WEB BASED CAR INFORMATION SYSTEM (WBCIS)

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CHAPTER 1

INTRODUCTION

1.1 Abstract

In today's world, the World Wide Web (www) has so much of information available on the Internet especially in the field of education. The Internet allows the public to use the global market space to promote their products through a barrier that breaks all time, distance and place within which the Electronic Commerce can conduct itself.

'The Web Based Car Information System' is an e-commerce web site that sells and promotes both new and used cars, providing maintenance tips, browsing and search facilities. The main objective of this project is to develop an attractive, interactive and user friendly online selling website using FrontPage 2000.

The development of the 'Web Based Car Information System' is emphasized to be a browser and platform independent. This will be accomplished by using VBScript and Java Applet to code the client side processing while Active Server Pages (ASP) to code the server side processing respectively. It is also aimed to have a back-end database that is Microsoft Access 2000 for providing updated product information, user information and product database.

It is vital to develop the 'Web Based Car Information System' as it will be one of the few sites in Malaysia that will be selling and providing cars together with their maintenance online. This website will also provide complete information on cars to the buyer. This might boost opportunity for the user who wants to set up such a virtual store.

1.2 Introduction

The Internet is a powerful tool that plays a very important part in our lives nowadays. The Internet helps both the user and companies to come together through business related especially online businesses. E-Commerce is stated to be the next big thing and is proving to be such. Many people do not know that E-Commerce is already being incorporated in our everyday lives. Withdrawing cash from the ATM and paying our bills through the telephone are some of the many examples of E-Commerce. There are many businesses currently in the electronic market that boosts both a normal shop and also an online web page that promotes their products over the World Wide Web (www).

The proposed system that I will be producing is a Web Based Car Information Systems. This concept is the same as an online car retail shop. The old way of selling a car, which is by having a showroom filled with selected cars, has been surpassed. The Government of Malaysia is encouraging its people to conduct their business through the Internet. Setting up the Multimedia Super Corridor (MSC) in Malaysia shows this. The Government has also stressed the importance of E-Commerce as the trend to come in the future. The rapid adoption of the Internet as a commercial medium has caused many car firms to experiment with the innovative marketing ways to attract the consumers in a computer mediated environment.

The common way of selling a car, using the showroom has many faults. Firstly, most car agents do not know the needs of the buyer clearly and secondly, the

geographical limitations that slow down many car applications, because in certain areas there are no car retail shops. The third main problem is the working hours of the shops that operate the showrooms. With the usage of the E-Commerce, the shop can run for 24 hours non-stop. In other words, having an online shop can boost the car industry growth of Malaysia.

Most companies run their business electronically using computers. The menu pop-up and order forms for their products can be generated through networks within the company. The fast paced world of computers makes business transactions fast and easy. The Web Based Car Information System (WBCIS) is built to fulfill the needs of a potential buyer and also the car retail company. Data kept electronically can be updated anywhere and anytime regardless of anything as long as there is a computer connected to the Internet. Information can be keyed in and be updated efficiently with the system's database.

Before a buyer buys a car, they will first think about the car, whether they want a used car or a new car. Next they decided what type of car they want to buy. After that they might want to discuss about the color of the car they might want to purchase. What kind of interior are they looking at with their choice of car? These are some of the many particulars a potential buyer would look into before buying a car. With a proper Web Based Car Information Systems, a buyer might be able to look through his options by using the search engine provided on the web site. The buyer doesn't have to make up his mind on the spot but can take his time to decide on their own time and to be able to go through the options as many times as he needs to.

By using the Web Based Car Information Systems, the buyer can send his application online at any time. Although it is not guaranteed the choice of car the buyer might want is in the database, but it certainly helps his make his decision a whole lot easier. Through this system, the company can offer their services and gain the trust of the buyer. This is because the buyer can check out the credentials of the online store anytime. With a database that is electronically adapt the company can make sure that the data is updated and analyzed all the time. The keyword here is "anytime". Anything that the buyer wants to do, can be done at whatever time he feels like it. This system is a user-friendly one, which caters to the buyer.

As Internet security issues are being resolved slowly, businesses are selling more and more products online, directly to their customers. With the many different types of computer security being offered such as SSL (Secure Socket Layer) and S-HTTP (Secure HyperText Transfer Protocol), many consumers are more confident of conducting an online transaction without the fear of credit cards frauds. By solving one of the biggest fears of the consumers, they will shop online without fear.

1.3 Objective

At this time, the car industry in Malaysia have spent a lot of money to setup a proper physical car retail showrooms by providing the public a manual way or through a car sales agent to order and purchase their vehicle. I have asked around throughout the areas of Petaling Jaya within the car showrooms. The outcome of the questions asked shows that there are many problems, which arise due to certain everyday acts. Some of these problems are persistent ones where by the user might get irritated with the old system.

1.3.1 Buyer Problems

Some of the main problems are listed below to give a better understanding of the problems the buyer faces. They are:

1. Working Hours

If for instance a potential buyer is interest in buying a car, he has to go the showroom during working hours. If the buyer happens to be a working person, this would prove to be a problem, as he would have to apply for leave just to visit the showroom. Even if he just wants to get certain information about a car, he would have to take the same step.

2. Geographical limitations

If the buyer happens to stay far from the showroom, this would prove to be an even bigger problem. This is because even if the buyer just wants to obtain information about a particular car, he will have to travel all the way to the showroom. This is because there are not many showrooms in rural areas and also there might be a showroom of only certain type of cars but not all the different types.

3. Limited Choice

A buyer would be definitely limiting his choice by visiting a showroom. This is because he would have to visit many showrooms to check out different types of cars. This would not only waste his time but energy and money by having to visit the showrooms one by one. The limited space in a showroom would only allow the company to showcase their latest models and not their used cars, not even the slightly older new cars all at once.

1.3.2 Seller Problems

At the same time, the seller to does have some problems that he is going through. Some of the main problems are:

1. Cost

The cost of operating the showrooms is high because of having to get the cars to show the customers/buyers. The cost of opening a showroom that exclusively promotes one type of car is also very high.

2. Limited Choice

A promoter will only be able to promote one type of car. This will also be a new edition that is just out. The old types of car will be sent back to the main headquarters. The promoter will not be able to show the older cars that have been on show previously.

1.3.3 Main Objectives

This Web Based Car Information System is built with an objective of allowing a sale or buy of a car through the Internet at any time of the day. The Web Based Car Information System that is being proposed has the objectives as stated below:

1. To design and develop a website that allows the buyer to browse, search and place an order for a selected car

This feature allows the buyer to browse through out the database of all the cars that are being offered. This includes both new and used cars. This saves the buyer a lot of time instead of having to visit many other different types of showrooms just to find

the selected car of his choice. This feature is the main reason of such a proposed system. It creates a user-friendly system, which will benefit the user.

2. To Improve Business

This system does not focus on one aspect of the business world but the same concept can be implemented to other types of retail business. It can also be used throughout Malaysia. The web portal will help the car industry because it reaches out to the buyer from all over the country and world. It will also help promote Malaysian cars to other countries by breaking the international market. This will increase the Malaysian market of cars to foreigners as well as the local.

3. To Allow Potential Buyer Easy Access

The user interface that is user-friendly will allow the user to access the system easily. This would save the buyer a lot of time by allowing him to browse through the system instead of collecting brochures from many different types of showrooms. The buyer can also save time by not having to see each car individually. Not having them to move around but just accessing the car's database online can save the buyer's time. By preparing an online system, the buyer can see all the car specifications and is able to make online comparisons.

4. To Avoid Mistakes

By making their own online applications, the buyer will feel more confident of their application. This is because the buyer would feel more confident of his application form because they would be more careful in applying for the car. This would also save the forms if there were mistakes made, as the buyer can simply refresh the form instead of using a new form every time there is a mistake made.

5. To design and develop an attractive and interactive interface for the website to make the Online store user friendly

Buyers are more attracted by any system that uses an interesting user interface and also a website that is information filled with especially information such as the nearest car dealer around. This system would also allow the user to find out any information that he wants to find out while making a purchase online.

6. To Reduce The Administration Cost

By implementing such a system, this would reduce the total cost of operating the car retail business. There would be fewer workers to employ making the whole business less complicated and less red tape to go through. This would definitely make the overall cost of the car less than expected, depending on the model of the car. The cost of employing staff for other jobs would be held back as the current staff would be able to sufficient to handle the jobs around the administration.

1.4 Project Significance

The process of gaining knowledge is not something that we can out limitations to stop it. It is an ongoing process that will be growing and growing. So will the methods of gaining this information. In other words, that whenever there is a new method of gaining information, it should be excepted. The proposed project of the Web Based Car Information System is one example of a new way of selling cars online especially in a country that is not as advanced as the western countries. This will be one of the first web site in Malaysia that will promote and sell cars online.

Besides that, it will also provide product-browsing facility in the form of a search engine to ease the buyer who wants to find a particular car item. Some of the advantage of shopping for a car online through the website are:

1. Customer's Benefit

- To save cost of transportation to the showroom and avoiding traffic jams
- To save time in purchasing an item because purchasing is just a click away
- To make it easier to browse through the car options
- To make it convenient for the type of buyer who likes to operate from home at their own pace rather than having them go to the store
- To be able to purchase a car at anytime of the day because the store is open 24 hours a day

2. Companies benefit

- To make it possible for E-Commerce to allow the companies to sell their products worldwide by setting up their virtual store. As a result, the product can be sold in more than one place at a time
- To make information on a particular company obtainable anytime
- To allow operational benefits, that is for industrial sellers by including reduction in errors, time and overhead
- To be able to upgrade with the times and current changes
- To achieve a paperless administration

1.5 Scope and Limitations of the Project

1.5.1 Scope:

This Web Based Car Information System is built to fulfill the following characteristics:

1. To build a database system that is able to keep and administer all the records
2. To build a web site with searching abilities using certain keywords
3. To build an application based on the web
4. To build a catalogue to list all the cars so that the buyer can search through the web system for a particular car.
5. To create a web site that provides information in the form of advise, tips and explanations on how to get financial advise and loans when purchasing a car
6. To provide a system that is able to be update by the administration officer
7. To build a system that can generate a report to the administration officer
8. To build a system that can
    a) Receive feedback from the buyer
    b) Generate an image of the car that he has chosen
    c) Generate a report to ease the overseeing of reports

1.5.2 Limitations

Due to enormous features that an E-Commerce sire might comprise, therefore there will be certain features and aspects that will not be included in this project. They would be:

1. This online car store will include most of the different types of cars available in the market today. Priority will be given to both International and Malaysian made cars. The proposed limit for the database is 80 records.
2. This project does not integrate with any financial institution or have any relationship with the banking system. Therefore all financial references will be redirected to another website which is in-charge of this aspect.
3. The administration section may not be adequately sufficient, this would mean that all staff with rights to access the database has the same privilege to do all the jobs in the project. This would include dealers.
4. The online car store couldn't produce 3-D images of the car. It would take a lot of time to generate a 3D version of every car in the database. The time to download the website for the buyer would also take a long time. A 2-D picture of the car will be provided for the buyer to look at when a search is conducted.
5. Due to probable time constraint, the learning and developing process are to be done in a parallel fashion. Without a strong base of the language, the author would most probably have to spend some time looking for solutions for problems that are likely to crop up during the developing process.

1.6 Proposed Schedule of the Project

To facilitate that the whole project runs on time, a schedule is proposed to foresee the smooth running of the development of the whole system. The draft of the proposed schedule is drawn using a Gantt Chart for a good look of the timeline proposed. Below is drawn a systematic timeline for the building of the proposed Web Based Car Information System.

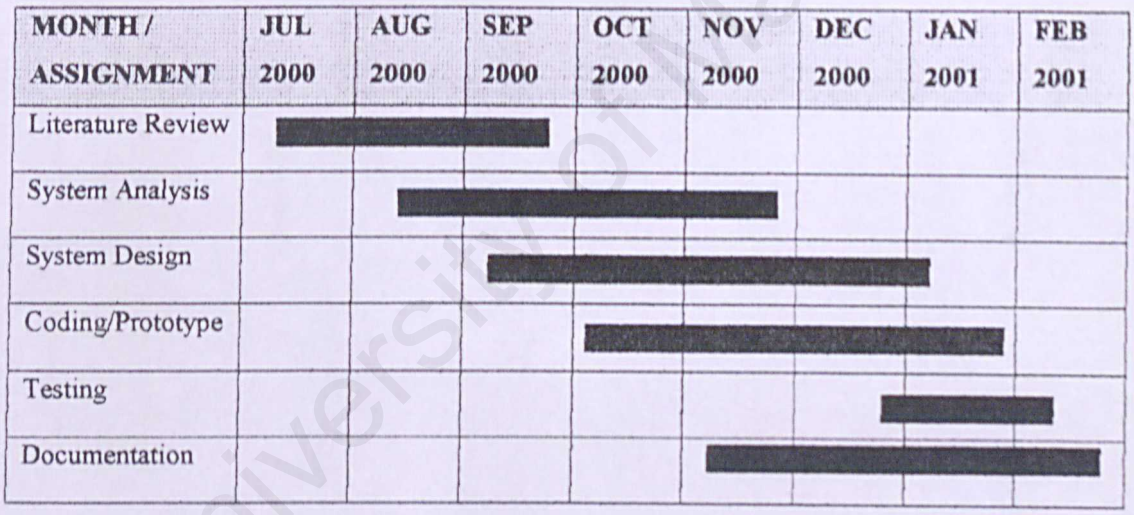

Chart 1: Proposed Gantt Chart for the Project Schedule

A project schedule is planned to ensure the smooth running and implementation of this project. The project is planned such that it will involve constant developing so that the whole project will be developed following a planed schedule. The schedule is planned such that it coordinates all the aspects of the project so that it will be finished by the proposed time allotted.

This Web Based Car Information Systems is a final year project. This means that there is little time allotted to finish this project. In order to complete this project, proper planning it a must to ensure the smooth running of the project. Some of the proposed planning is:

1. To define the objective of the project
2. To decipher the source of information
3. To finish the proposed schedule and work order
4. To report and document the project thoroughly

CHAPTER 2

LITERATURE REVIEW

2.1 Purpose

The introduction of the Internet has prompted many companies to try out its vast opportunity that it has to offer. The Internet is fair by offering the same chance to the smaller companies to have a go together with the bigger companies. Allowing them to promote and market their products along side each other does this. With some companies, this has proved to be a good move.

In the global electronic market, there are many E-Commerce sites that support the car retail market. There are some car web portals available on the Internet. There are about 26 websites listed as the main references. The websites listed here are all used as references during the stating of some websites. All these websites are used one way or another even as the design for the user interface.

The international websites are:

a) DreamMotor (http://www.dreammotor.com)

b) AsianAuto (http://www.asianauto.com)

c) Auto World (http://www.autoworld.com)

d) Cars.com (http://www.cars.com)

e) WebGuide4 Cars (http://webguide4.com/cars)

f) Autotrader – Used Cars (http://autotrader.com)

g) eBay Motors (http://www.ebayautotrader.com)

h) LookSmart Automotive (http://www.looksmart.com)

i) Yahoo! Autos (http://www.autos.yahoo.com)

j) eAuto (http://www.eauto.com)

k) Car Trackers (http://www.cartrackers.com)

l) AutoWeb (http://www.autoweb.com)

m) GetAuto (http://www.getauto.com)

n) Car Buying (http://www.carbuying.com)

o) AutoSpeed (http://www.autospeed.com)

p) CarList.com (http://www.carlist.com)

Some of the better-known Malaysian Car Web Portals are:

a) AutoWorld Malaysia (http://www.autoworld.com.my)

b) Price The Car (www.pricethecar.com)

c) DMMS Home (www.dmms.com.my)

d) MSN Car Point (http://www.msn.com.my/auto.asp)

e) Buy Car (http://www.buycar.com.my)

f) Dozo – Car (http://www.dozo.com.my)

g) Cars for Sale (http://www.carsforsale.com.my)

h) Cars & Wheels (http://www.car.com.my)

i) KL International Motor Show – Virtual Booth (http://www.auto.com.my)

j) ECar Malaysia (http://www.ecar.com.my) - NEW SITE!

All these websites are chosen because they feature a variety of cars and do not promote exclusively one type of car. These websites also feature both new and old cars alike.

As a result, it can be said that there are some basic pre-requisites for an E-Commerce website to be an effective one that actually provides some use to the public. Listed below are five of the main requirements are:

- A Stable and supportive institutional environment
- Good Bandwidth
- Efficient and trusted payment
- Fulfilment systems and logistics
- User friendly, affordable access devices and interactive interfaces.

2.2 The Approach That Was Taken

Before a system can be developed, a lot of researching has to be done. The researching here is to look for information pertaining to the system. The information can come from many different sources of the Internet. For a different type of information, the method of searching for it is also different. Some of the common sources of information are system users, forms and documents, computer programs, procedure manuals and reports.

Documentation is the process of recording the information one gathers about a particular project; the process in implementing the project is also recorded to keep track of the procedures. The research for the literature review is similar to the documentation. The information about the project is documented to give the developer a wider perspective of the proposed project. There are many ways of gaining information about a particular subject. For this project documentation, the author used a few normal methods of gathering information. They are listed below:

2.2.1 Questionnaires

Firstly there is the questionnaire where by the questionnaire will help the developer know what the public is expecting and knows. A few questions are asked and by analysing the answer, the author can gain some form of information about the subject. Another way of gaining information is through interviews. It has the same

techniques as the questionnaires. In this method, observations made of the users activities and his behaviours are also vital to know his preference of a system.

2.2.2 Reading Materials

Previous completed documentations were used as a reference items. Not many projects were found. Other web-based projects were looked at. These documents were found in the documents room in the Faculty of Computer Science and Information Technology. Sources found in the library and other forms of reading material such as magazines, newspapers and publications. Books on programming, forms of security and electronic trading were also looked into besides the car industry.

2.2.3 Internet

For this project, the Internet was the main source of Information gathered, as it was very easy and efficient in gathering information. When using the Internet, many E-Commerce Car websites were used as guides. Many websites were visited to get information about things like which software would be better to use when developing such a system against other similar software's, existing car E-commerce websites to compare with were also seen. Many queries were also posted to these sites to obtain some form of help to develop an effective web site. The interfaces for

most of these websites were noted to give the author a guide as in to how the web sites should look like.

Basically, all the sources can be divided to two types, the printed resources and the electronic resources. In the next section, the findings from all these resources will be described in detail. Most of the sources came from the electronic (online) books and sites on the World Wide Web (www). Some keywords were used during the search process.

Another very effective way of searching for information about this project is by going through the previous final year projects completed by the seniors. Although this way proved to be a limited one, it also proved to be very helpful in certain areas. Most of the e-books were found at the http://www.itlibrary.com site under the programming languages and databases sections.

Some of the findings that were obtained about any particular online store are as follows:

a) EDI Interchange

b) Difference between the conventional method and the electronic method

c) Database Publishing

d) Security

2.3 EDI Interchange

Electronic Data Interchange (EDI) is when data is changed from one computer to another over a connected network. It can be any kind of data, as long as it in the form of information. EDI is the alternative for the old method of interchanging information. The old way would be through sending each other letters or just using the fax. With EDI, information can be changed instantly without much difficulty ever though the computers might not be the same. EDI does not depend on the computer's internal hardware because EDI prepares the interface integration in the system.

The level of effectiveness of the EDI will increase if the administration will offer this service with proper maintenance. Edi is basically using a basic format of messaging to make sure that the parties involved use a common language when conducting a business together.

2.3.1 The Benefits Of EDI

- Fast processing time
- Accuracy, readiness of data for the decision maker
- Less staff support needed
- A responsive environment that supports it

2.4 Difference Between The Conventional Method And The Electronic Method

The examples shown between both the ways are based on the car retail business. These are created to show that there is a big difference between the both ways.

