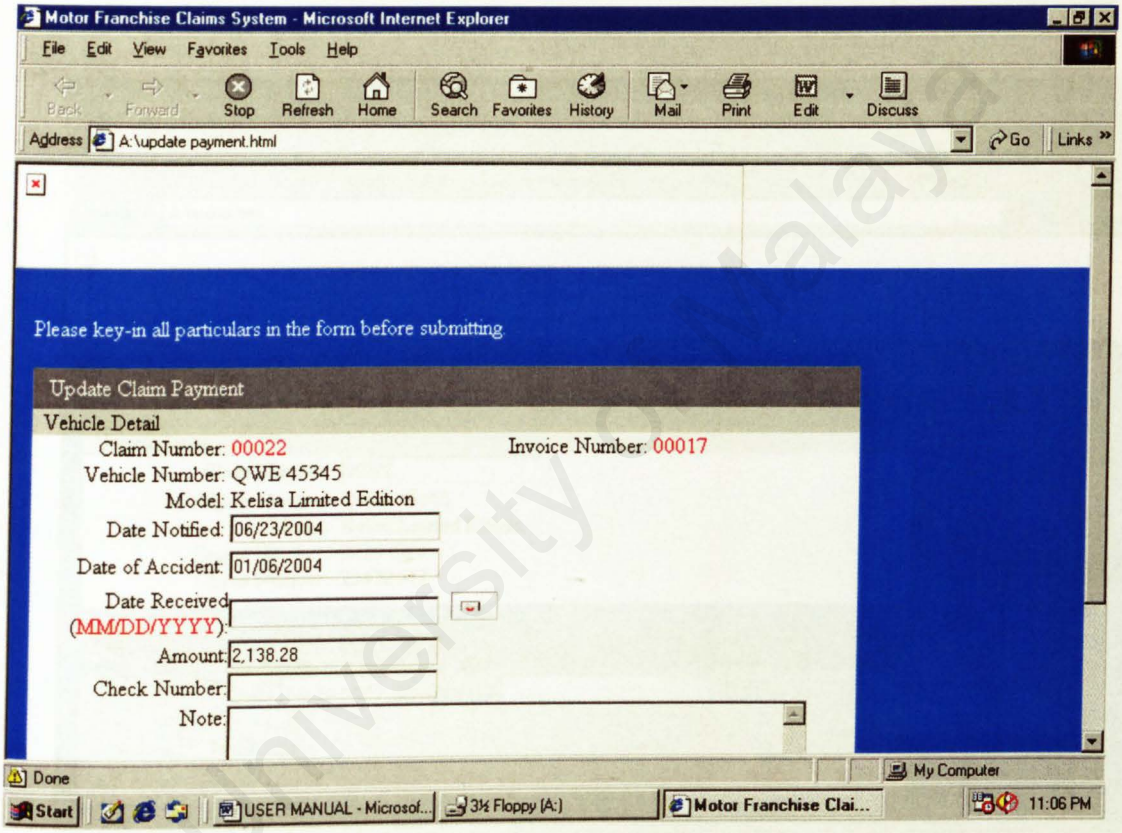
This function allows the headquarters personnel to update the Insurance Approval obtained from the Insurance Company. This function is done after submitting the estimate of repair to the Insurance Company.



Screen 10: Headquarters Update Approval Screen

3.4 Update Payment Function

This function allows the headquarters personnel to update the payment details, i.e. Cheque no., and date receives of payment from the Insurance Company. The cheque amount will be set default by the Invoice amount submitted to the Insurance Company. This function is done after submitting the Invoice to the Insurance Company and after getting the payment from the Insurance Company.