2.4.1 Conventional Method

Listed below are some of the main conventional methods of business:

- Buyers calling or visiting their car agent at the showroom to find out some information
- If there isn't any stock left, the supplier will call to inform the agent to confirm on the delivery of the order
- After that the agent will in turn call the buyer to inform him on the shortage of stock
- The buyer having to hand in his car form/application with payment in person
- The car agent has to call the bank to confirm the payment either by credit card or check
- The agent preparing an order form and message to clean up the stock books. The agent will also have to update his invoice balance

From this short passage, it is observed that there are many small physical processes just to process on order of a car. This method proves to be rather slow compared to the fast pace world nowadays. Just for a one-way communication, there are many process for both the agent and the buyer to go through, making this a very difficult transaction.

2.4.2 Electronic Method

Listed below are the same business but using the E-Business:

- A buyer getting his questions answered online at anytime of the day without have to go to the showroom. All the information about all the cars is readily at hand.
- Online buying
- Payment through the web using his credit card and certification instantly by the bank.
- Data entry about both the customer and his choice of car process and distributed on the Internet to other vendor and agents instantly so that there will be no mix-up.
- All invoice and receipts electronically generated over the Internet
- Sales ledger and stock records instantly updated automatically

These are just some of the many way that E-Commerce and quicken up a business eventually making the business grow much faster. There are only just a few

physical processes to be done in order to buy a car online. This kind of business will definitely attract the buyers.

An E-business will also save the administration in cost in the sense of saving the company operation cost, such as a small premise for work and extra staff. It also quickens the business. There is freedom of expanding their portfolio of cars in their database. There is also accurate data being change online with instant changes if a car is bought. There is also less payment be cause there is a cut of cost in operational handling. There is a quick and flexible way of updated records online. With the enhancement of a 24 hours shop, this will ease the buyer's woes as in the working hours.

2.5 Database Publishing

There are three parts to this database publishing. First is the web publishing, then the relational database, thirdly is the ODBC and finally the SQL.

2.5.1 Web Publishing:

Web publishing, also known as web database, is the practical application of Web publishing to a real-world business problem publishing on the corporate network. Publishing database content through a Web server has been done extensively for quite number of years on the Internet, especially at www.news.com and www.download.com. A primary benefit for a Web publisher is the ability to separate content (an article) from presentation (an HTML page).

Take for example a new product that exists in a site that sells products online. The database is used to store what are the new product contents as plain text, with little or no formatting. Reviews are broken down into their component parts--headline, body, sub stories, graphics, and so on. These elements are stored in separate fields as tables within the database. Pre-designed templates dictate the layout of product. When a user clicks the link for a particular new product, the URL tells the server to extract certain content from the database, merge it with a particular template, and deliver the finished page to the user's browser.

Storing content in a database offers other conveniences. Software developers are familiar with the benefits of reusability and modularity. By designing additional templates, one can easily reuse content on another Web site or modify it to fit a new design. For users, databases make site searches more accurate: they can be limited to certain fields, returning better-quality hits than would full-text search.

Another advantage to database publishing is the ability to distribute data updates. With the right interface, even a new user can go into the database to update information; the Web publishing system can then send out the changes immediately. Maintenance and security is also easier in the database world. Creating an HTML template once and merging it with new content is a more reliable way to publish information with a consistent layout, no matter how many times the content of the page may change. Finally, databases help keep the wrong content off Web site by enforcing security checks, such as "hide" flags, and checking the current date against the date a story is set to post. [1]

2.5.2 Relational Database:

Relational Databases are the basic standard for managing business information today. A relational database is a type of database based in the relational model; non-relational databases commonly use a hierarchical, network, or object-oriented model as their basis. Relational databases have been designed to efficiently process high volumes of short transactions involving simple alpha/numeric data. Relational databases have the

flexibility to handle ad hoc queries and new data relationships, and they pay a lot of attention to data integrity, availability, and multi-user data sharing (concurrency control) requirements. They provide a robust set of functions for administrating, distributing, accessing, and updating business information. A relational database management system (RDBMS) is the software that manages a relational database. For example, Microsoft has provides two low costs, highly capable RDBMS products: Microsoft Access and Microsoft SQL Server. IBM also delivers its excellent DB2 database product for all IBM Operating Systems and Microsoft NT. Some other database tools that are well known and widely used today are Informix and Oracle. [5]

2.5.3 Open Database Connectivity (ODBC):

ODBC is a functional library designed to provide a common Application Programming Interface (API) to underlying database systems. The ODBC communicates with the database through a library driver, just as Windows communicates with a printer via a printer driver. Depending on the database being used, a networking driver may be required to connect to a remote database.

The use of ODBC as the API between an application to the relational database engine enables us to pick virtually any database product and change database products with minimal impact to our application. A data source name must be created in order for the driver to locate the database is. [7]

The steps for accessing a database from a Web page:

- Define the data source and the ODBC driver to the ODBC driver manager.
- Use a form on an HTML page to request information from the user
- Create a script to process the form and access the database.

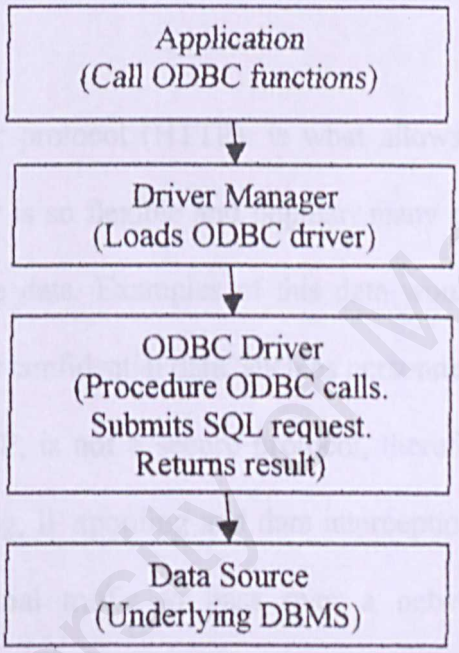

Chart 2: ODBC Structure

2.5.4 Structured Query Language (SQL):

SQL is the ANSI-standard relational database language used for managing objects, data, and security. SQL is a nonprocedural language, in contrast to the procedural or third-generation languages (3GLs) such as COBOL and C that had been created up to that time. It will be used in this project as to retrieve data from the existing tables of the database.

2.6 SECURITY

Internet security means keeping unauthorized users from reading, changing and deleting information of a database of company's data published on the Internet. This also means keeping hackers and intruders away from data interception during transactions.

Hypertext Transfer protocol (HTTP), is what allows the World Wide Web to communicate. Since HTTP is so flexible and popular, many companies are trying to use HTTP to transfer sensitive data. Examples of this data would be credit card numbers, purchase order numbers, or confidential data, such as personnel records.

Unfortunately HTTP, is not a secure protocol, therefore it is prone to different attacks such as data tapping, IP spoofing and data interception. In order to make HTTP safe enough for confidential traffic to pass over a network, encrypting and data authenticating connections are required. This is handled by using a secure protocol to transfer information between the server and client. There are currently two popular secure protocols in use. [8]

One protocol is called SSL for Secure Sockets Layer. It is more popular since it can be used with protocols other than HTTP, which will be discussed below. The other protocol is S-HTTP, for Secure HTTP but its not as widely used as the above mentioned security protocol; therefore it will not be discussed here.

2.6.1 Secure Socket Layer (SSL)

Secure Sockets Layer is a protocol that sits between HTTP, or another protocol, and the TCP/IP stack. It allows secure connections using digital certificates. It allows for authentication, encryption, and data integrity. SSL was developed by Netscape Communications and is supported by their browsers and servers. SSL is a powerful encryption method. Because it has a publicly available reference implementation, it can easily add it to existing software such as Web and FTP servers. [1]

SSL requires a digital certificate. This is an encrypted piece of data that contains specific certificate information such as the name of the server, the server's public key, the expiration date and the name of the Certificate Authority (CA).

The other part of the digital certificate is the signature. The digital signature is an unforgettable piece of data proving the certificate authority has signed the certificate. The certificate authority is a server that is known and trusted by many other servers. The CA is used to verify the relationship between a server and its public key.

To obtain a certificate you must generate a public and private key. The private key is stored and kept secret and the public key is sent to the CA along with proof of the server's identity and some other information such as:

- Common Name. Usually the fully qualified domain name (FQDN) of the server.
- E-mail address. Used to correspond with user in case the CA needs further information.
- Organization. The name of user's business or institution.

- Locality. Where user's business is located.
- Country. The abbreviated country the business is in.

The CA then generates a digital signature for the server and sends back a signed certificate. This certificate is then published or attached to messages that the server sends out. Users can then verify the certificate using the digital signature and the public key of the CA who signed the certificate. Once the certificate has been verified, the data inside the certificate can be trusted.

In use, the client will send a connection request to the server. The server will return a signed digital certificate. The client then authenticates the certificate using the digital signature and the public key of the CA.

If the certificate is not authentic the connection is dropped. If it is authentic then the client sends a session key and encrypts the data using the server's public key. This ensures only the server can read it since decrypting requires knowing the servers private key. This is why the private key must be kept secret.

Once the server has the session key, it can use this to encrypt and decrypt data with the client. Since the data sent between the client and server is encrypted, it cannot be read by anyone else. [13]

2.6.2 Other Security Options

Other than the method mentioned above, there are a few other security methods that are worth mentioning here which can protect the websites from hackers. They are:

2.6.2.1 Security Through Obscurity

By making your websites harder to find, it prevents casual user from breaking into your website. This is one of the easiest was available. This will not prevent someone who is trying to break into a site, but it may keep out some people for a longer period of time. By making it difficult for someone to find your website, it dissuades him from finding your site.

Security through obscurity is not real security. It is more like camouflage and, like camouflage, once your site is seen it is extremely vulnerable. This form of security relies heavily on the fact that it cannot be seen, that is the most of the security it provides. In other words, once it is found, it leaves the web site open to intruders to break into. Obscurity is a good way to make intruders spend time poking around and hopefully does something to set off alarms and alert someone that they are trying to get in. The best defence, though, is to use a combination of security measures, such as server security or firewalls, in conjunction with obscurity. There are a few ways to hide an Intranet:

- Using hard to guess names.

Most companies use WWW for the Web server machine name. Using something different can make it harder to find. Use a name that is not obvious.

- Hiding your server's name.

Not listing your server name in the DNS tables for your site, and not using it to browse the Web, sends e-mail, or post to Usenet can do this.

- Using non-standard ports.

The standard port is 80. Using different port makes it harder to find.

2.6.2.2 Using Server Security

Most www servers offer a layer of protection called the access controls. These access controls may be used to allow you to define IP address ranges that can retrieve documents from a Web server. Most web servers also allow specifying a username and password before allowing any documents to be retrieved.

There are 5 security models to make sure the web server can be secured:

- All that is not allowed is denied

This means that user start out denying everyone accesses and only allowing certain machines access.

- All that is not denied is allowed

This means that the user allows everyone and denies those sites that are known to be bad.

- Restricting certain IP address

This means restricting certain terminals whereby their IP addresses are known such as those from a different country.

- User name and password
- The most obvious case is when multiple people use the same machine but only one person should have access to your Intranet. This can happen if your users use Internet Service Providers (ISP) to gain access when they are out of the office.
- Configuring basic authentication

Using usernames and passwords with an operating system (such as UNIX).

2.6.2.3 Firewall

Most companies connecting to the Internet needs a firewall. The Web server software security and other forms of security are not just enough, because there are too many other ways to get information. For example, FTP, telnet and shared file systems.

Firewalls are a system or group of systems that enforce a policy between two networks. In most cases the Internet is one of the networks; however, firewalls can be placed between two different networks. Firewalls can protect against many types of attacks. Limiting what sorts of protocols is done can pass this into the company network.

2.7 Analysis

Some research over the Internet was conducted. Some reasons on why an online car store would succeed are given below:

- Convenience and ease of use of the web site makes it more interesting and fun to shop online.
- Shoppers only buy 5% of the time they visit e-commerce sites: facilitate product research, cross shopping, and other non-buying tasks that account for 95% of visits if you want to turn people into loyal users.
- E-commerce is going global, with many users buying from foreign sites. This allows a change to the local car dealer to sell their product overseas and gain more customers.

This result comes from a survey sponsored by the Danish E-Commerce Association. The survey was completed by 2,929 Internet users, of which 1,780 (61%) had actually bought something online. [16]

The respondents of this survey that was conducted on the Internet showed that most people felt it easier, pleasant and efficient to buy a product online. The results are shown in the table on the next page.

Most Important Reasons People Shop on the Web	
Easy to place an order	83%
Large selection of products	63%
Cheaper prices	63%
Faster service and delivery	52%
Detailed and clear information about what is being offered	40%
No sales pressure	39%
Easy payment procedures	36%

Table 1: Most Important Reasons People Shop on the Web

Another reason that the buyer wants to access from the Internet is detailed information about the product that he is going to buy. The Web Based Car Information System will provide detailed information about the car that it will be offering. This will mostly apply to new cars that will be sold on the Internet. There are some international website that offer the specifications of the car, that is one of the difference that this website will offer to the local public. This is substantiated by a quote taken from the New York Times: *"When we ask customers what they want, they don't answer 'community feeling' or 'shopping experience,' they want more music samples, ease of use, speed, and low prices."* [12]

Of all the Online Car websites that have been research, many hold some good and bad points. Some websites are too complicated while others just have little needed information about a particular car. Some websites hardly provide sufficient information to a potential buyer about a particular car. From a research conducted by the author, the proposed website will learn from all the current websites there are on Online Car Shops. By doing such the proposed will have to offer the very best to the public both local and the globally.

Some websites offer maintenance tips with a question type standard. This is where the buyer posts questions to the website. After a few days he will receive a reply to his question. Websites such as "PriceYourCar" (www.priceyoucar.com.my) offer maintenance tips while some don't. While other car websites offer feedback posts such as "Autoworld.com.my" but don't offer tips such as the website "Cars For Sale". The proposed will try to incorporate all these features to make it and even more effective Web Based Car Information System.

Most website also show pictures of the cars that they offer to the public for example "DMMS Home", while some the current website do not project a picture of the car in mention like for instance the website "Price The Car" doesn't offer full pictures to the buyer. The proposed Web Based Car Information System will generate a picture of the cars that are on sale to the public. This is one of the features that will distinguish this particular websites from some of the current websites on the World Wide Web. It also

proposes to include a few 3D pictures to give the buyer a feel as though he is sitting in the car.

There is currently one main website which offers the full specifications about some of the cars to the public. That is AutoWorld (www.autoworld.com.my). The proposed website will offer full specifications to the user/buyer to allow him to be able to make his choice. This feature will benefit the buyer in a lot of ways. This will be done because it will offer all the information the buyer will need to make his choice on his type of car that he would prefer. This feature will definitely be offered in the proposed website.

Certain available websites also offer new car price listing. One particular website is "Dozo Car". Most of these websites are unfortunately not regularly updated. This is due to the many reasons. Some of the reasons are:

- Currency Exchange Rates
- Revised Import Duty
- Local Market Demand

The proposed website will contain updated new car price listing. This will benefit the buyers when they browse the proposed website. This is because it will give the potential buyer a benchmark price of the cars they might want to buy. Those who are

interested in buying used cars will also be able to compare current prices of new cars with used cars. This will let them browse through prices of the car without having to move around car garages and showrooms.

The proposed website will also feature different calculators to help the potential buyer calculate the cost of buying a car. This feature will help him to decide whether he will be able to afford the car that he is planning to buy. The calculators that are being planned to be incorporated in this website will be a collective. It will feature all the current calculators that are being offered by other websites. This is another extra feature that this website will offer to the public. Some of the website only have some of the proposed calculators. Some of the calculators that will be offered on the proposed website are:

a) Loan Payment Calculator

b) Road Tax Calculator

c) Loan Affordability Calculator

Most of the calculations methods are derived from the proposed formula given by the Jabatan Pengangkutan Jalan Malaysia. [9] This formula is used by most of the current websites that offer this particular feature to the public. These are some of the main features that the proposed website will offer to the public.

CHAPTER 3

METHODOLOGY

3.1 Project Description

"Web Based Car Information System" is an online car store prototype for those who prefer to shop online for their vehicles. It will have all the features of an E-Commerce site.

The Modules proposed in the project:

1. Main

   When the buyer enters the site, he will come to the start up page showing him the main menu and containing links.

2. Browse

   Retains the vehicle in question, vehicle price, and vehicle particulars.

3. Login

   Dealer login and password to purchase a car.

4. Register

   New dealer would want to register to the website to obtain a login name and password.

5. Car Maintenance

   This section provides a section for customers who want to contact the store or have question pertaining to their vehicle. It serves as an advice corner to the buyer.

6. Search

   Will allow the buyers to search for a particular car according to their specifications.

7. Contact

   Allows customer to contact the store for assistance or any problem that arises.

8. Database Administration

   Administrate the database directly in the database instead of on the web.

3.2 System Requirements

3.2.1 Functional Requirements

A functional requirement describes the interaction between the system and its environment. The functional requirement also helps to describe how the system should behave if it is has any stimuli. The important thing is that the questions addressed by the functional requirements must have the answers that are independent of an implementation of a solution to the problem.

1. Buyer Module

Buyer Module allows visitors or buyers to browse through the information of the cars sold by the Web Based Car Information System. A non-registered dealer must register as a member of Web Based Car Information System before he/she can administer any item on the store. This module includes the following functions:

i) Search for cars by model or make. The buyer can choose from the options provided in the menu. This will help the buyer when choosing his vehicle.

ii) A dealer must register as a member of the website before he can make administer the store. A member can also update their information

such as changing password, change personal information including address or telephone number.

iii) Only registered dealers can make a purchase. When the term making a purchase here is used, it means having the buyer contact the dealer after selected his/her choice of vehicle. A summary for the customer information and the purchase car will be displayed before submitting the form.

2. Administration Module

This module allows the administrator to manipulate the records in the Web Based Car Information System database. The administrator administrates the module in the database (which is Access 2000) and not at the web. Among the task that can be carried out by the administrator are as follows:

i) View, update, add and delete dealer records.

ii) View, update, add and delete used car records.

iii) View, update, add and delete new car records.

3. Car Module

This module will provide all the information on the cars in the system. It covers the type of the car (new or used), model, make, year, colour and other distinct description about the cars. It also includes the search function that allows the buyer to search for the cars.

3.2.2 Non-Functional Requirements

Non-functional requirement are defined as constraints under which the system must operate and the standards, which must be met by the delivered system. The Web Based Car Information Systems includes the following functional requirement:

3.2.2.1 Reliability

A system that can run for a long period of time with out failure or crashing is a good website. This would be a good definition for a reliable system. The system should not produce high cost failures when used in a reliable manner, that is the normal manner the buyer would use the website.

3.2.2.2 Robustness

Robustness refers to the quality that causes a system to be able to handle, or at least avoid disaster in the face of any unexpected data. The Web Based Car Information Systems supports robustness by developing program logic to process anticipated errors in the input, such as testing for presence of alphabetic data that was accidentally keyed into a numeric field. When such error is detected, an error message prompted for re-entry before any further processing is carried out. This error message will explain the type of error

and the necessary correction(s) to be made, so similar mistakes would not be repeated.

3.2.2.3 User Friendly

This system can be considered as attractive and an easy-to-use application because the buyer only has to click on the hypertext or image by using the mouse. The grouping of the cars will make the visitor or buyer feel more comfortable to browse the store. The use of suitable frames and navigation bars will help the user to use the system with more confidence.

3.2.2.4 Security

A secure server protects certain important modules. These modules are implemented using SSL or SET technology. For a buyer who wants to purchase any cars, they must login with their correct user ID and password to prevent unauthorized access into their account. They can change the password if they choose to do so. For the administrator, they have to login directly into the database before accessing it.

3.2.2.5 Accuracy

Accuracy refers to the precision of computation and control the Web Based Car Information Systems provides. For instance, it calculates the amount the buyer would have to pay for car instalments and alike. If the website is inaccurate, it would not be a good website.

3.2.2.6 Modularity

Modularity is a key factor in good program design. The working of the system is decomposed into modules so that distinct functions of modules can be isolated from each other. Modularity has the advantage of making testing and maintenance much easier. In the Web Based Car Information Systems, modularity of the program will be applied from the beginning as this will lead to easy modification in future. The modular in design approach means other shell modules may be easily combined or joined at a later time.

3.2.2.7 Implementation

The Web Based Car Information Systems can be implemented under any browser such as Internet Explorer or Netscape Navigator that supports Java and frames.

3.2.2.8 Response Time

The response time to retrieve the information such as the car information can be considered within a reasonable interval time. It means that all desirable information should be available to user at any point in time. The requirement for up-to-date information is also a necessity.

3.3 Hardware and Software Requirements

3.3.1 Server Hardware Requirements:

1. A server with Pentium II 233Mhz processor (recommended)
2. At least a 64 Megabit RAM
3. A 1.5GB Storage Space
4. A Network Interface Card (NIC) for retrieving and broadband of 10MBps or more
5. Other standard computer peripherals

3.3.2 Server Software Requirements:

To host the system, the server computer needs to have various supporting software installed.

- Network operating system-Windows 98
- Web Server Service- Personal Web Server 4.0
- Server Scripting Engine- Active Server Pages
- Database connectivity interface driver – Active Data Object

3.3.3 Client Hardware Requirements:

The client hardware requirements are minimal as long it has a reasonable amount of memory and a dial up connection line. The recommended configurations are:

- 16 MB RAM (minimum)
- Network connection through existing network configuration or modem (recommended at least 14.4 kbps)

3.3.4 Client Software Requirement:

The client software requirements fall on the browser used by users. It requires a system that can run Microsoft Internet 4.0 above or Netscape Communicator (supports Java Applet, frames and Macromedia Applications).

3.4 Tools Used

3.4.1 Operating System

Windows 98

Windows 98 is the most complete platform available for building and hosting Web-based applications, and the easiest server operating system available. It's flexible and compatible that can reduce hardware and software costs. It is also reliable and easy to manage.

The reason Windows 98 is used as operating server in this project is:

- Backward compatibility with Windows 3.X and DOS
- User friendly environment and easy to use
- High-performance, reliable, secure, and easy-to-manage server for sharing information and running applications in the most demanding businesses.
- Backed up by the world most largest software industry, Microsoft
- Portability
- Scalability
- Multitasking environment
- Fault tolerance

3.4.2 Web Server

Personal Web Server (PWS)

Microsoft Personal Web Server 4.0, with its built-in is the easiest way to publish information and bring business applications to the net especially for those who want to sell online.

The reason PWS is used is because:

- PWS can enlist integrated Web services to easily extend these strengths of an intranet
- Innovative Web publishing features, customisable tools, and new wizard technologies unique to PWS 4.0, make Windows 98 with PWS the easiest way to publish information and share it securely over the Internet.
- Powerful management tools in PWS 4.0 will help to easily maintain Web sites, manage content, and analyse usage patterns to improve site as it evolves.
- Customisable management tools, flexible administration options and analysis tools.
- Integrates easily with ASP to host ASP application
- Easy administration features the Personal Web Manager to help you administer your Web server.

3.4.3 Web Development Tool

Front Page 2000

Using Microsoft FrontPage 2000 is an easy way to create and administer professional-quality websites. FrontPage 2000 is capable of creating complex, interactive and creative website with just a simple mouse click.

FrontPage 2000 website creation and management tool gives the users control of their website. They can position elements exactly where they want them on the page, give their website a professional and consistent look across all of its pages, import and edit HTML just as they like, and use the latest in Web technology, all without HTML programming. [10]

The reason FrontPage 2000 is used in this project is:

- Can set up and maintain their site as a whole, easily monitor the condition of the web site and make updates regularly
- Easy database integration with the web project
- Supports the latest Web technology such as ASP, ActiveX, HotBot and many more for form processing and form interaction.
- Easy to insert java Applet and Macromedia applications to an existing web page
- FrontPage provides a range of scripting features that are compatible with JavaScript and Visual Basic Script

- There is also The Navigation View lets user create and manage the navigational structure of Web site within seconds
- FrontPage 2000 will update the Navigation Bars automatically, saving users time and keeping the current links
- Give the user a choice to edit the HTML coding in different frames. For user who are experienced in HTML coding, this as an added advantage of the software where the user need not to modify the pages individually but in different frames where it shows more pages

3.4.4 Database

Microsoft Access 2000

Microsoft Access 2000 is a relational database that was developed by Microsoft. It has currently 10 million users worldwide. The Access package is one of the best-selling relational database packages for Windows on the market. Microsoft Access 2000 provides relational database power to give the information users need to make better decisions. Together with the ODBC driver for Access, both can retrieve data from database in client server based system. [1]

The reason Access 2000 is used because:

- It integrates data from spreadsheets and other databases, and is the easy way to find answers, share information over intranets and the Internet,

- Access 2000 allows generating, analysing and creating reports fast. It integrates ease of use from the data entry point to printing in HTML.
- This relational database tool can be integrated easily Microsoft FrontPage 2000
- Many simple and user-friendly features in building tables, queries, forms and reports that can be customized to suit project needs.
- It is very compatible the server side script that is going to be used that is Active Server Pages (ASP), which will be described below.
- Provide concurrent help by assisting users in answering their question
- Easy to learn wizard provided

3.4.5 Scripts

3.4.5.1 Server Side Script

Active Server Pages (ASP)

Active Server Pages is a programming environment that provides the ability to combine HTML, scripting, and components to create powerful Internet applications that run on the server. If the user creates websites that combine HTML, scripting, and some reusable components, they can use ASP to glue these items together. Users can create an HTML interface for an application by adding script commands to the HTML pages and

encapsulate it for business logic into reusable components. These components can be called from script or other components.

(http://msdn.microsoft.com/workshop/server/asp/ASPover.asp?)

The reason ASP is used as server side script:

- ASP combines HTML with script in the same file for better application flow.
- Because the scripts are processed on the server, user does not have to worry about the browser's script capabilities.
- ASP support VBScript and JavaScript.
- ASP provides easy access to databases via ADO (Active Data Object) that is the new database object model.
- Creating an ASP requires only standard knowledge of HTML, that is a person who knows HTML will find ASP easy to learn
- ASP development is compile free (does not require a compiler)
- ASP protects proprietary business algorithm and information

3.4.5.2 Client Side Script

3.4.5.2.1 VBScript

Visual Basic Script (VBScript) scripting language enables us to embed commands into an HTML document and it has been designed to make it easier to develop client-side Web applications that run on the Web browser. When an Internet Explorer 3 user downloads the page, the VB Script commands are loaded by the Web browser along with the rest of the document and are run in response to any of a series of events. Again, like JavaScript, VB Script is an interpreted language; Internet Explorer 3 interprets the VB Script commands when they are loaded and run. They do not need to be compiled into executable form by the Web author who uses them.

The reason VBScript as client side scripting is because:

- VBScript is powerful and VBScript can be used to develop richly interactive Web pages that respond to user input in an intelligent manner. In the case of a server-side application, VBScript can be used to process data submitted by users with the aid of ActiveX controls specially designed for Microsoft Active Server Pages.
- VBScript is lightweight. VBScript code is lightweight, fast, and has been optimised to be transmitted via the Internet.

- VBScript is easy to use compared to scripting languages such as JavaScript. VBScript is easier to use because it is based on the easy-to-learn BASIC (Beginner's All Purpose Symbolic Instruction Code) language.
- VBScript is cross platform that is it will function on a UNIX machine as well as Macintosh computers in addition to Windows 95 and Windows NT computers.
- VBScript is compatible with the client side script that is going to be used in this project, ASP.

3.4.6 Other Web Development Software Tools

The other related software that will be used in the project is as follows:

- Notepad for modifying HTML and ASP Codes
- Internet Explorer 5.0 as the browser to view the web page
- Paint Shop Pro 5.0 and Adobe PhotoShop 5.5 to create attractive images for the website
- Microsoft Word 2000 for the project documentation

3.5 Justification

For this project, the proposed model is the Waterfall Model. A comparison of some of the model was conducted. Of the model that this comparison was done was the SDLC Method, Spiral Methodology, the RAD (Rapid Application Development) Methodology, Prototype Model and a new type of model the WaterSluice Model.

A methodology is a description of the process required for the development of a system. Methodologies vary in many aspects. They can be very broad, identifying the major steps involved from the conception of the system to the final use of that system, or they can be narrower. Methodologies also vary greatly in their depth. The amount of detail they provide when describing the design process varies considerably.

3.5.1 Waterfall Model

This methodology is presented in Pressman [6] and many other software engineering textbooks. As shown in the figure below, this model is chosen because it shows all the comprehensive steps on what happens during the development of the project and helps the developer to know the sequence of the event that they should be expecting.

Some of the main advantages of using this type of model with prototyping are:

- It makes sure that the developer is building the right system according to the specifications. This also enables the developer to conduct verification checks for the quality of the implementation
- It is easy to associate and identify each milestone
- This method is suitable to be used when there are uncertainties in the earlier stages of the project
- Prototyping enables the early involvement of the developer and this makes the development more accurate
- With this model, the development of the system can be backtracked if there is any errors found in the system.

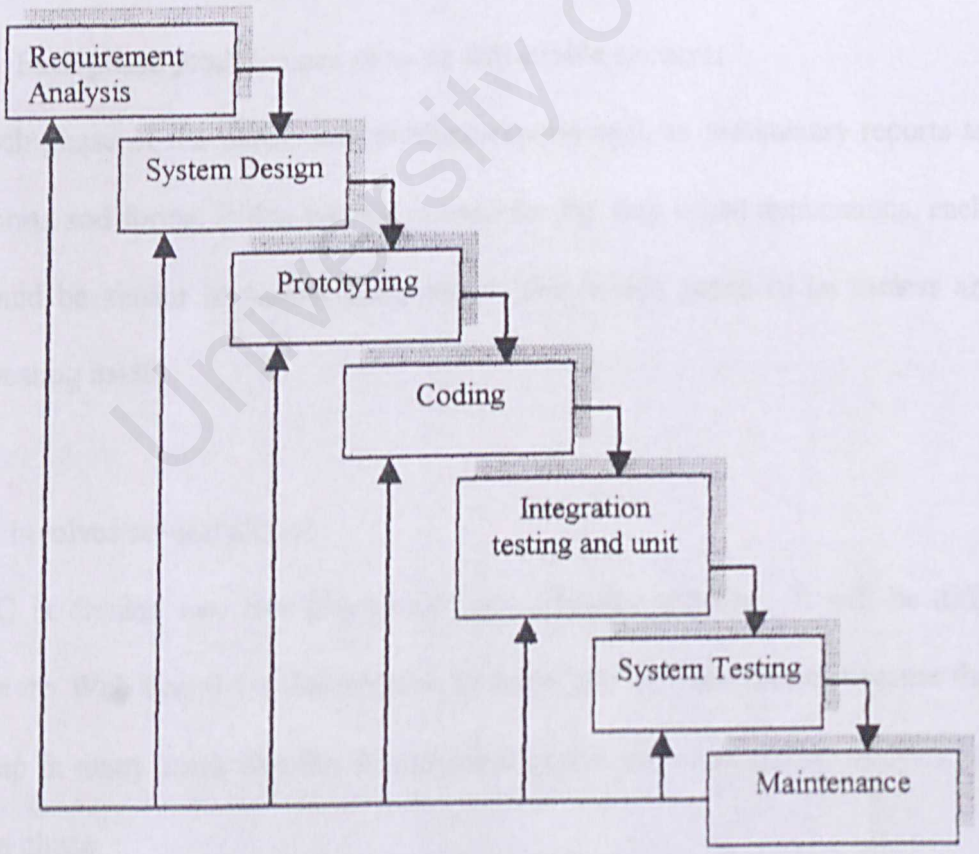

Chart 3: Waterfall Methodology

3.5.2 System Development Life Cycle (SDLC) Method

The reasons for not using the SDLC method in planning the project are explained below:

- Involves very structured system development

Enables the system to be visualized as an integrated group of elements. For a web-based project like the "Web Based Car Information System", this feature is not really very relevant because the view of the system may change during the development process. By having to change the system always, it would take a lot of time.

- Each phase produces one or more deliverable elements

Each phase of the SDLC will produce reports such as preliminary reports and final reports and forms. If this method is used for the web based applications, each report would be similar at almost every stage. This would prove to be useless and even repeating itself.

- Involves several phases

SDLC is divided into five phases that are arbitrary actually. It will be difficult to divide the Web Based Car Information Systems into all these phases because they may overlap in many areas like the development phase may start during analysis phase or design phase.

3.5.3 Spiral Methodology

This methodology, developed by Boehm [2], and also presented in Pressman, presents the process in a business context. This is where managers make decisions about the feasibility of a project, the resources allocated to it and the risks associated with development. How this methodology works is at each cycle of the spiral, a fresh decision is made as to the purpose and value in doing another cycle. The four steps in the spiral methodology are: planning, risk analysis, engineering and customer evaluation.

The spiral methodology is an incremental improvement on the waterfall methodology. It allows for feedback to each team There are stages where mistakes in the requirements can be corrected. The end user gets a peek at the results and can feedback information. The implementation team can feedback performance and viability information back to the requirement team and the design team. The product can track technology better. As new improvements are made, the design team can incorporate them into the architecture. [15]

Even though it might seem to be a good type of methodolog to implement, it does have some very big downfalls, especially for building a website hich has to be independent of frequent feedback improvments. The spiral methodology has no governors to control oscillations. More often than not, the length or number of cycles

grow unbounded. There are no constraints on the requirement team to "get things right the first time".

This happens to be the main reason why this methodology wasn't chosen. For a website it is very important that when a website is publiched, it has to be good this first time around. This leads to the sloppy thinking from the requirement team giving the implementation team many tasks that eventually get thrown out. The architecture team is never given a complete picture of the product and hence will not be able to complete an efficient global architecture. There are no firm deadlines in thisd methodology too. Cycles continue with no clear termination condition. The implementation team may be chasing a continuously changing architecture and dynamic product requirements. [14]

3.5.4 Rapid Application Development (RAD)

The RAD methodology is a very flexible methodology. It incorporates prototyping and user feedback, as it's main mechanisms. It is usually chosen in cases where a large user community will have significant input to the system, the requirements of the new system are unclear, or there is a high degree of possibility that the requirements and feature set will change as the project proceeds.

The explanation of the RAD Methodology starts of with a system being proposed. Once a system is thought of, the Brainstorm, Requirements, and Analysis

steps may be repeated until enough information is known to create a prototype. The prototypes are mock-ups at this stage, and may be completely thrown out if necessary. Code is not deliverable quality. The prototypes will usually change significantly after user feedback. This shows that user feedback is essential to a good system.

The Object Creation and User Review steps can be repeated multiple times until the system is correct and accepted by the user community. Objects might include data entry forms, high profile management reports, engineer reports, etc. Optionally, if the User Review step results in fundamental changes in the direction of the system, the Brainstorm, Requirements, and Analysis steps can be repeated. Once all of the above steps are completed to the acceptance of the user community, the system code is finalized in preparation for final delivery.

3.5.4.1 Advantages Of The RAD Methodology:

1. Flexible and adaptable to changes.
2. A Prototyping application gives users a tangible description from which to judge whether critical system requirements are being met by the system.
3. RAD generally incorporates short development cycles - users see the RAD product quickly.

4. RAD involves user participation thereby increasing chances of early user community acceptance.

5. RAD realizes an overall reduction in project risk.

3.4.5.2 Disadvantages Of RAD Methodology

1. Unknown cost of product. As mentioned above, this problem can be alleviated by the customer agreeing to a limited amount of rework in the RAD process.

2. It may be difficult for many important users to commit the time required for success of the RAD process.

3. Needs a lot of user/buyer input to achieve an effective and efficient website. [11]

3.6 System Planning

3.6.1 User Interface Design

The goal of user interface design is to provide the best way for users to interact with computers, in as user-friendly as possible while still having the distinguished look. This is known as the Human-Computer Interaction (HCI). Improving interaction between people and computer is one of the most important activities in system design. People no longer want to know how it's done, but more how good and impressive it looks like.

There are two main aspects of the interface design. First is to choose the transaction in the business process to be supported by the interface. This will define the broad interface requirement in terms of what information to be entered and output through the interface during transaction. The second one is the design of the actual screen presentation including its layout and in fact the sequence of screens that may be needed to process the transaction. [17]

3.6.1.1 Web Based Car Information Systems Screen design

Since the Web Based Car Information Systems is a web-based application, its screen design is presented in the form of web pages. To generate a better user friendly interface, the Web Based Car Information Systems screen design are formatted in a

standard layout so that the various types of information and messages always appear in the same general display area. This would include main buttons like the "Home", "Search", "Dealer", "Tips", and others alike.

These are divided into 2 parts, a navigation bar and working area. Navigation bar is simply an index that guides their way to pages they are interested directly, quick and easily. The navigation bar is usually situated around the edges of the screen. This is to keep the screen as clean as possible.

The working area is the area where user input and displaying results take place. The working area must remain in a space that is long and big enough to display information and messages. This is usually in the middle of the screen. The Web Based Car Information Systems doesn't use frames to divide the pages because it complicates the ASP coding.

Figure 1: FindCar.com Default Page

3.6.2 Architectural Design

The sub-system making up the relationship is identified and documented. The Web-Based Car Information System is designed to use the traditional client/server architecture and extends it to the web. To show this an N-Tier Architectural System is built. Each component is built into each tier to fulfil its role then tied together to form a final system.