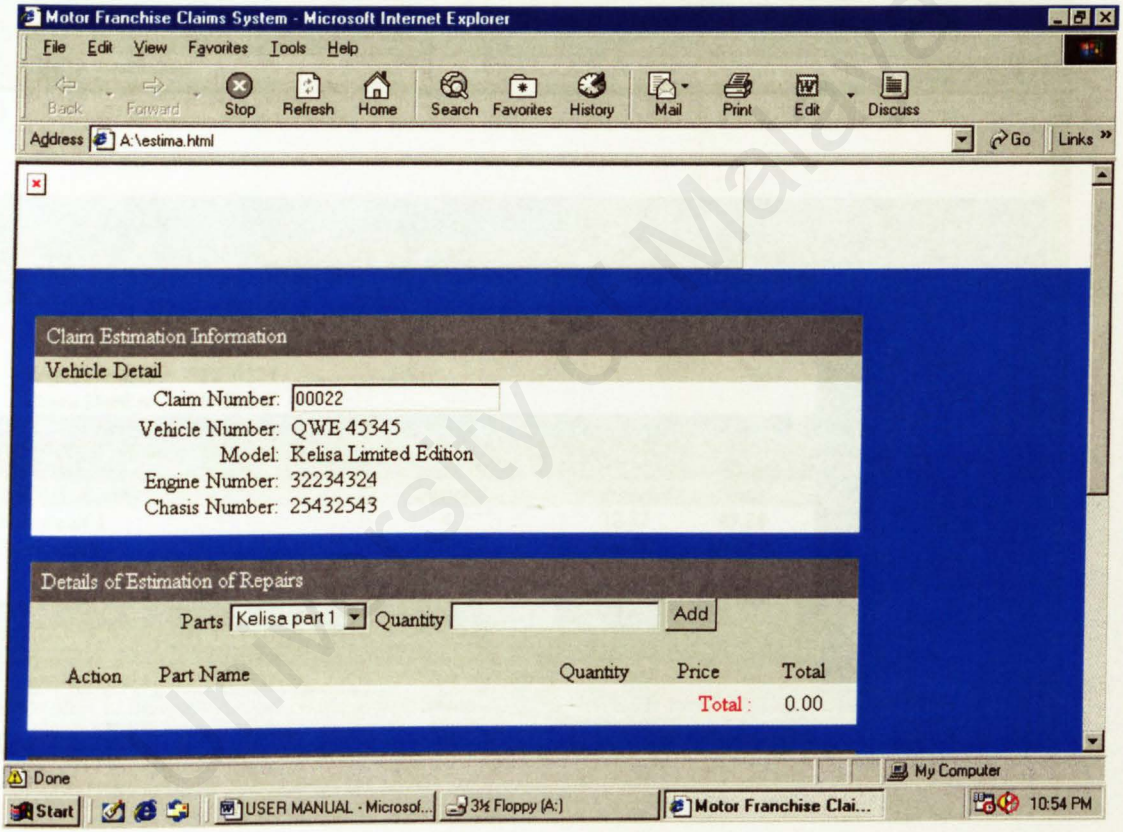


Screen 11: Headquarters Update Approval Screen

4 WORKSHOP MODULE

4.1. Estimation Function

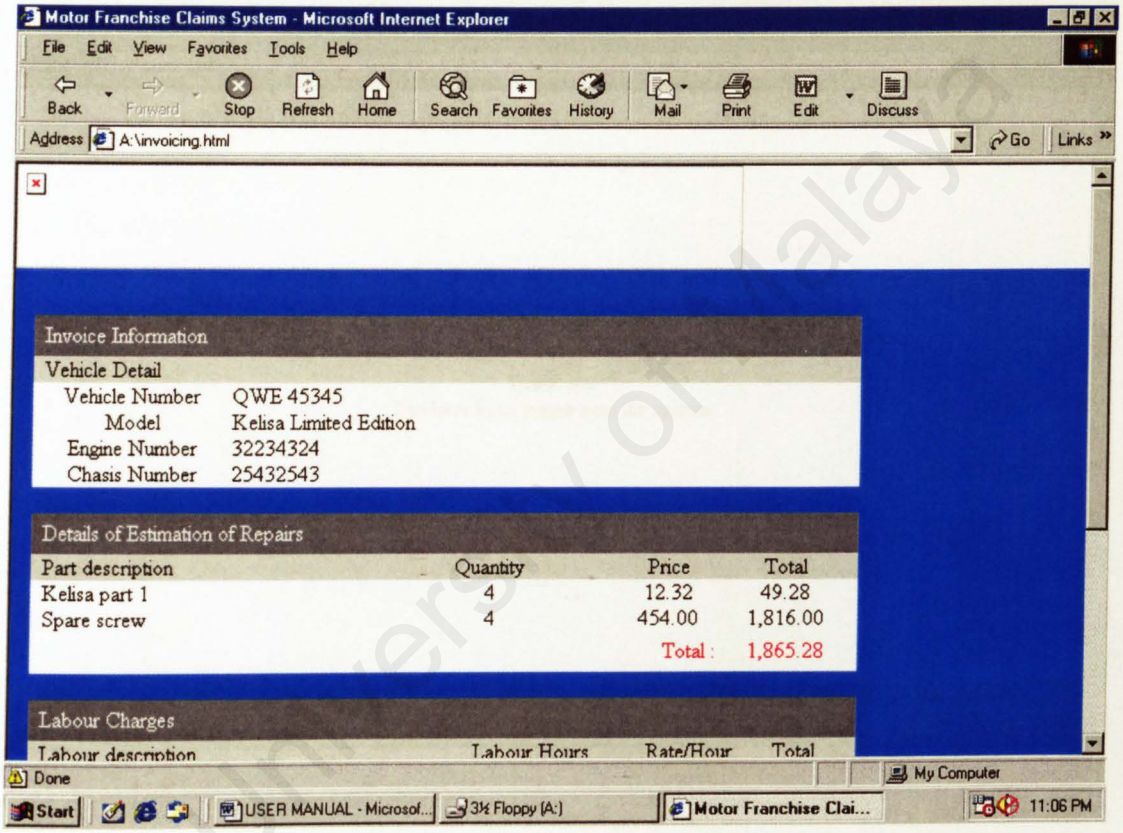
Create Estimation is the first screen for a Workshop User. In this screen, Workshop personnel will create an estimate of repair. Parts pricing and labour details are available from the database. User need to select the parts, it's quantity and type of manpower required.