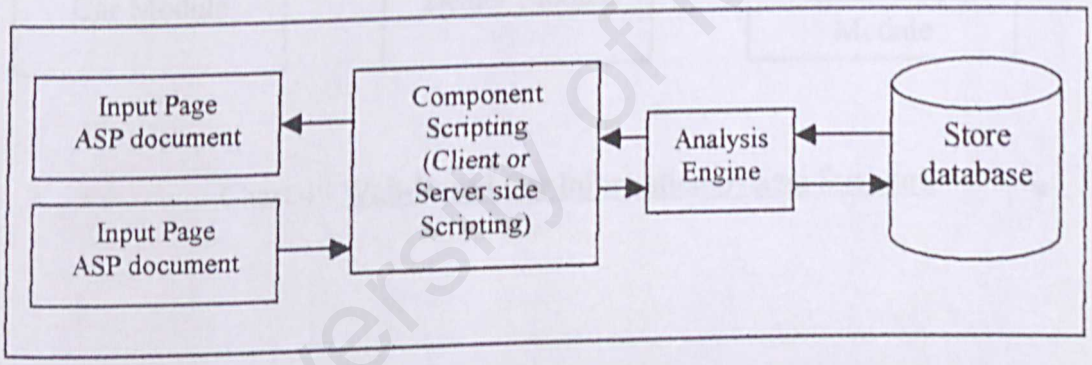

Figure 2: System Architecture

3.6.2.1 System Structure

This is the architectural structure chart, which shows the levels in the wholes system. It works by the highest level incorporating the lower levels. The chart also shows the connections between each module and the levels it connects to. The modules

at the top can call the module at the bottom. The usage of structure chart is to describe the interaction between independent sub-systems. Lines between the rectangular boxes represent the connection between modules. Lines between the rectangular boxes represent the connection between modules. The main structure chart is as follows:

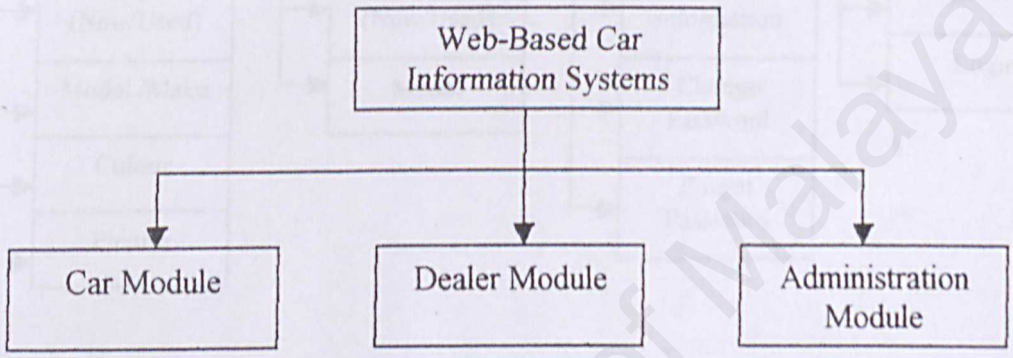

Chart 4: Web-Based Car Information System Structure

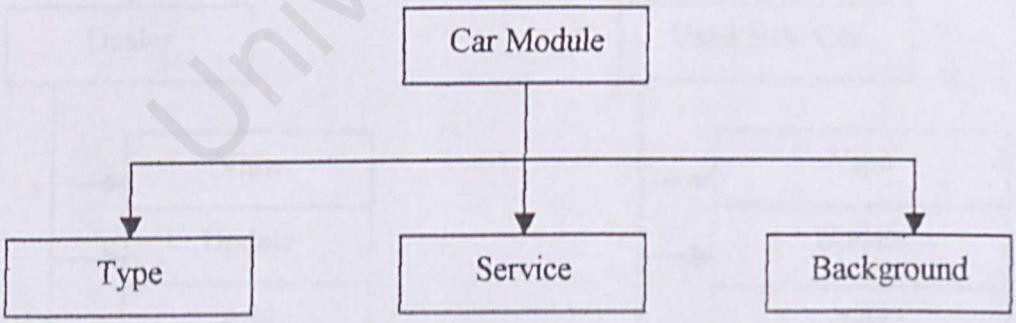

Chart 5: Car Module

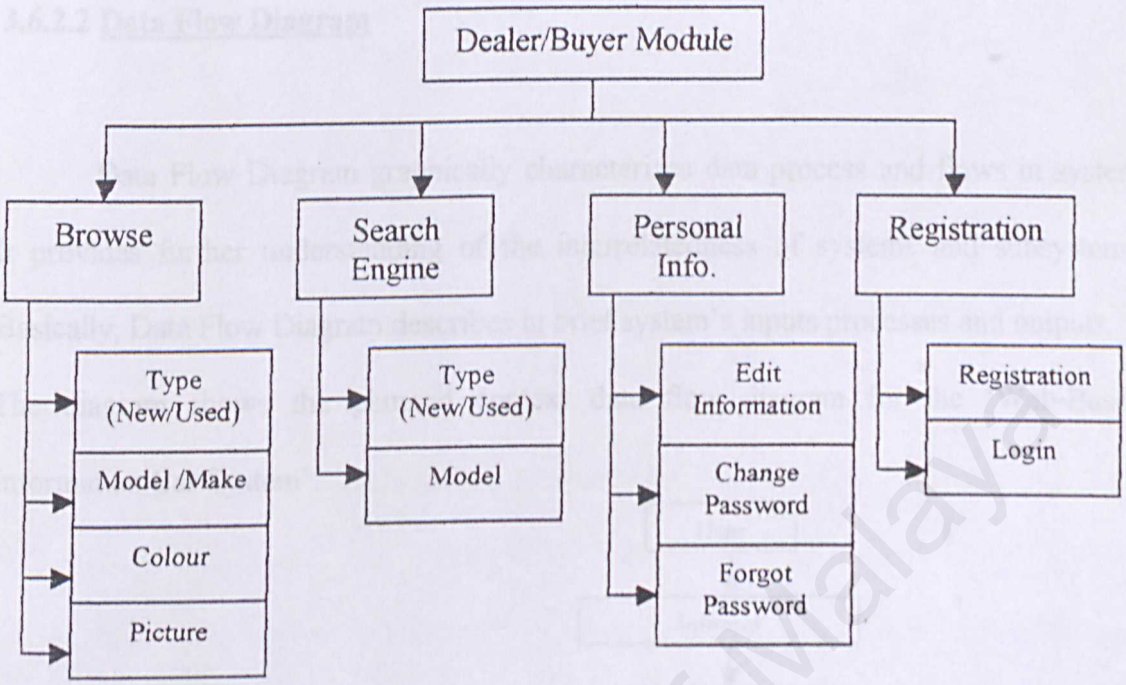

Chart 6: Customer Module

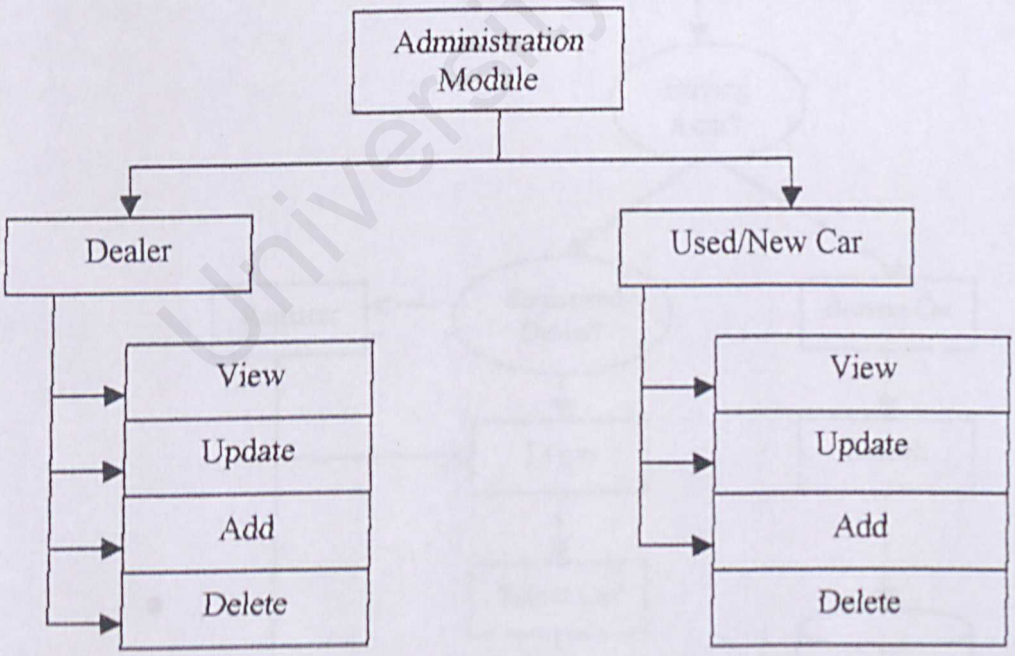

Chart 7: Administration Module

3.6.2.2 Data Flow Diagram

Data Flow Diagram graphically characterizes data process and flows in system. It provides further understanding of the interrelatedness of systems and subsystems. Basically, Data Flow Diagram describes in brief system's inputs processes and outputs. The diagram shows the planned context data flow diagram for the 'Web-Based Information Car System'.

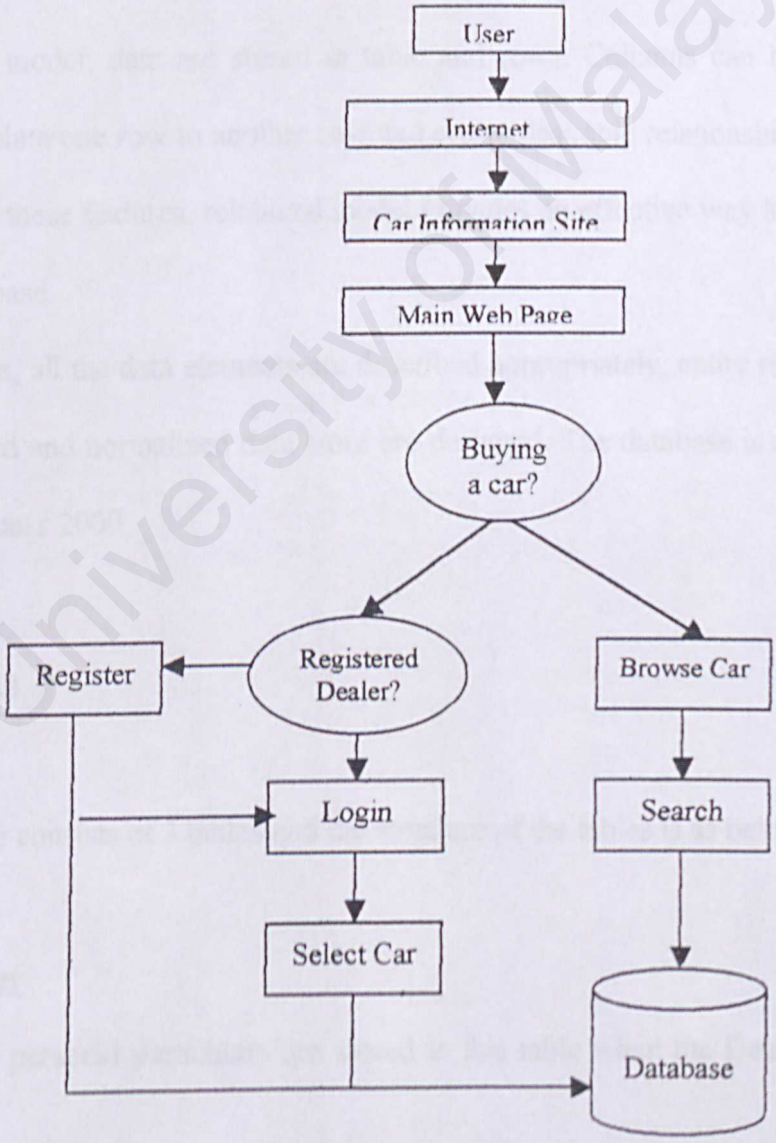

Chart 8: Data Flow Diagram

3.6.3 Database Design

A database is defined as a collection of data stored in a particular format and reached through a computer. The Web-Based Car Information System uses the relational database model in its database implementation. This is because it enables data to be stored in a way that minimize duplicated data and eliminates certain type of processing error that can occur when data are store in other ways.

Under this model, data are stored in table and rows. Columns can be used to contain data that relate one row to another row and create desirable relationship between the tables. With all these features, relational model provides an effective way to structure and process a database.

In this phase, all the data elements are described appropriately, entity relationship diagrams are created and normalized data store are designed. The database is developed using Microsoft Access 2000.

3.6.3.1 Table Design

The database consists of 3 tables and the structure of the tables is as below[18].

3.6.3.1.1 Dealer

The dealer's personal particulars are stored in this table when the Dealer enters their information.

The primary key is the DLoginID.

Field Name	Data Type	Description
DloginID	Text	Dealer's login ID
DfirstName	Text	Dealer's first name
DlastName	Text	Dealer's last name
DIC_No	Text	Dealer's IC number
DAddress1	Text	Dealer's address
DAddress2	Text	Dealer's additional address
DAddress3	Text	Dealer's additional address
Dcity	Text	City where the dealer lives in
Dstate	Text	State where the dealer lives in
Dpostcode	Text	Post code where the dealer lives in
DOffice_tel	Text	Office telephone number
DHome_tel	Text	Home telephone number
DE-mail	Text	Customer's e-mail address
Dpassword	Text	Password to login

Table 2: Dealer Table

3.6.3.1.2 Used Car

This table will show the used car specification for the customer to view. The primary key would be the CCarID.

Field Name	Data Type	Description
CcarID	Text	Car Numberplate
Ctype	Text	Indicates whether the car is new or used
Cmodel	Text	The model of the car
Cmake	Text	The make of the car
Cyear	Number	The year the car was manufactured
Ccolour	Text	The colour of the car
Ccapacity	Number	Capacity of the car
CMileage	Number	Mileage of the car
Cfuel	Text	Petrol or Diesel
CCondition	Text	Condition of the car
CPrice	Currency	Price of the car
Ccarpic	Text	Picture of the car

Table 3: Used Car Table

3.6.3.1.3 New Car

This table holds the particulars for the new cars. This table differs slightly from the used car table. The primary key is NCarID.

Field Name	Data Type	Description
NCarID	Text	Car Numberplate
NCModel	Text	The model of the car
NCMake	Text	The make of the car

NCCapacity	Number	Capacity of the car
NCPrice	Currency	Price of the car
NCPic	Text	Picture of the car

Table 4: New Car Table

3.6.3.2 Form Design

Because the administrator communicates with the database back to back directly, instead on the web, forms are designed for inputting data and for viewing the data on-screen.

Forms play a very important role as a tool of capturing or retaining data in any information system. Forms are designed in the system development because it can be used for the basic of data entry screen design. The elements that are added to a form are called 'controls'. Controls can be graphics, text labels, pictures, and other static elements that do not change as it moves from record to record; as well as 'text boxes' that do change when you move from record to record. Controls can also be used to display or enter data, or perform and display calculations. [19]

In the Web-Based Car Information System, some forms were designed in the database for the use of the system administration. Among the function of the form designed are to view, edit and delete.

CHAPTER 4

IMPLEMENTATION & TESTING

4.1 Implementation And Testing

System implementation and testing is the next phase after system design and analysis. System implementation is the process where the requirements and the design that has been proposed were converted into program codes. System testing is performed to ensure that the programs are executed correctly according to the requirements.

4.2 System Implementation

This is the process of creating the system needed to satisfy an information system requirement. System implementation consist of the following 5 steps:

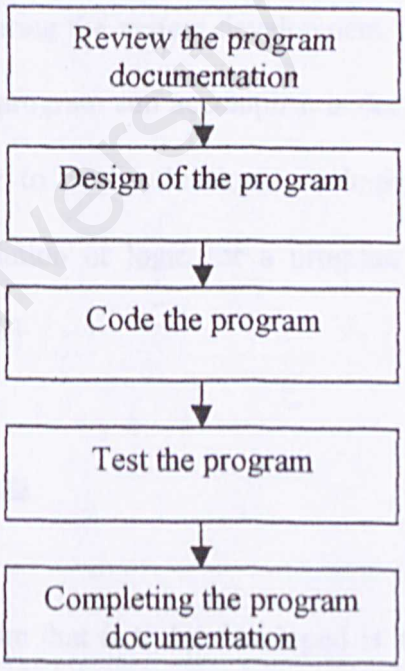

Chart 9: System Development

4.2.1 Review The Product Documentation

Reviewing the product documentation that was proposed during the previous phases. The program documentation catalogue system consists of simple process check, report layout, data dictionary entries and the source document. This document has the author understanding his work better so that what was needed to be covered during this coding phase is done. [19]

4.2.2 Design The Program

After the program documentation review, the second level of program design needs to be completed during the system development. For this second level of program design, exactly what the program can accomplish is decided. This is the process of what the system must be able to do by developing a logical solution to the programming problem. The logical solution or logic for a program is a step-by-step solution to a programming problem. [19]

4.2.3 Code The Program

Coding the program that is to be developed is a process of writing the program instruction that implements the program design. Design specification must be translated

to machine-readable format. This is done through program coding. If the design is performed in detailed manner, coding can be accomplished mechanically. [6]

4.2.4 Test The Program

During the testing program level, the program is tested to ensure it functions are running correctly before the program processes actual data and produces info on which user will be relying on.

4.2.5 Documentation Of The Program

Completing the program is essential for the successful operation and maintenance of the information system. This documentation includes the system's user manual that may be needed by most of the customer as well as the system administrator. This is to help the user use the Web Base Car Information Systems correctly and efficiently.

4.2.6 Program Coding

During this phase, the programs are written and user interfaces are developed and database is initialized with data. The design must be translated into a machine-readable form. The coding step performs all this tasks. If the

design is performed in a detailed manner, coding can be accomplished mechanistically. During coding, the components built during the development phase are put into operational use. The system is built according to the original design, which was done.

4.2.6.1 Coding Approach

A program technique called top-down, stepwise refinement; an approach that is essential to the development of well-structured program is used here. This approach enables the program to determine the top down, stepwise refinement process when the pseudocode algorithm is specified. This approach was adapted due to the dependency of the function to login in each module. [17]

4.2.6.2 Coding Style

The coding style is an important attribute of source code and it determines the intelligibility of a program. An easy to read source code makes the system easier to maintain and enhance. The element of coding style includes internal (source code level) documentation, method for data declaration and approach to statement construction.

4.2.6.3 Code Documentation

The Code documentation begins with the selection of identifier (variable and variable) names continues with the composition of connectivity and ends with the organization of the program. The use blank line or indentation so that the comment can be readily distinguished from code.

Since FindCar.com is a web Application, so languages that used includes HTML and VBScript. In this system, the scripts that are written are mostly to perform validation and calculation on the input text. For the client side scripting they must be delimited by the <SCRIPT> .... </SCRIPTS> tags. The easiest way to add a script to an Active Server Page (ASP) is by using the script delimited <% and %>. Any enclosed scripting within these delimiters will be processed as a script.

Preparation of a HTML and ASP document involves an endless cycle of testing and modifying the ASP source codes. This includes loading the file in the browser for viewing, validating the input and then going back to make further changes where necessary. Microsoft FrontPage is used to develop these documents. This tool enables easy performance of the many complex programming and database tasks which are required in the creation of a website, as well as the incorporation of HTML formatting, layouts and graphics. The images used in this application were created using JASC Paint Shop Pro, Paint, and also Adobe Photoshop 5.5.

4.2.6.3.1 Internal Documentation

Internal comment provides a clear guide during the maintenance phase of the system. Comments provide the development with means of communicating with readers of the source code. It even helps the developer of the program to know his own code. The statement of purpose indicating the function of the module and a descriptive comment that is embedded within the body of the source code is needed to describe processing function.

4.2.6.3.2 Naming Convention

Naming convention provides easy identification for the programmer. The naming convention is created with coding consistency and standardization in mind

4.2.6.3.3 Modularity

In order to reduce complexity, changes are facilitated so that results are easier implemented by encouraging parallel development of different part of a system.

4.2.7 Database Connection

The ADO (ActiveX Data Object) connection is used in this as a means of database connection. ADO provides the means by which program code accesses the database. ADO connects to a database through an OLE DB provider. OLE DB is Microsoft new lower-level database interface that provides access to many different kinds of data. The OLE DB provider exposes these data to ADO, which in turn allows connection to data using Data Control or Object interface. [20]

All communications with a database takes place through an open connection. Before any information can be inserted into or retrieved from a database, a connection with the database must be opened. Using the data source to connect to the Microsoft Access does this.

Shown below are some of the steps tat ought to be followed to open a database connection.

a) Create an instance of the database connection to open a connection with the database
b) Call the open method of the connection object to actually open the database

An example is shown below.

```
Dim strconnect, rstClientInfo,sql
        set strconnect=server.CreateObject ("ADODB.connection")
```

```
set rstClientInfo=Server.CreateObject ("ADODB.recordset")
sql = "SELECT * from Dealer where DLoginID='" & session("DLoginID")
&"'"
strconnect.Open "customers"
rstClientInfo.Open sql,strconnect
```

4.2.8 Server Side Scripting

As mention in previous chapter, ASP is a server side script that is embedded in the HTML coding. ASP codes are located within the delimiter <%...%> in the HTML script are invisible to the client and are executed in the server, hence named server side script. Hence ASP is suitable to employed in the Web Based Car Information System and produce consistent result regardless of the browser used. Some of the ASP objects used in the development of this project are:

4.2.8.1 Request Object

When user connects to a Web server and request a document that is an ASP application, certain information about that transaction is available to the ASP application through this object. Almost all the interaction that takes place between the web browser and the ASP application is funnelled through the request object.

4.2.8.2 Response Object

This object is used to create dynamic pages such as creating static pages that are returned to a client browser when a specific URL is requested. It also can add and alter HTTP headers, dynamically build page bodies, and automatically redirect clients to alternative pages.

4.2.8.3 Session Object

As the user moves from one section of the application to another, the browser needs to keep track of certain user-specific information. This task is enabled through session object, which can store object and information for the life of an individual visit to a Web site.

4.3 Testing

Software testing is a critical element of software quality assurance and represents the ultimate review of specification, design and coding. It is often referred as verification and validation. Rules that can be serving well as testing objective are:

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

In Figure 4, the arrow from the top boxes indicates the normal sequence of testing. The arrows returning to the previous box indicates that previous testing stages may have to be repeated because of some problems. The stages in the testing process are:

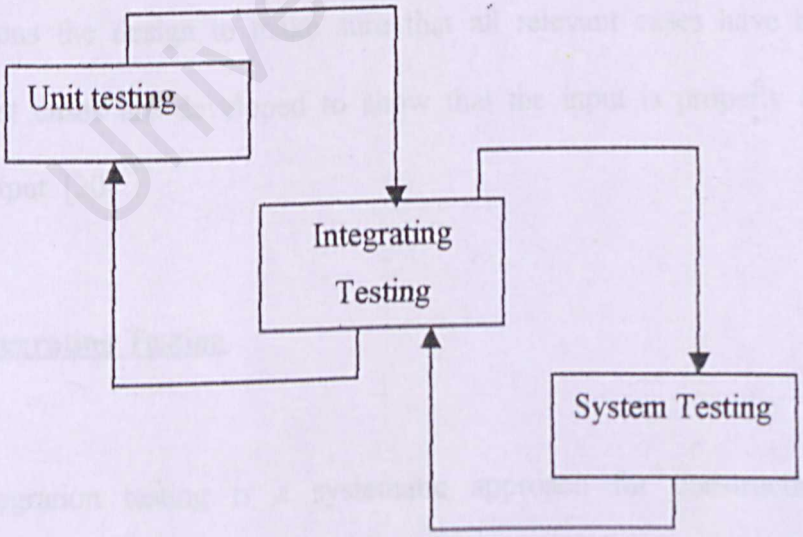

Figure 3: Testing Stages

The system has undergone 3 stages of testing. They are unit testing, integration testing and system testing.

4.3.1 Unit Testing

Unit testing focuses on the verification effort on the smallest unit of software design in the module. This process enables the tester to detect errors in coding and logical mistake. For this system, unit testing was done during the coding phase and it was eventually a time consuming one. Important control path are tested to uncover error within the boundary of the module. Testing involving interaction between modules is initially avoided.

The first step is to examine the program code by reading through it, trying to spot the algorithm, data and syntax fault. This is followed by comparing the code with specifications the design to make sure that all relevant cases have been considered. Finally, test cases are developed to show that the input is properly converted to the desired output. [20]

4.3.2 Integrating Testing

Integration testing is a systematic approach for constructing the program structure while at the same time conducting tests to uncover errors associated with interfacing. In other words, when the individual component are working correctly and

meets the objective, these components are combined into a working system. Testing the interface of 2 components explores how components interact with each other.

Incremental testing was applied during the development of the system. The system was constructed and tested in small arguments, where errors were easier to isolate and correct. Error will be corrected before processing to the next integration. [20]

4.3.3 System Testing

System testing is performed is the final phase of testing whereby it is performed after completion of coding for each module. This process ensures that all units in the module will function accordingly when integrated and have fully satisfied its functional requirements. System testing is designed to reveal bugs that cannot be attributed to individual components or to the interaction among component or to the interaction among components and other objects. [20]

4.4 Analysis Of The Testing

From the testing process that has been carried out, the following test result can be summarized:

4.4.1 Achieve The Main Objective Of The Project

Generally, the main objective of the project as described earlier has been achieved. The system could handle and maintain the customers and product database. This is an important and major activity in the business organization. For the management, the various types of reports have been generated. Besides, it provides safeguard to prevent unauthorized users to access or modify the system the database.

4.4.2 Enhancement On The User Interfaces

The user interface for the system should be more attractive and user friendly in order to attract the user to use the system. As some of the user may not be computer literate, so it is important to provide the user interface as easy to use as possible. The customers may be reluctant to use the system that is not user-friendly. Therefore, using of graphics and more attractive icons to represent the button may help to improvise the user interface.

4.4.3 Enhancement On The Product Information Module

Since this is a Web Based Car Information System, the product information must be clear. This includes the picture and description of the product and also its functionality. This information may not only provide the overall clear picture for the customer, but also convinces them to purchase the product.

CHAPTER 5

EVALUATION

5.1 System Evaluation

Evaluation was implemented more than simply comparing obtained data with expected information. It was related to user environment, attitudes, information priorities and several other concerns that are to be considered carefully before effectiveness can be concluded. At all phases of the system approaches, evaluation is a process that occurs continuously, drawing on a variety of sources and information.

The role of this phase in the development of this software was to determine:

- The extent to which the expected outcome have to be realized
- The perspective value of the process where extraneous factors were taken to consideration.

5.1.1 Evaluation Technique

This section explains what techniques were used to conduct the evaluation at varying levels throughout lesson design and development. These techniques are:

5.1.1.1 One To One Evaluation

It was conducted extensively during the initial information design and development. The procedures were informal and were mainly used to identify potential major problems associated with the planned information design.

5.1.1.2 Small Group Evaluation

It was implemented when Online Sports Store was nearly completed. The reasons was to determine

- Information effectiveness
- Acceptability of the information
- The appropriateness of the materials and strategies employed
- The extent to which the organization complied with the constraints identified during need assessment

5.1.1.3 Field Test Evaluation

This evaluation was carried out when the information system was believed to be of the final draft quality. If problems were identified, additional changes may be made. However, the informal evaluations conducted at this point should ensure that the information system is completed or minimal changes will be required.

5.2 System Strength

There are some strengths in the system that was developed. They would include some of the points given below:

5.2.1 User Friendly

In overall, the Web Based Car Information System could be evaluated as a simple to use application. Unlike command-based environment, such as MSDOS, FindCar.com provides simple indirect, user friendly and graphical based interface for user to deal with it. In the environment FindCar.com, the users are required only minimum amount of typing and inputs when having any interaction with the system. Besides, sufficient instruction and guidance are provided to guide and assist user. For example, error messages will be displayed to guide user whenever invalid user input are encountered by the system.

5.2.2 Transparency

The system is transparent to the user, as they do not need to know where the database resides, how the system is structured, etc. For example, users do not need to know how retrieve and insert record into the database. All they need to do is submit data and then view the query result by conducting a search.

5.2.3 Error Messaging

In FindCar.com, the error messages are immediately displayed just a short while the button is clicked. Message box or error pages will be displayed for them to allow users to identify their errors effectively.

5.2.4 Easy Accessibility

This system is a Web-based application and can be accessed easily using the Web Browser. Any web browser such as Internet Explorer 4.0 could be downloaded free from the Microsoft's website. Any user can use the search capabilities without having to log on as a user; only dealers are required to log on.

5.2.5 Custom Password System

Creating a custom-authentication system prevents unauthorized users from viewing the pages that they don't have permission to access. In this case, it would be the dealer that is allowed to view the database and not any normal user. A dealer can only update his/her information after login in.

5.2.6 Searching Capabilities

FindCar.com provides searching capabilities that allow users to search for a particular car with specified criteria

5.2.7 Able To Provide Database Maintenance

Agents are able to do housekeeping for the database maintenance. They can add, delete, update and even view any record.

5.2.8 Mailing Services

FindCar.com is furnished with mailing facilities to help the user. Just in case the user has a problem with the system or wants to know about a particular car they can e-mail the staff of FindCar.com.

5.3 System Weaknesses

There are some limitation in the FindCar.com system due to time constraints, facilities, constraints and limitation of the program language itself, including:

5.3.1 Lack Of Security Features

Security features are not included the dealer login registration due to time and facility constraint. Therefore, there is no protocol or Internet security involved such as SSL (Secure Socket Layer) or SET employed.

5.3.2 Database Is Not Encrypted

Data stored in FindCar.com database is not secured enough because it is stored in plain text format rather than in encryption format.

5.3.3 Browser Limitations

FindCar.com can only run in Internet Explorer 4.0and above. The user using other browsers will not be able to use the available functions in the system.

5.4 Future Enhancements

Some of the future enhancement that should be considered to be included in this project in the future is:

5.4.1 Security Enforced

Enforce security feature in the dealer module by enforcing SET or SSL technology to verify the information given by the dealer. By employing this technology, dealer identification can be recognized. Hence, reduce the possibility of fraud. Besides, dealer information and authorization can be guaranteed safe and will not be intercepted by other unauthorized party since encryption technique is provided by the SSL or SET technology.

5.4.2 Customer Information

Customer information should be included in the database. This is to keep track of the customer's status regarding the car of his/her choice. This includes the customer's name, address, products supplies, car they are interested in and the status of the car.

5.4.3 Report Printout Capability

For future enhancement, FindCar.com needs to provide printing facility without relying in the browser's print out function. It should print out the car information and other reports and documentation. With its own printing facility, the layout of the printout documents will have better control and quantity.

5.4.4 Software Upgrade

Database development tool used is Microsoft Access 2000. In future, this software must be replaced by higher performance and more stable database platform such as Microsoft SQL Server.

5.4.5 Language Support

FindCar.com should include other language support. This will enable information to be displayed in the different languages like Bahasa Melayu, Japanese and others. This will broaden the usage of the system.

5.4.6 Error Detection Features

The system will actually give a more comprehensive error detection features to ensure that only valid input is being passed to the server and this will be done through client-side scripting. This is important to ensure that the system is robust and easy to maintain and also maintaining the reliability of the system.

5.4.7 Attractive Homepage

FindCar.com will be better published if its homepage is enhanced to be more attractive and interactive by adding more meaningful and user-friendly images, 3D images of the car, animation images and sounds.

5.5 Problems Encountered And Solution

Throughout the development of FindCar.com, a few problems were encountered. However, most of them were resolved eventually. Some of the problem encountered was:

5.5.1 Problems In Tooling And Solution

Since Web based programming only started and was popular late 1990's, the exposure of knowledge in web based programming language is limited. Therefore it was difficult for it was difficult for author to select the most appropriate programming language and tools for the development.

To gain more insight of web-based programming and identify the most appropriate approach to develop FindCar.com, in depth studies and research on the web based programming language was carried out in earlier stage of development. The studies and research activities including Internet surfing, reading topic related magazine and reference books.

5.5.2 Lack Of Knowledge In The Language.

Due to time constraint, learning and developing process was done in parallel. Without a strong base of the language, author has to spend a lot of time in looking for

solution to solve problem that were occurred during development of FindCar.com. This happens to cases related to concept of programming language that are new to the author, such as session, response object that are new to the author.

5.5.3 Slow Response Time

Some of the modules in FindCar.com such as the search module needed to be able to response in minimum amount of time. If all the information such as list of a certain type of a car is stored in the database, the response time will be very slow and thus unfavourable.

5.5.4 Difficulty In Choosing An Appropriate Operating System For The Project.

There were some difficulties in choosing the appropriate Operating System to host and to develop the system. Options that the author had for developing the system included Windows 95, Windows NT, Linux and Unix. Because of limited facilities to the Linux and Unix system in the faculty, therefore this system was not implemented in this project. Therefore Windows 98 was used for it is the most stable and robust Operating System available and was used for the development of this project.

5.5.5 Determining The Scope Of The System

It is impossible to build a full-scale complete system within the time given frame. FindCar.com included both Used and new cars. This increased the cars database. Inexperience with the current computerization of searching for cars was another hindrance to implement a true workable system.

CHAPTER 6

CONCLUSION

6.1 Conclusion

The Web Based Car Information Systems is a start to computerize the transaction/operations in the business organization towards the effort of paperless concept. The aim of the project is to develop and Online Car Search Systems. FindCar.com is not only an information system useful for both the customer and the dealer, but it also includes an administration module. While developing the whole system is not very easy task because various objective has been targeted, but it can still be considered as a contemporary effort to achieve the goal. Overall this project has achieved and fulfilled the objective and requirement as determined during the analysis phase.

In the process of developing the system, invaluable insight was gain into complexities and intricacies of programming. The application of software engineering principles throughout the development has served to further enhance the required skills for developing a good system. Most of the software has captured the attention of many software developers. It provides very powerful features enabling anyone to create highly interactive and dynamic WebPages. Adherence to a development schedule is very important in order to get a job or a task done on time. This experience will definitely prove useful in future system development.

Although not a very complex system, the Web Based Car Information System nevertheless achieved its successful development, which is the first step towards the

future development of the system definitely. The problem and experience gained during the system development should be useful in future endeavours. It is hoped that this system can provide a foundation upon which many more innovative and comprehensive system may be built to perform multiple task and fulfil various user requirement.

APPENDIX A

USER MANUAL

Table Of Contents

1.0 Introduction

The Web Based Car Information System (FindCar.com) is a web-based application. It is designed to manage dealer, used car and new car information on the Internet. It is easy to use and learn because the user interface is user friendly. All the functions in this system can easily be executed by a simple point and click on the available function button.

The Objectives for this system are to:

- Provide information management system for a car company over the Internet.
- Improve the business
- Reduce the paper usage
- Save the buyer's time that used to be spent looking at cars in a showroom
- Provide easy access for the current and future customers

This user manual will guide you through all the functions available in the system. This manual includes the following parts:

- Dealer Manual
- Search Manual
- Other Functions

2.0 Getting Started

FindCar.com is a web application that can be accessed through typing the address of the site in the Web Browser. Before accessing FindCar.com web site, make sure that your computer meets the minimum hardware and software requirements as stated in the previous chapter.

2.1 Starting FindCar.com

To use FindCar.com, the first thingy that you need to do is to start your Web Browser. Then in the address text box, type in the web site address of FindCar.com and press the Enter Button to access the FindCar.com web site.

A successful connection will cause the web browser to display the **Default Page** of FindCar.com, which contains the main function buttons that is provided by the web site. The layout will look like Figure 4.

The functions of the six buttons are summarized in Table 5.

Button	Usage
Home	Enter to the Default Page

Search	Enter to the Search Page
Dealer	Enter to the Dealer Login Page
Finance	Enter to the Finance Page
Tips	Enter to the Tips Page
Contact	Enter to the Contact Page

Table 5: Usage of the buttons on the Default Page

Figure 4: Default Page For The FindCar.com Systems

- There are other buttons at the side of the **Default Page**. Their functions are summarized in Table 6.

Buttons	Usage
Search	Directed to the Search Page
Browse Cars	Directed to the Browse Car Page
Dealer Login	Directed to the Dealer Login Page
Online Loan	Directed to the Financing page
Calculator	Directed to the Calculator page

Table 6: Usage of the side buttons

- All these buttons will direct you to the respective pages.

3.0 Dealer Manual

3.1 Dealer Login

- The system will proceed to **Dealer Page** when you click on the "**Dealer**" button from the **Default Page.**

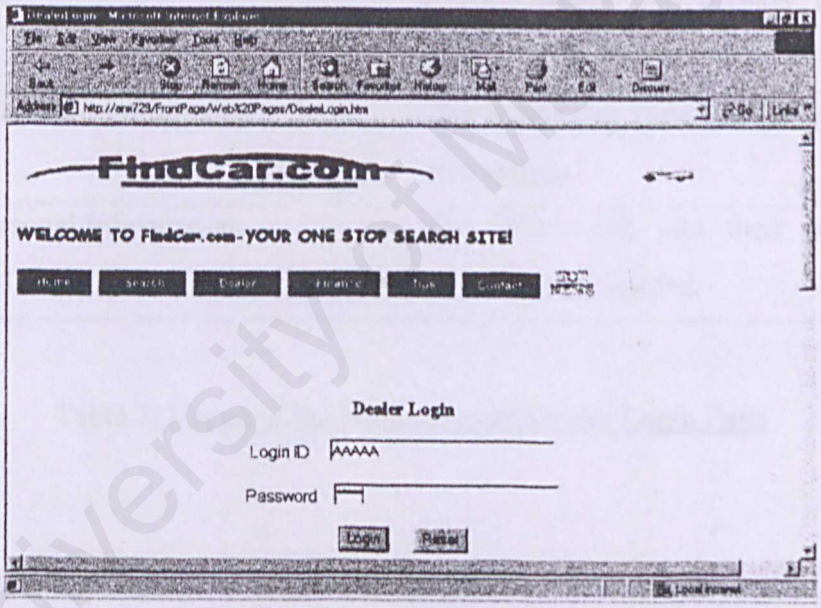

Figure 5: Dealer Login Page

- This page consists of the section that the dealer will use to login, register, check his/her personal information, forgot their password, and to edit their details. The usages of each of these functions are summarized in Table 7.

- Click on the **"Reset"** button to reset the information.

Button	**Usage**
Login	Dealer can login to administer the database
Forgot Your Password	Dealer can send an e-mail to the administration to retrieve his forgotten password
Register	A new dealer can register to gain access to the database
View Personal Information	The dealer can view his/her personal information.
Edit Personal Information	The dealer can edit their personal information if needed.

Table 7: Usage of the buttons on the Dealer Login Page

- The layout after you have logged in is shown in Figure 6.

Figure 6: Login Welcome Page

- Click on the **"Continue"** button to proceed to the **Default Page** again in order to browse the online shop. The **Default Page** is shown in Figure 4.

3.2 Other Dealer Functions

- At the bottom part of the **Dealer Login Page**, there are more functions provided for the Dealer. There are a few functions at the bottom half of the page such as "Forgot your password", "New Dealer", "View Your Personal Information" and "Edit Your Personal Information". The layout of the bottom part is shown in Figure 7.

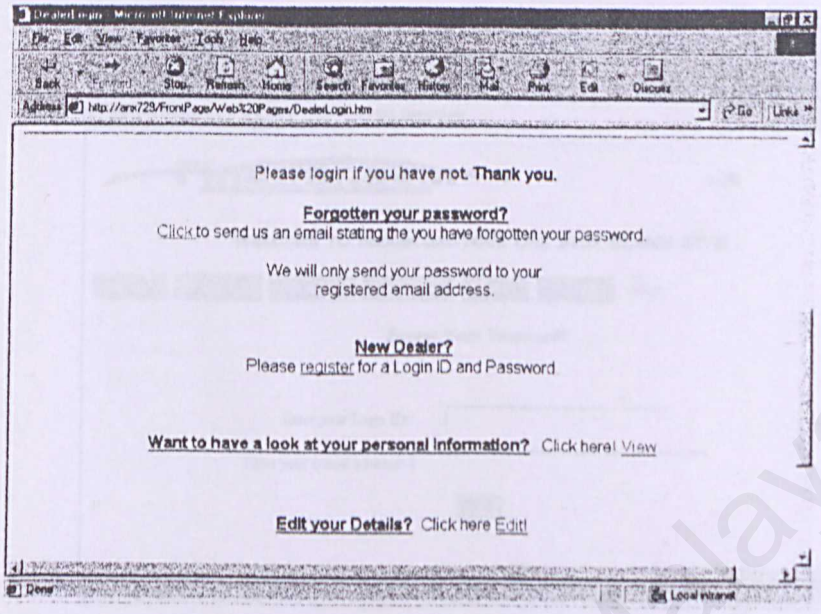

Figure 7: Dealer Login Page (bottom page)

3.2.1 Forgot Your Password

- If you have forgotten your password, click on the place of **"Forgotten Password"**. An e-mail will be sent to you, to give you your password. The layout is shown in Figure 8.

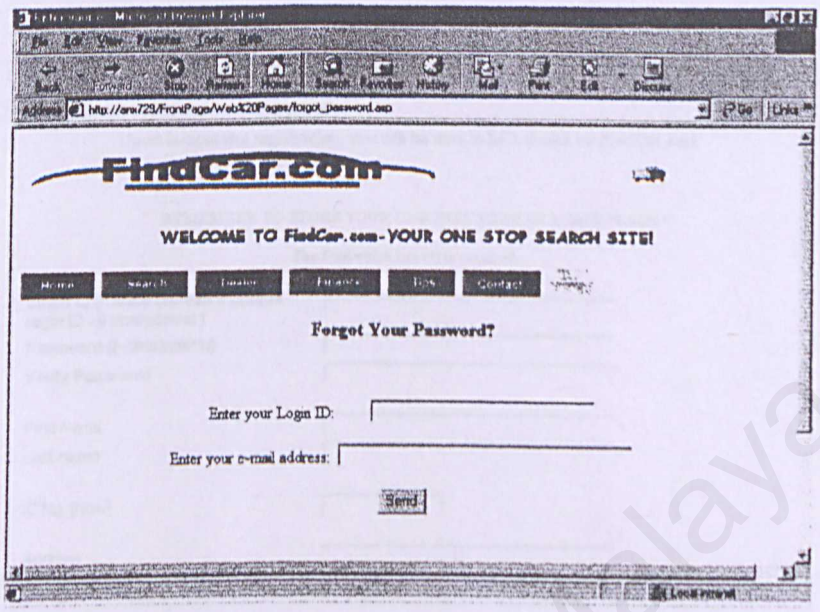

Figure 8: Forgot Your Password? Page

- Click on the **"Send"** button to send your e-mail.