Screen 12: Workshop Estimation Screen

4.2. Invoicing Function

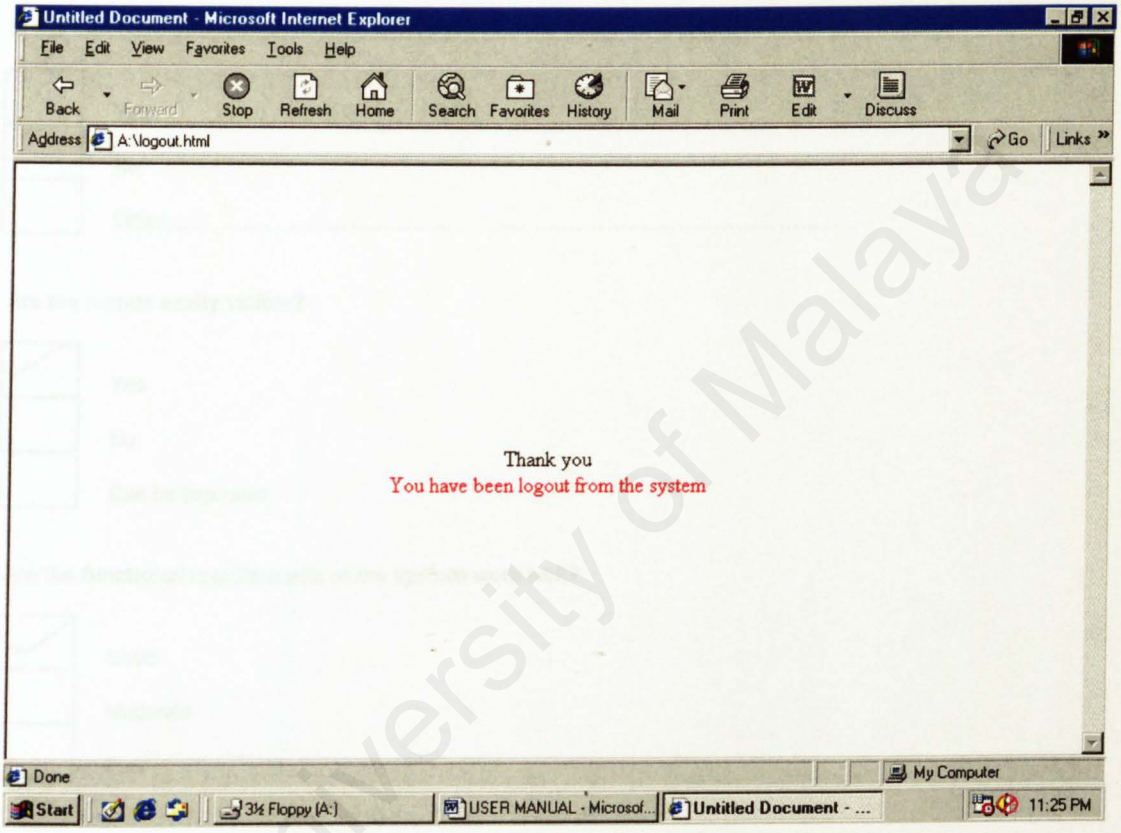
Invoicing function is done after completing a repair job. However, Invoicing will be done based on the Approval amount obtained from the Insurance Company. The invoice will be submitted to the Insurance Company manually for the to prepare payment.