3.2.2 Register New Dealer

- If you haven't registered as a dealer yet, and would like to, click on the **"New Dealer"** button. The layout is shown in Figure 9.

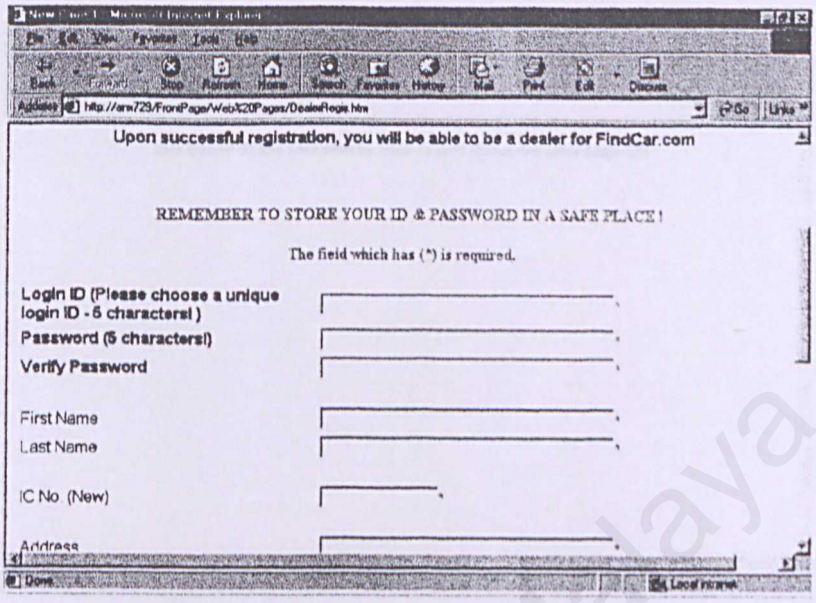

Figure 9: Register New Dealer Page

- The fields with an asterisk cannot be empty
- Click on the **"Submit Dealer Registration"** to register your details.
- If the Login ID that you have choosen is already taken, an error message will pop up. The layout is shown in Figure 10.

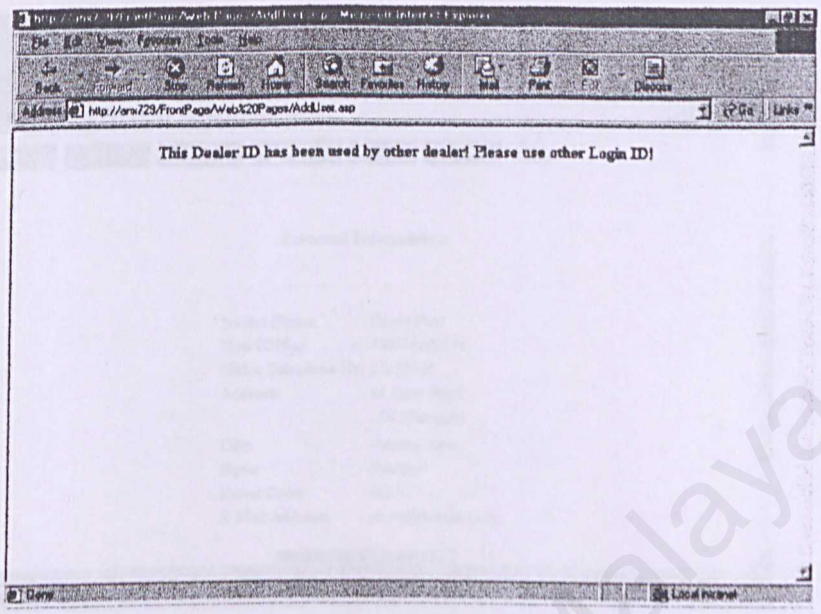

Figure 10: Error Message For Registering With The Same Login ID

- Go back to change your Login ID and re-register.

3.2.3 View Personal Information

- If you want to view your personal details, you can click on the **"Dealer"** button again and proceed to the **Dealer Login Page**, shown in Figure 5.
- Click on the **"View"**. The layout is shown in Figure 11.

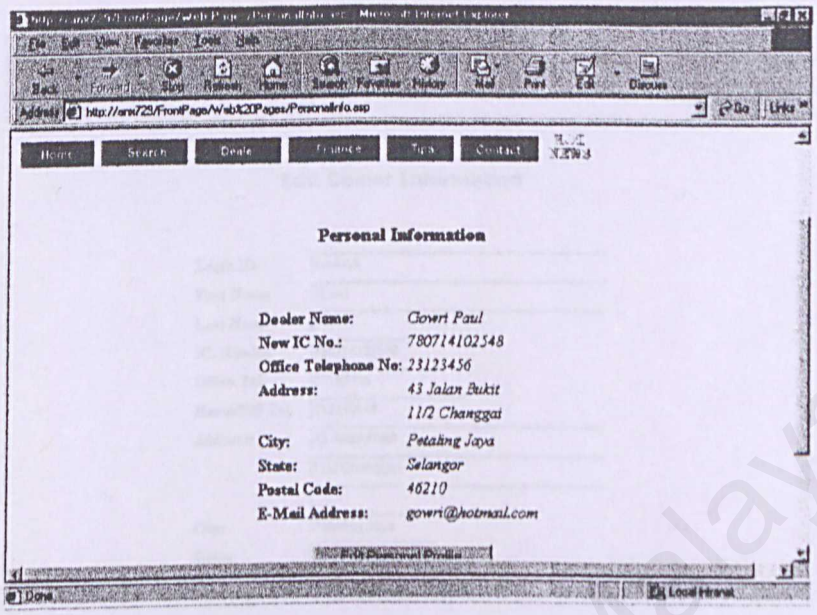

Figure 11: View Personal Information Page

3.2.4 Edit Personal Information

- If you want to edit your personal details, click on the **"Edit Personal Details"** button. The layout is shown in Figure 12.

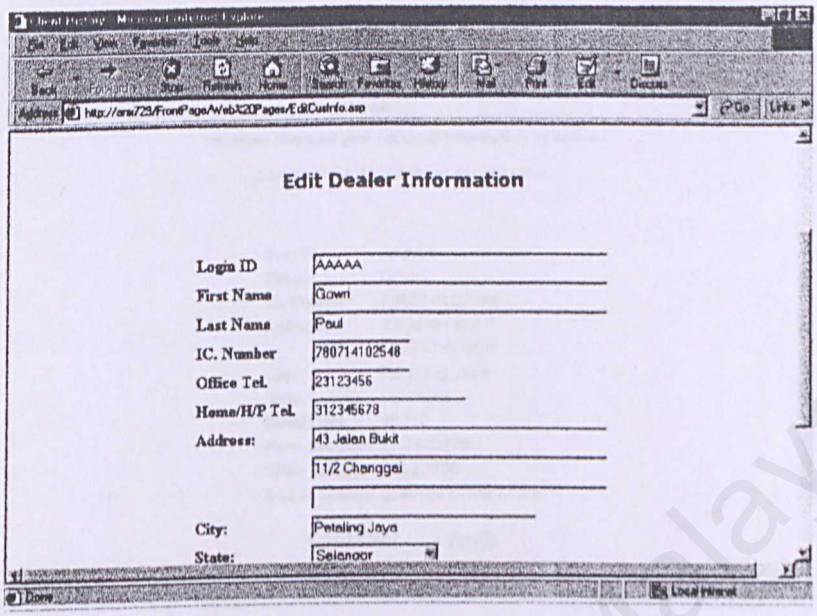

Figure 12: Edit Dealer Information Page

- After editing your personal details, click on the **"Submit"** Button.
- You will then be redirected to another page confirming your personal details again. The layout of this page is shown in Figure 13.

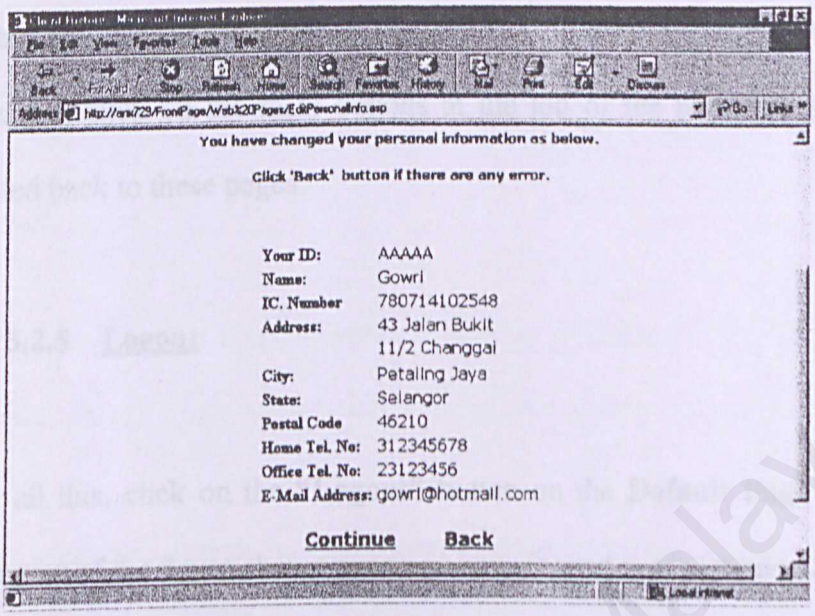

Figure 13: Personal Detail Confirmation Page

- If you still want to edit your personal details, click on the **"Back"** button. If your details are all correct, then click on the **"Continue"** button. You will be directed to the **Default Page**.
- The last function on the **Dealer Login Page** is the **"Edit Your Details"** Click on the **"Edit"** button to edit your details. You will be directed to the **Edit Dealer Information Page** shown in Figure 12.
- After editing your details, click on the **"Submit"** button and you'll be directed to the **Personal Detail Confirmation Page** shown in Figure 13.
- If there are still changes to be made, click on the **"Back"** button to edit it again, of click on the **"Continue"** to proceed to the **Default Page** (Figure 4).

- If there are any instances where you want to be directed back to the **Default Page**, just click on the main buttons at the top of the page and you will be directed back to these pages.

3.2.5 Logout

- After all this, click on the **"Logout"** button on the **Default Page** to log out. The layout of the figure shown once you have logged out is found in Figure 14.

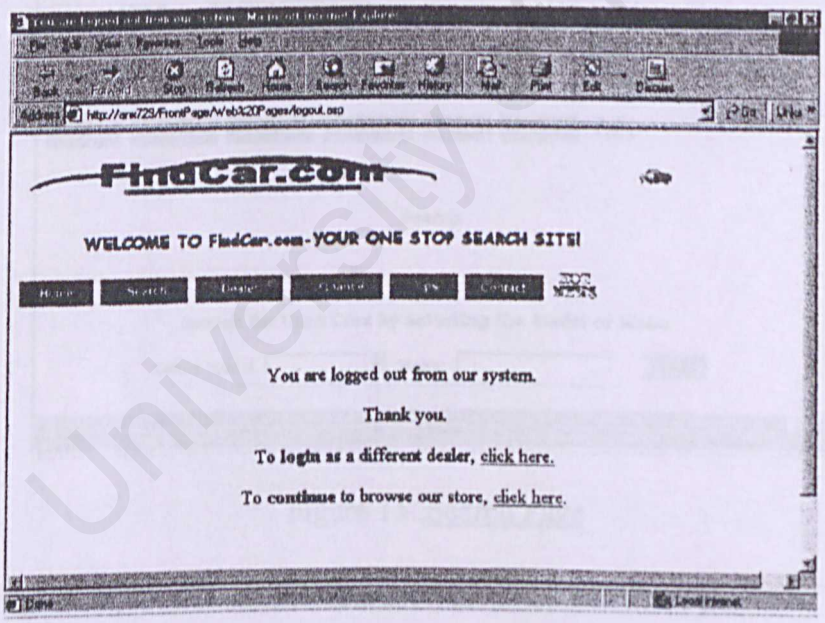

Figure 14: Dealer Logout Page

4.0 Search Manual

4.1 Search

- From the **Default Page**, click on the **"Search"** button. You will be directed to the **Search Page**. The layout of the page is shown in Figure 15.

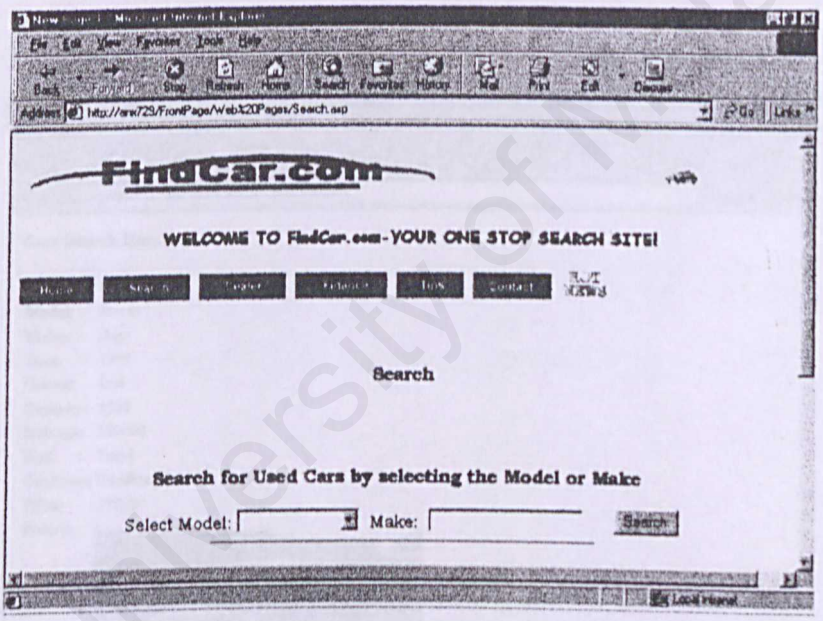

Figure 15: Search Page

4.1.1 Used Cars

- To conduct a search for Used Cars, select the **"Model"** that you want from the drop down list provided. If you want all the same model cars to shown, leave the **"Make"** section empty.
- If you want to narrow your search to a specific make, then enter the type of make in the **"Make"** box that you want. Then click on the **"Search"** button.
- Your search results will be shown in a different page. The **Used Car Results Page** is shown in Figure 16.

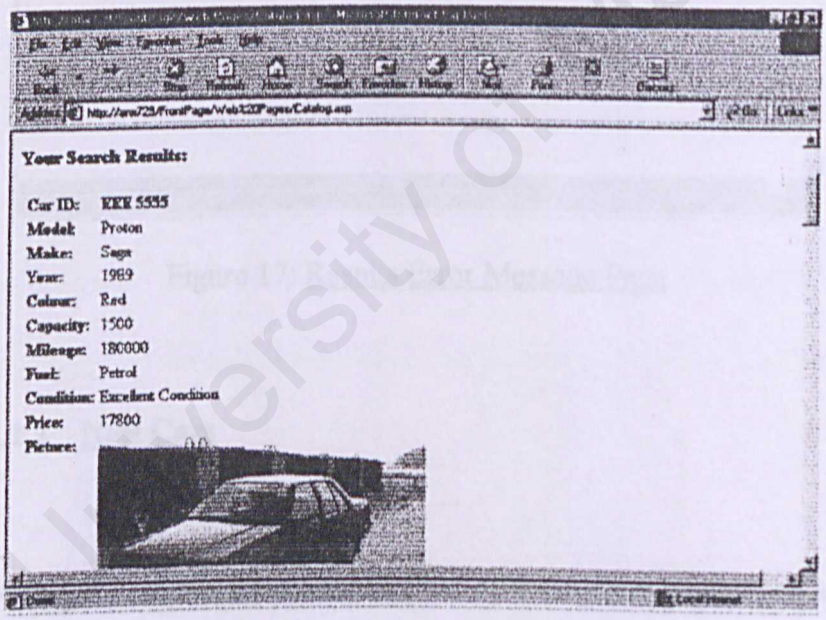

Figure 16: Used Car Results Page

- If your search for a car that is not in the database, you will get an error message asking you to search for a different car. The layout of the **Results Error Message Page** is shown in Figure 17.

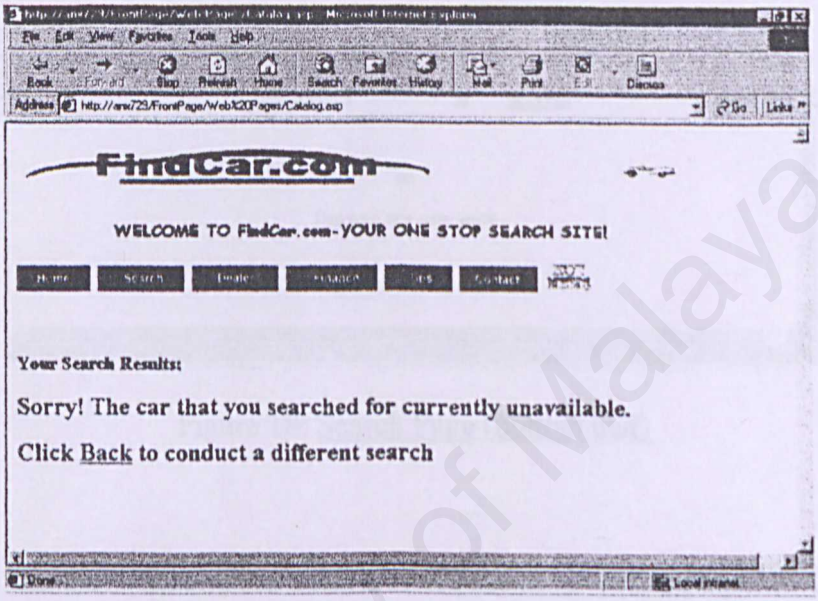

Figure 17: Results Error Message Page

4.1.2 New Cars

- If you want to conduct a search for New Cars, look at the bottom half of the **Search Page**. The layout is shown in Figure 18.

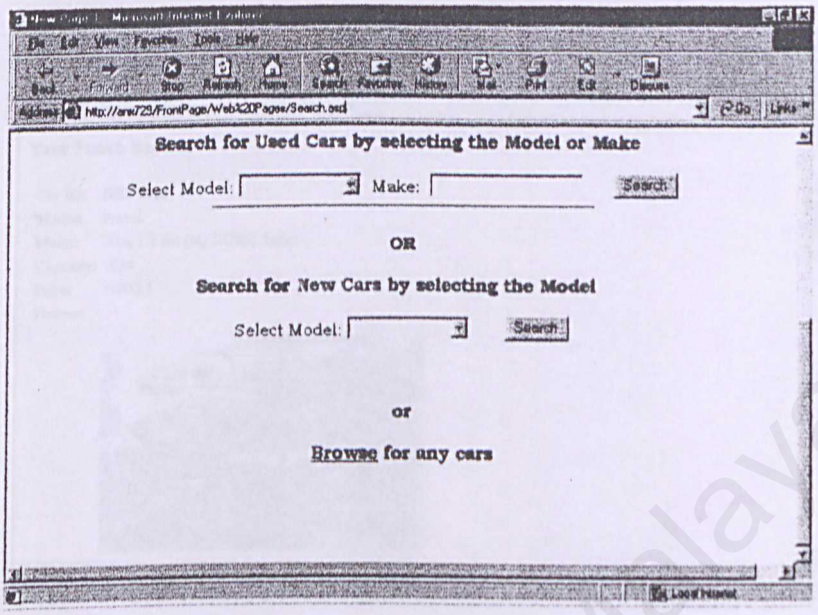

Figure 18: Search Page (bottom half)

- For the New Cars, your search is limited to only the Models of the cars. Select a model from the drop down list and click on the **"Submit"** Button.
- Your **New Car Results Page** will look like the layout shown in Figure 19.