Screen 13: Workshop Invoicing Screen

5.0 Logout Screen

This screen will appear upon clicking the Logout button.



Screen 14: Logout Screen

Questionnaire - User Acceptance Testing
Motor Franchise Claim System (MFCS)

---

1. **What is your perception about the general appearance of the MFCS?**

- [x] Good
- [ ] Moderate
- [ ] Poor

2. **Is the Database information is sufficient to provide the basis for a accident claim processing?**

- [x] Yes
- [ ] No
- [ ] Other, ...

3. **Are the menus easily visible?**

- [x] Yes
- [ ] No
- [ ] Can be improved

4. **Are the functional requirements of the system work well?**

- [x] Good
- [ ] Moderate
- [ ] Poor

5. **Do you think the Motor Franchise Claim System (MFCS) can benefit the Motor Franchise Holders in-terms of monitoring accident claims?**

- [x] Yes, MFCS is very useful
- [ ] No, it does not have any purpose

6. **Other Comments, if any?**

To add image transfer facilities.

Declaration:

I hereby declare that the above questionnaire was fully and honestly answered by my self. Thank you.

Name : Safura Mohd. Ali

Date : 17/02/04

Organisation : PSSB (Perodua Sales Sdn. Bhd.)

Questionnaire - User Acceptance Testing
Motor Franchise Claim System (MFCS)

---

1. **What is your perception about the general appearance of the MFCS?**

- [x] Good
- [ ] Moderate
- [ ] Poor

2. **Is the Database information is sufficient to provide the basis for a accident claim processing?**

- [x] Yes
- [ ] No
- [ ] Other, ...

3. **Are the menus easily visible?**

- [x] Yes
- [ ] No
- [ ] Can be improved

4. **Are the functional requirements of the system work well?**

- [x] Good
- [ ] Moderate
- [ ] Poor

5. **Do you think the Motor Franchise Claim System (MFCS) can benefit the Motor Franchise Holders in-terms of monitoring accident claims?**

- [x] Yes, MFCS is very useful
- [ ] No, it does not have any purpose

6. **Other Comments, if any?**

Declaration:

I hereby declare that the above questionnaire was fully and honestly answered by my self. Thank you.

Name : NORASIKEN MOHD ALI

Date : 18.05.2004

Organisation : PERODUA SALES S/B

Questionnaire - User Acceptance Testing
Motor Franchise Claim System (MFCS)

---

1. **What is your perception about the general appearance of the MFCS?**

- [x] Good
- [ ] Moderate
- [ ] Poor

2. **Is the Database information is sufficient to provide the basis for a accident claim processing?**

- [x] Yes
- [ ] No
- [ ] Other, ...

3. **Are the menus easily visible?**

- [x] Yes
- [ ] No
- [ ] Can be improved

4. **Are the functional requirements of the system work well?**

- [x] Good
- [ ] Moderate
- [ ] Poor

5. **Do you think the Motor Franchise Claim System (MFCS) can benefit the Motor Franchise Holders in-terms of monitoring accident claims?**

- [x] Yes, MFCS is very useful
- [ ] No, it does not have any purpose

6. **Other Comments, if any?**

Declaration:

I hereby declare that the above questionnaire was fully and honestly answered by my self. Thank you.

Name : NORASIAH BT. KHAIRUDDIN

Date : 17 - 02 - 2004

Organisation : PERODUA

Questionnaire - User Acceptance Testing
Motor Franchise Claim System (MFCS)

---

1. **What is your perception about the general appearance of the MFCS?**

- [x] Good
- [ ] Moderate
- [ ] Poor

2. **Is the Database information is sufficient to provide the basis for a accident claim processing?**

- [x] Yes
- [ ] No
- [ ] Other, ...

3. **Are the menus easily visible?**

- [x] Yes
- [ ] No
- [ ] Can be improved

4. **Are the functional requirements of the system work well?**

- [x] Good
- [ ] Moderate
- [ ] Poor

5. **Do you think the Motor Franchise Claim System (MFCS) can benefit the Motor Franchise Holders in-terms of monitoring accident claims?**

- [x] Yes, MFCS is very useful
- [ ] No, it does not have any purpose

6. **Other Comments, if any?**

_____
_____
_____

eclaration:

I hereby declare that the above questionnaire was fully and honestly answered by my self. Thank you.

Name : LORETTA NUSA

Date : 18/2/04

Organisation : PGRODUA