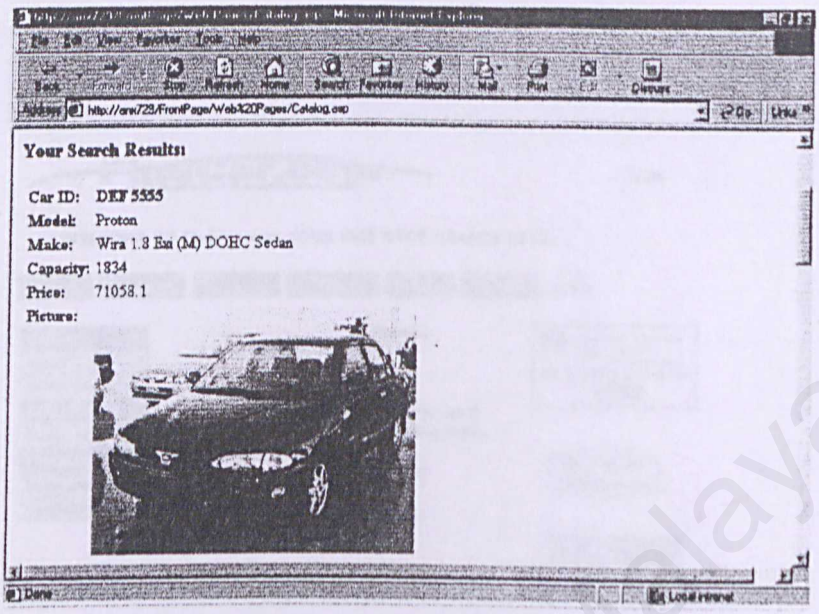

Figure 19: New Car Results Page

- If you have conducted a search for a car that is not in our database, you will be directed to the **Results Error Message Page** shown in Figure 17 and asked to conduct a different search.

4.2 Browse

- At the bottom part of the **Search Page**, there is a link to go to the **Browse Page**.
- You will be directed to the **Browse Page**. The layout of the page is shown in Figure 20.

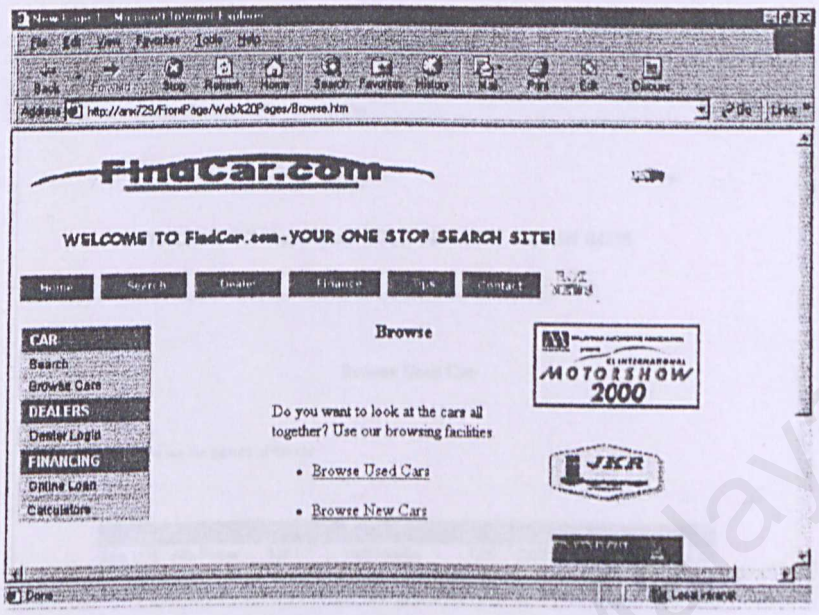

Figure 20: Browse Page

- You can also get to this page by clicking the side button **"Browse Cars"** on the **Default Page**.

4.2.1 Used Cars

- To browse for Used Cars, click on the **"Browse Used Cars"** button. You will be directed to the **Browse Used Cars Page**. The layout is shown in Figure 21.

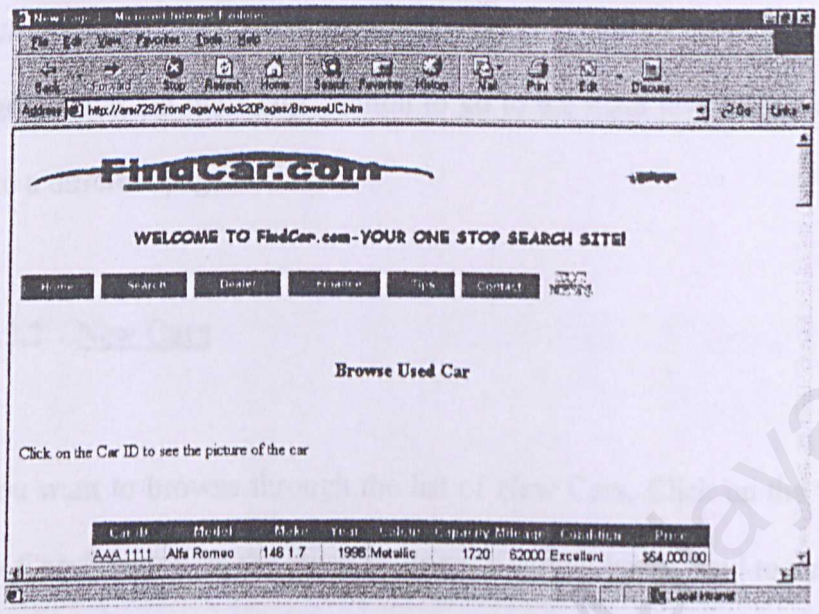

Figure 21: Browse Used Car Page

- If you want to see a picture of the car, click on the link in the Car ID column, you will be directed to the **Used Car Pictures Page**. A layout of the page is shown in Figure 22.

Figure 22: Used Car Pictures Page

- Click on either the **"Back"** button to go back to the **Browse Used Car Page** or click on the **"Top"** button to go to the main header of the page to go to a different page.

4.2.2 New Cars

- If you want to browse through the list of New Cars, Click on the **"Browse New Cars"** button on the **Browse Page**. You will be directed to a new page titled **Browse New Cars Page**. The layout is shown in Figure 23.

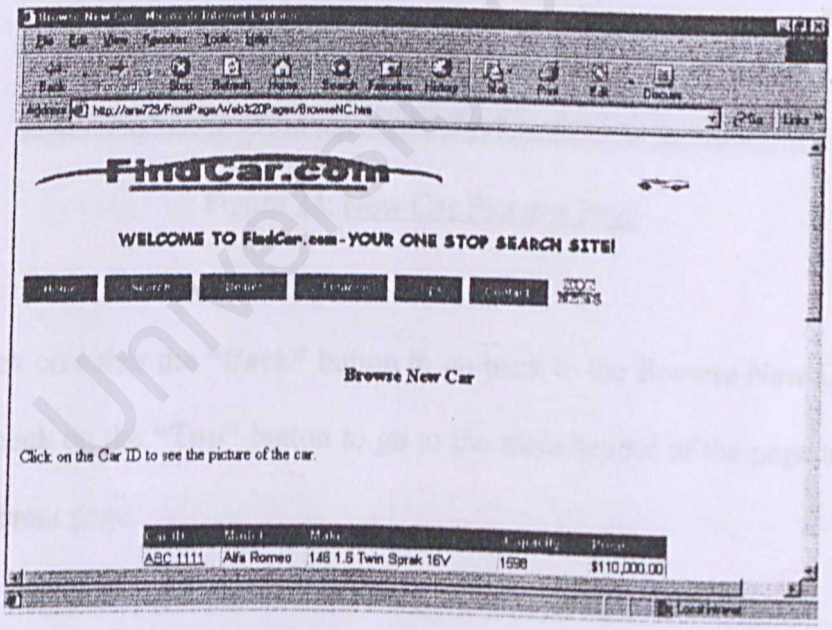

Figure 23: Browse New Car Page

- To see a picture of the car, click on the link in the Car ID column. You will be directed to the **New Car Pictures Page**. A layout of the page is shown in Figure 24.

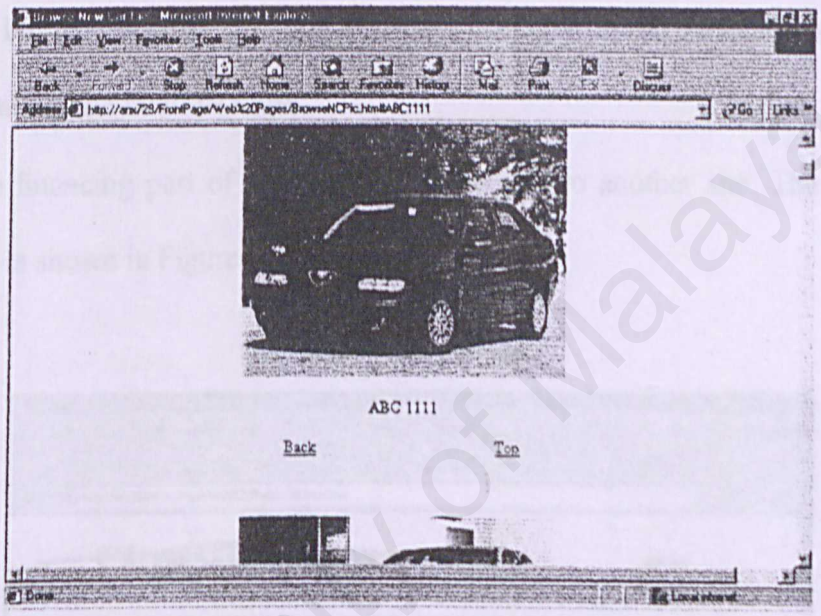

Figure 24: New Car Pictures Page

- Click on either the **"Back"** button to go back to the **Browse New Car Page** or click on the **"Top"** button to go to the main header of the page to go to a different page.

5.0 Other Functions

5.1 Financing

- To buy a particular car, you will have to click on the **"Financing"** button found on the **Default Page**.
- The financing part of this website is directed to another site. The layout if this is shown in Figure 25.

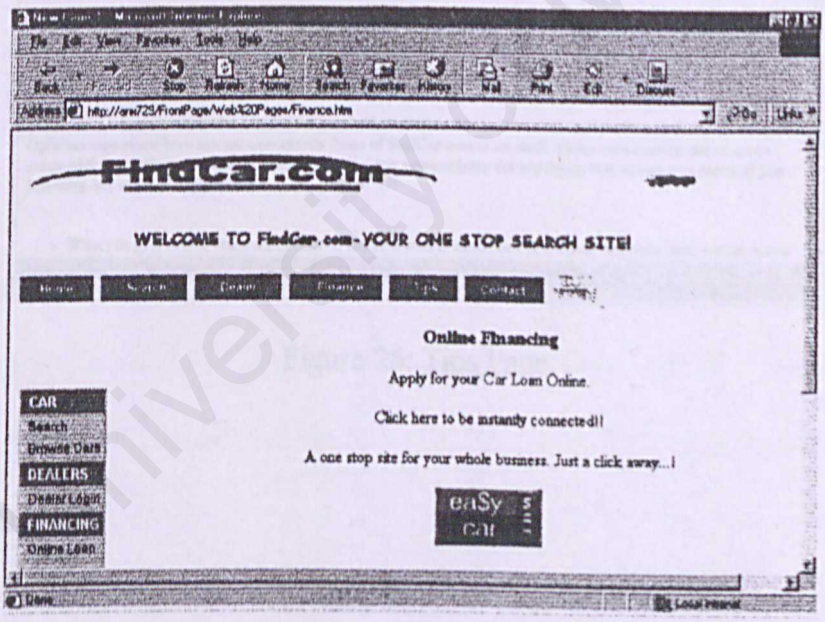

Figure 25: Finance Page

5.2 Tips

- To be directed to the **Tips Page**, click on the **"Tips"** button at the header of the **Default Page**. The layout of the page is shown in Figure 26.

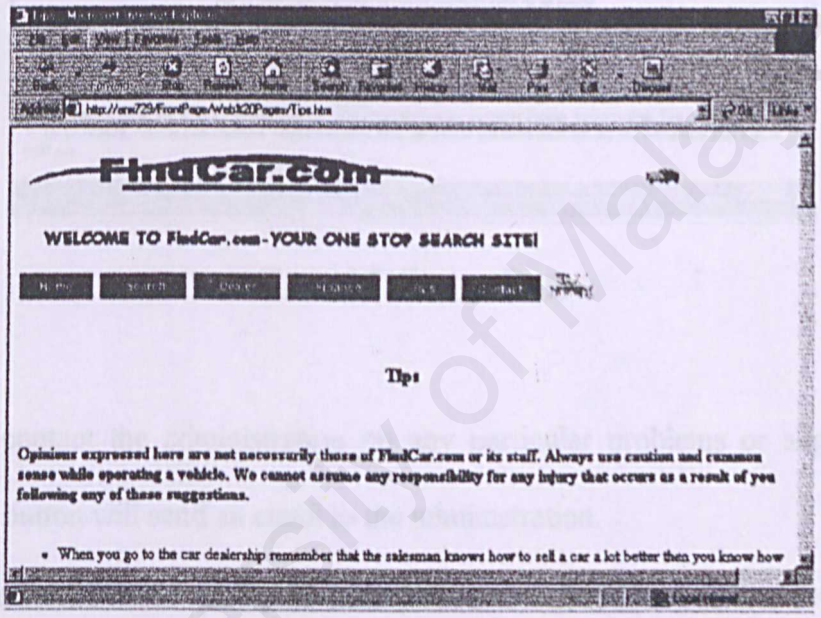

Figure 26: Tips Page

5.3 Contact

- Click on the **"Contact"** button on the header on the **Default Page**. You will be directed to the **Contact Page**. The layout is shown in Figure 27.

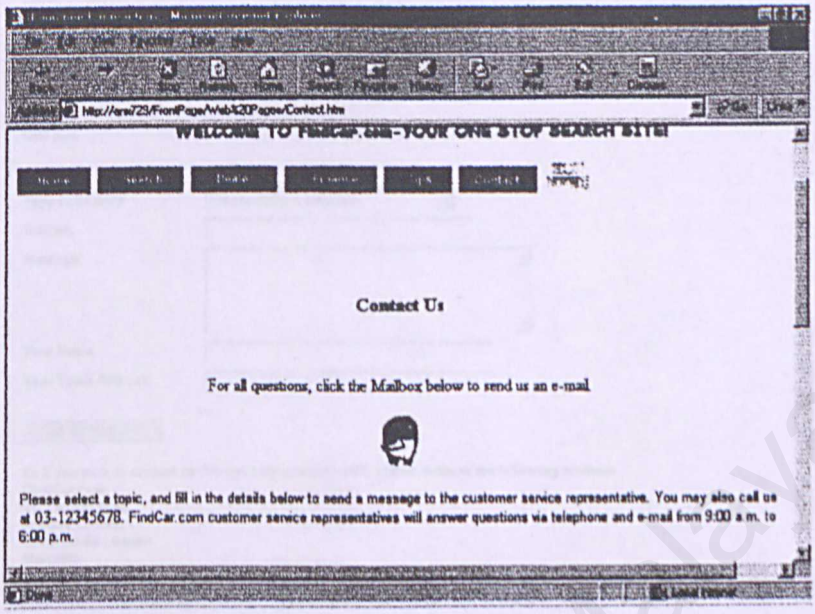

Figure 27: Contact Page

- To contact the administration on any particular problems or suggestions, this button will send an email to the administration.
- To send an email of a particular problem, the bottom half of the **Contact Page** has a formatted email. You can enter in the details of this and click on the **"Send Message"** button to send the email. The layout of the page is shown in Figure 28.

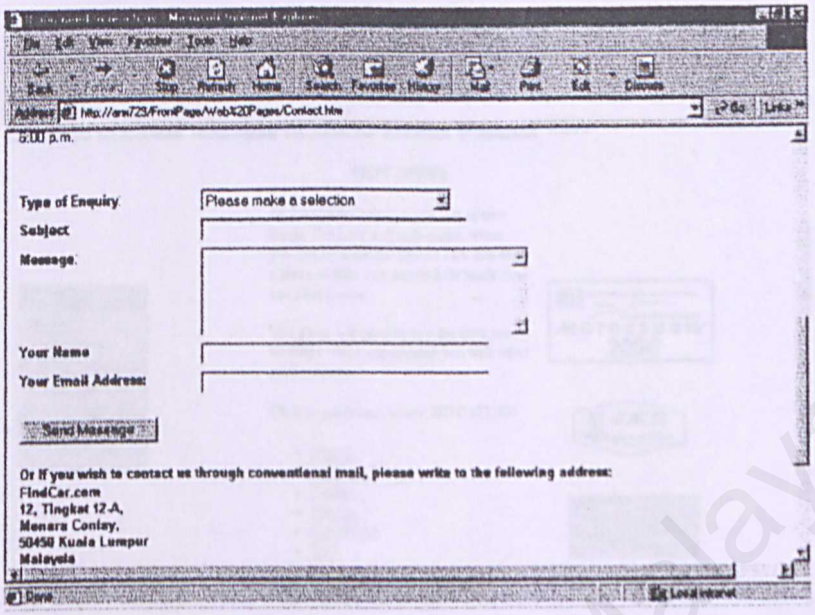

Figure 28: Contact Page (bottom half)

5.4 Hot News

- Click on the **"Hot News"** button in the **Default Page** to be directed to the **Hot News Page**, where all the links of the functions are listed for easier navigation. The layout is shown in Figure 29.

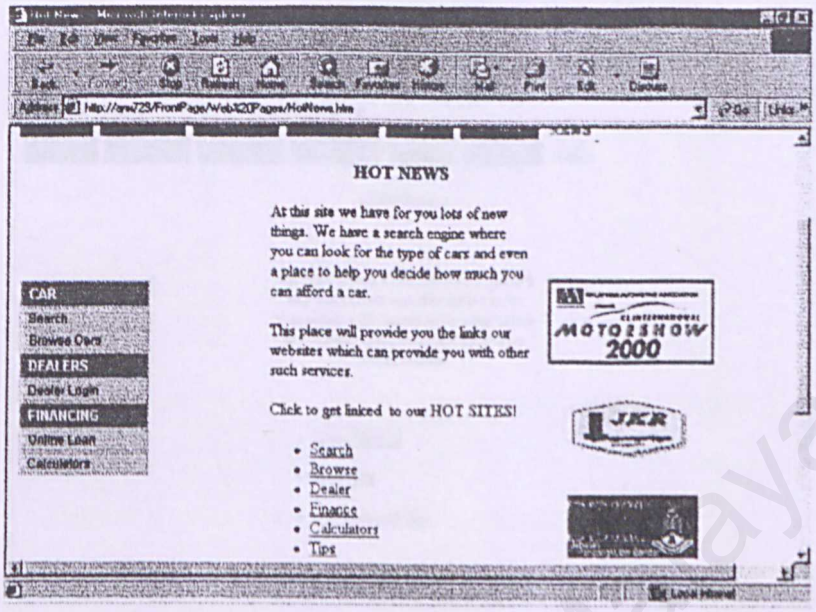

Figure 29: Hot News Page

5.5 Calculators

- Click on the **"Calculators"** button on the side bar of the **Default Page** to be directed to the **Main Calculator Page**. The layout of the page is shown in Figure 30.

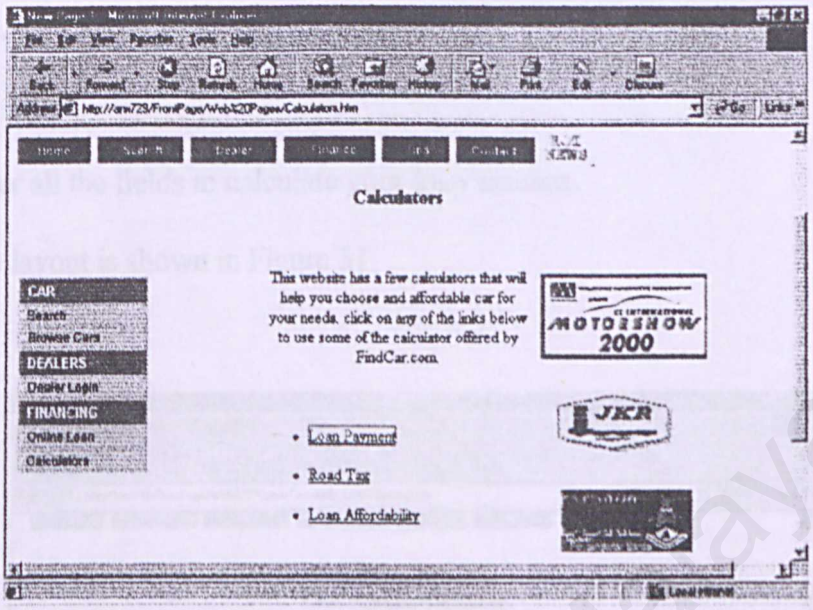

Figure 30: Main Calculator Page

- The three types of calculator have different functions. They are summarized in the table below.

Buttons	**Usage**
Loan Payment	To calculate the monthly payments
Road Tax	To calculate the road tax payments
Loan Affordability	To calculate the affordable loan amount

Table 8: Usage of the Calculators

5.5.1 Loan Payment Calculator

- Enter all the fields to calculate your loan amount.
- The layout is shown in Figure 31.

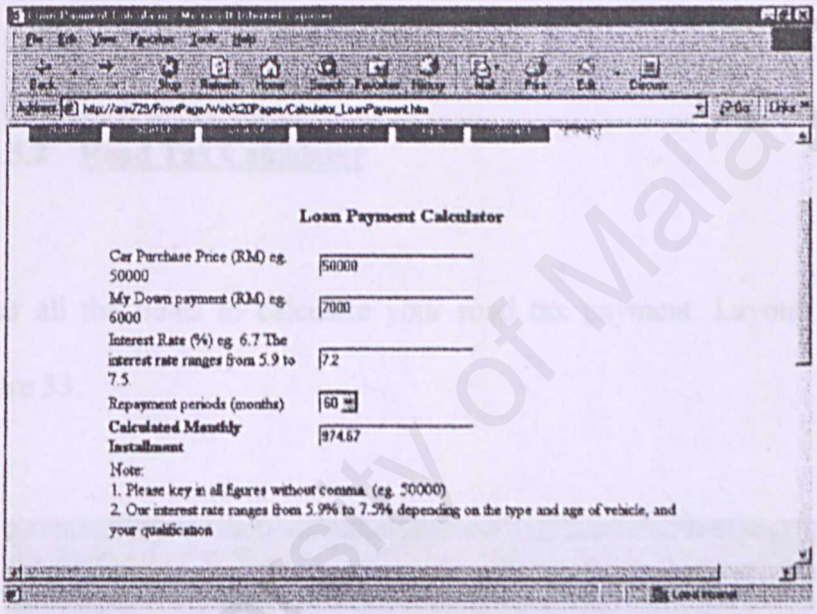

Figure 31: Loan Payment Calculator

- To remind the buyer to enter a sizable amount for the down payment, an error message is enabled. The message is shown in Figure 32.

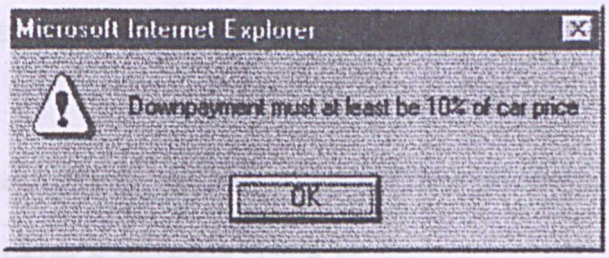

Figure 32: Calculator Error Message

5.5.2 Road Tax Calculator

- Enter all the fields to calculate your road tax payment. Layout shown in Figure 33.

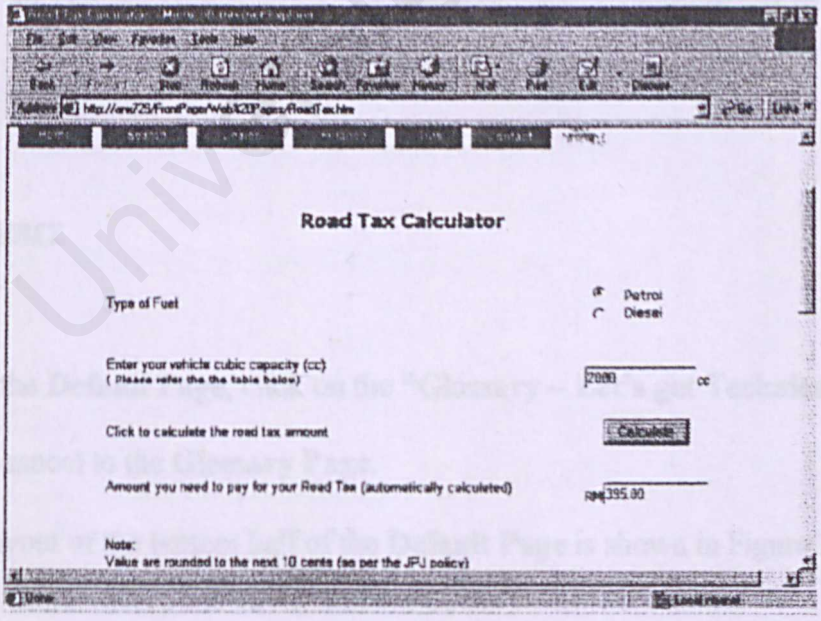

Figure 33: Road Tax Calculator

5.5.3 Loan Affordability Calculator

- Enter all the fields to correctly calculate how much you can afford each month. The layout is shown in Figure 34.

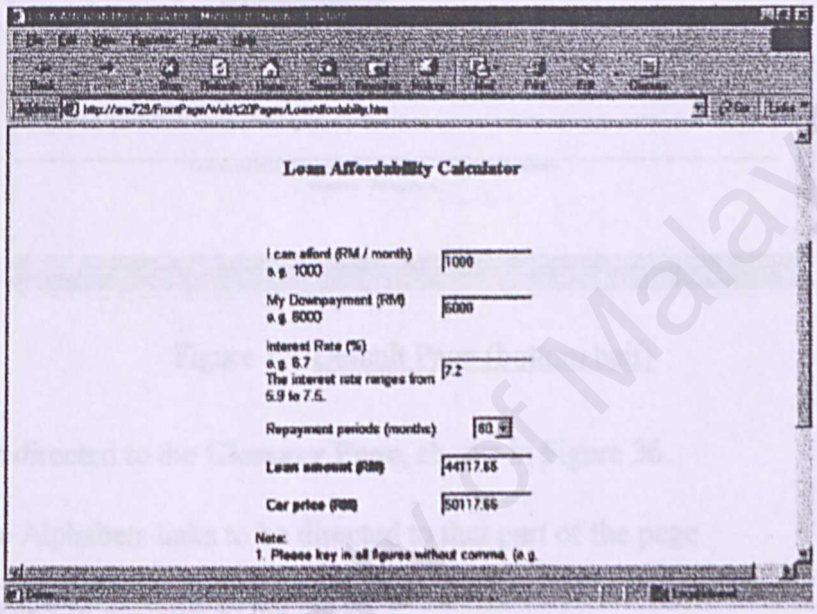

Figure 34: Loan Affordability Calculator

5.6 Glossary

- On the **Default Page**, click on the **"Glossary – Let's get Technical"** button to connect to the **Glossary Page**.
- A layout of the bottom half of the **Default Page** is shown in Figure 35.

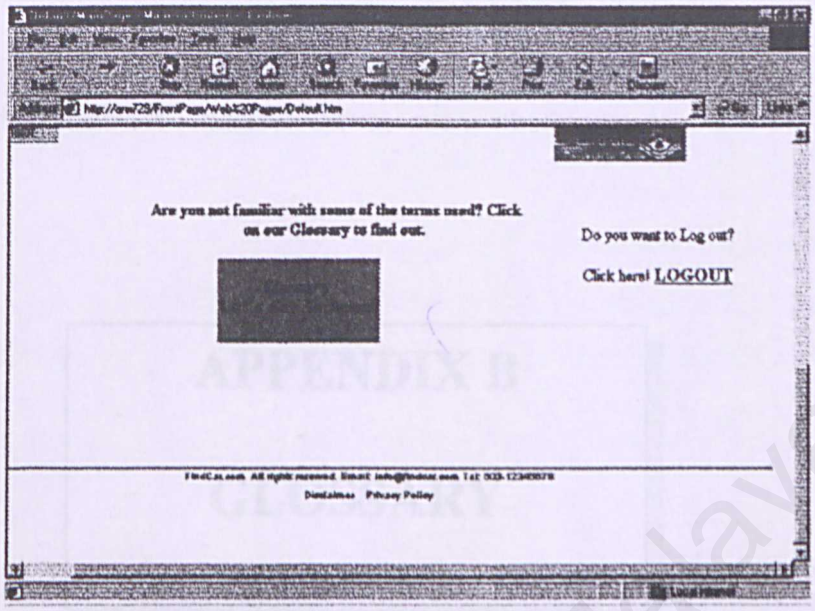

Figure 35: Default Page (bottom half)

- You will be directed to the **Glossary Page**, shown in Figure 36.
- Click on the Alphabets links to be directed to that part of the page.
- Click on **"Top"** to get back to the links.

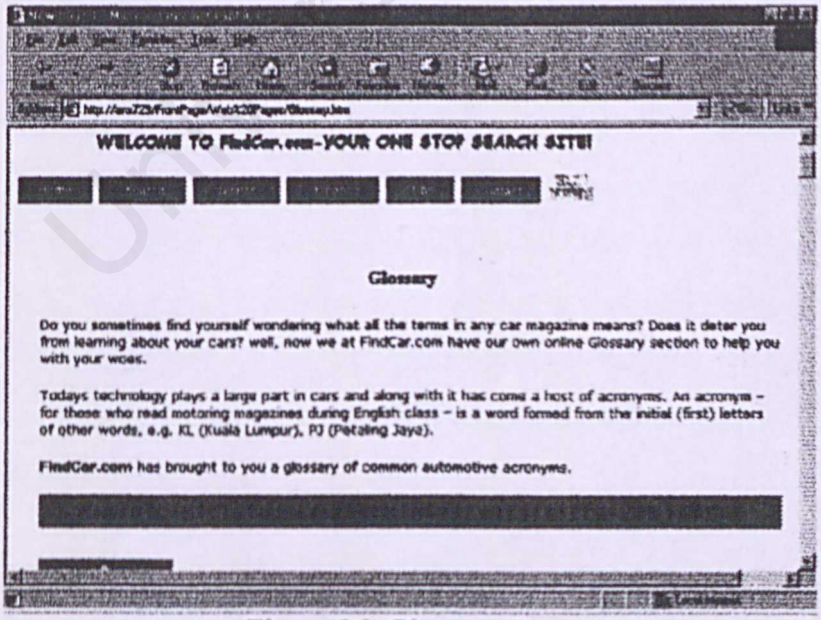

Figure 36: Glossary Page

APPENDIX B

GLOSSARY

Glossary

ActiveX A relatively new technology that makes it easy to embed animated objects, data, and computer code on Web pages. With ActiveX controls, a Web browser that supports ActiveX can play just about any item you might encounter on a Web page.

bandwidth The maximum information-carrying capacity of an electronic connection or network.

binary file An executable file or a file that is not in ASCII text format.

browse To wander around a portion of the Internet looking for items of interest. Also known as surfing or cruising.

browser A software program for viewing HTML pages.

cache A temporary storage area that a Web browser uses to store pages that it has recently opened. The cache enables the browser to quickly load these pages if you decide to return to them.

CGI (Common Gateway Interface)-A set of rules that describes how a Web Server communicates with another piece of software on the same machine, and how the other piece of software (the "CGI program") talks to the Web server. Any piece of software can be a CGI program if it handles input and output according to the CGI standard. Usually a CGI program is a small program that takes data from a Web server and does something with it, like putting the content of a form into an e-mail message, or turning the data into a database query.

client. All the computers and software that make up the Internet are either clients (which receive and translate data) or servers (which provide and translate data). Thus, client software allows you to get information from the Internet.

comment Text in an HTML document (or computer program) that will be seen only by the people who edit the source for that page. Comments are normally invisible when a page is viewed with a Web browser.

Common Gateway Interface (CGI) An interface for external programs to talk to a Web server. Programs that are written to use CGI are called CGI programs or CGI scripts, and are commonly used for processing HTML forms.

compression The process of making a computer file smaller so that it can be copied more quickly between computers.

digital Electronic circuits generally considered to use an on or off sequence of values to convey information.

direct connection A permanent, 24-hour link between a computer and the Internet. A computer with a direct connection can use the Internet at any time.

domain The address of a computer on the Internet. A user's Internet address is made up of a username and a domain name.

domain name system (DNS) An Internet addressing system that uses a group of names that are listed with dots (.) between them, working from the most specific to the most general group. In the United States, the top (most general) domains are network categories such as `edu` (education), `com` (commercial), and `gov` (government). In other countries, a two-letter abbreviation for the country is used, such as `ca` (Canada) and `au` (Australia).

download To retrieve a file or files from a remote machine to your local machine.

e-mail (electronic mail) A system that enables a person to compose a message on a computer and transmit that message through a computer network, such as the Internet, to another computer user.

e-mail address The word-based Internet address of a user, typically made up of a username, an at (@) sign, and a domain name (that is, user@domain). E-mail addresses are translated from the numeric IP addresses by the domain name system (DNS).

encryption The process of encoding information so that it is secure from other Internet users.

FAQ Short for frequently asked questions, a computer file containing the answers to frequently asked questions about a particular Internet resource.

firewall A security device placed on a LAN to protect it from Internet intruders. This can be a special kind of hardware router, a piece of software, or both.

form A page that includes areas to be filled out by the reader. HTML forms allow information to be sent back to the company or individual who made (or maintains) the page.

frame A rectangular region within the browser window that displays a Web page alongside other pages in other frames.

FTP (File Transfer Protocol) The basic method for copying a file from one computer to another through the Internet.

graphics Digitized pictures and computer-generated images.

graphical editor A program that allows you to edit an approximation of what a Web page would look like when viewed with a Web browser. Graphical editors usually hide the actual HTML tags they are creating from view.

home page. Frequently, this term refers to the cover of a particular Web site. The home page is the main, or first, page displayed for an organization's or person's World Wide Web site.

Host Any computer on a network that is a repository for services available to other computers on the network. It is quite common to have one host machine provide several services, such as WWW and USENET.

HTML (Hypertext Markup Language) The document formatting language used to create pages on the World Wide Web.

HTTP (Hypertext Transfer Protocol) The standard method for exchanging information between HTTP servers and clients on the Web. The HTTP specification lays out the rules of how Web servers and browsers must work together.

hypertext Text that allows readers to jump spontaneously among onscreen documents and other resources by selecting highlighted keywords that appear on each screen. Hypertext appears most often on the World Wide Web.

image compression The mathematical manipulation that images are put through to squeeze out repetitive patterns. It makes them load and display much faster.

image map An image on a Web page that leads to two or more different links, depending on which part of the image someone clicks. Modern Web browsers use client-side image maps, but you can also create server-side image maps for compatibility with old browsers.

interlaced GIF An image file that will appear blocky at first, then more and more detailed as it continues downloading. (Similar to a progressive JPEG file.)

Internet A large, loosely organized integrated network connecting universities, research institutions, government, businesses, and other organizations so that they can exchange messages and share information.

Internet Explorer An advanced Web browser created by Microsoft Corporation. Internet Explorer is powerful and easy to use.

Internet service provider (ISP) The company that provides you or your company with access to the Internet. ISPs usually have several servers and a high-speed link to the Internet backbone.

intranet A private network with access restricted to one organization, but which uses the same standards and protocols as the global public Internet.

ISDN (Integrated Digital Services Network) Essentially operates as a digital phone line. ISDN delivers many benefits over standard analog phone lines, including multiple simultaneous calls and higher-quality data transmissions. ISDN data rates are 56Kbps to 128Kbps.

Java The Web-oriented language developed by Sun Microsystems.

Kbps (kilobits per second) A rate of transfer of information across a connection such as the Internet.

LAN (local area network) A computer network limited to a small area.

link An icon, a picture, or a highlighted string of text that connects the current Web page to other Web pages, Internet sites, graphics, movies, or sounds. On the Web, you skip from page to page by clicking on links.

Login Noun or a verb. Noun: The account name used to gain access to a computer system. Not a secret (contrast with Password).Verb: The act of entering into a computer system, *e.g.*, Login to the WELL and then go to the GBN conference.

Mbps (megabits per second) A rate of transfer of information across a connection such as the Internet. (Equal to 1,000Kbps.)

micropayments. A method by which companies can keep an "electronic charge account" for customers. Micropayments offer an affordable way to charge anywhere from one cent to one-hundredth of a cent as payment for services or products offered over the Internet.

modem (modulator/demodulator) A device to convert the digital signals of a computer to an analog format for transmission across telephone lines.

multimedia A description for systems capable of displaying or playing text, pictures, sound, video, and animation.

navigation Movement within a computer environment (for example, navigation of a Web site).

Netscape Short for Netscape Communications Corporation, a software company that developed and markets a popular World Wide Web browser called Navigator. Some people casually refer to Navigator as Netscape.

network A set of computers interconnected so that they can communicate and share information. Most major networks are connected to the global network-of-networks, called the Internet.

password A secret code, known only to the user, that allows that user to access a computer that is protected by a security system.

pixel An individual dot of color in a computer graphics image.

progressive JPEG An image file that appears blurry at first, then gradually comes into focus. (Similar to an interlaced GIF file.)

protocol Specific rules and conventions defining how data may be exchanged between any two devices.

resolution The number of individual dots, or pixels, that make up an image.

resource A generic term to describe the varied information and activities available to Internet users.

search engine A program that provides a way to search for specific information.

server A networked computer that "serves" a particular type of information to users. See also Web server.

server-side image maps A technique for implementing Web page images that lead to more than one link, so that the server computer determines which link to go to. This method is now less commonly used than client-side image maps.

source The actual text and commands stored in an HTML file, including tags, comments, and scripts that may not be visible when the page is viewed with a Web browser.

surfing Another term for browsing.

table Text and/or images arranged into orderly rows and columns. HTML provides several tags specifically for creating tables. Another term for database table where data are being kept or inserted.

TCP/IP (Transmission Control Protocol/Internet Protocol) The agreed-on set of computer communications rules and standards that allows communications between different types of computers and networks that are connected to the Internet.

text editor Any program that allows you to edit text with your computer.

URL (uniform resource locator) Also commonly called a location or address. This is an addressing system that locates documents on the Internet.

username Used with a password to gain access to a computer. A dial-up IP user typically has a username and password for dialing the access provider's Internet server.

VBScript A script language developed by Microsoft. A technical competitor to Java and JavaScript applications.

Web server A computer on the Internet that hosts data that can be accessed by Web browsers using the HTTP protocol.

Web Site. A collection of World Wide Web documents, usually consisting of a home page and several related pages. You might think of a Web site as an interactive electronic book.

Webmaster. The individual responsible for maintaining and updating the content of a World Wide Web document. Webmasters are the creative force behind the World Wide Web.

World Wide Web (WWW or the Web) A set of Internet computers and services that provide an easy-to-use system for finding information and moving among resources. WWW services feature hypertext, hypermedia, and multimedia information, which can be explored through browsers such as Netscape or Internet Explorer.

APPENDIX C

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