Abstract

The difficulty encountered throughout the project was all about the development of the ModifiCARtor software. In order to accomplish the need of graduation structure of Bachelor of Computer Science (Software Engineering) at University of Malaya, this document has been written with the application of knowledge learned from the Faculty of Computer Science and Information Technology, University of Malaya.

AutoMobile Parts Modification Systems (ModifiCARtor)

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Abstract

This project document has been written for Latihan Ilmiah 2 (WXES3182) in order to accomplish the need of graduation structure of Bachelor of Computer Science (Software Engineering) of University of Malaya. This document has been written with the practice of knowledge learned from the Faculty of Computer Science and Information Technology, University of Malaya.

The difficulty and challenge that have been faced throughout the project is all about to give the student experience how the real software development world works. It also gives a chance for students to practice what they have learned before entering working environment.
Acknowledgement

Unlimited thanks to Allah Almighty for His Merciful. Thousands of thanks to everyone who helped directly or indirectly to finish this work.

Mrs. Zarinah Mohd. Kasirun as Supervisor of this project, Mrs. Azwina Yusof as Moderator of this project, all personnel involved in interview and research, course mate who give support, close-friends for their friendship, magnificent people in Spatialworks Sdn. Bhd., house mate of 27, Jln 17/21B, PJ for their co-operation, and the person I love so much. All of you are something to this.

Never ending love to my father, mother, brothers, sisters, and to all my lovely nieces and nephews. Without them I am no one. Love mom.
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Chapter 1
Introduction

1.1 Project Introduction

Number of personal own car increasing year by year. It is same goes with the price itself. Older model sometime more optimum than newer model for example fuel consuming. Some people prefer older design because may be they look classic. Or may be some people like to express their creativity. All these lead car owner to modify their existing car to a new look, and new performance car.

Car major such as Toyota, Honda, Proton and many more, from business view, do not like people to modify car. For sure they want people to buy their car new.

Because of that, for our car owner, obtaining part could be difficult from the original carmaker and hence they are used to get part from third party auto part seller.

1.2 Project Rationale

There is still no system to help car modifer to identify compatibility of the part, to preview desired modified car and to directly order desired part that been previewed.

This system will give new experience for car modifier to search into parts.
1. Introduction

1.1 Project Introduction

Number of personal own car increasing year by year. It is same goes with the price itself. Older model sometime more optimum than newer model for example fuel consumption. Some people prefer older design because may be they look classic. Or may be some people like to express their creativity. All these lead car owner to modify their existing car to a new look and new performance car.

Car maker such as Toyota, Honda, Proton and many more, from business view, do not like people to modify car. For sure they want people to buy their car more. Because of that, for car modifier, to get the correct auto part could be difficult from the original car maker. Their choice always used auto part from third party auto part seller.

1.2 Project Rationale

There is still no system to help car modifier to identify compatibility of the part, to preview desired modified car and to directly order desired part that been previewed. This system will give new experience for car modifier to search auto parts.
1.3 Project Objective

The main objectives of the system are:

- **Preview**
  
  To let car modifier to preview their desired car before making decision on which part to choose.

- **Shopping Cart**
  
  At the same time car modifier choose their part, it's also working as shopping cart which car modifier can choose base on their budget.

- **Expert Advice**
  
  Car modifier can also ask for expert advice before modifying their car or to put on their budget and criteria the system will help to choose and recognize part for car modifier.

1.4 Project Scope

This project will cover all modification aspect of a car. Proton Satria have been choosing as car model study. This model is the most modified models by car owner.

1.5 Target user

Target users for sure are the car owner who would like to modify their car. It's also for any person who have plan in future to modify their car.

1.6 Expected Outcome

The expected outcome would be a useful system that could help car modifier to choose part, preview part, comparing price, and make order for the part.
1.7 Project Scheduling

Analyses have been done about constraint and risk that probably will be faced. This effect the duration of the system can be delivered. A project schedule based on the analyses has been drawn in order to deliver this system in timely manner.

![Figure 1.1 Project Schedule](image)

Project schedule have been divided to each workflow. The project schedule start from 9 June 2003 and expected to be deliver completely in 34 weeks.

All the workflow schedule exact date had been describe in table below:
Table 1.1 Project Schedule Date

<table>
<thead>
<tr>
<th>Work flow</th>
<th>Start Date</th>
<th>End Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literature Review</td>
<td>09/06/2003</td>
<td>28/07/2003</td>
</tr>
<tr>
<td>Design</td>
<td>14/07/2003</td>
<td>15/09/2003</td>
</tr>
<tr>
<td>Implementation</td>
<td>15/09/2003</td>
<td>15/12/2003</td>
</tr>
<tr>
<td>Testing and Assessment</td>
<td>27/10/2003</td>
<td>05/01/2004</td>
</tr>
<tr>
<td>Deployment</td>
<td>17/11/2003</td>
<td>19/01/2004</td>
</tr>
<tr>
<td>Documentation</td>
<td>09/06/2003</td>
<td>19/01/2004</td>
</tr>
</tbody>
</table>

Although the real Project duration is 36-38 weeks, project schedule been set to create buffer in case of task delay in any workflow.
2. Literature Review

2.1. Introduction

In this literature review, studies are conducted to understand and expose ourselves to various issues regarding car modification. Questions pertaining to various subjects are studied and researched upon. The main objective in literature review is to obtain an understanding in all the system needs in terms of technical and documentation. Information on themes, concepts, software and tools and techniques are gathered to develop the system and points in question are listed. Some of the existing systems are provided in this chapter and to determine basic aspects that should be included in the system.

2.2. Sources

In order to gain useful information for this project, several resources have been used to supply this project with sufficient and accurate information. These include:

* The internet

The main source of this project is. Most of the information in each topic is collected and downloaded from here. Helps a lot in observing existing systems and software reviews.

* Document room

Thesis done by senior students have been studied and reviewed from time to time to gain skills in developing a system and documentation.

Chapter 2

Literature Review
2. Literature Review

2.1. Introduction

In this literature review, studies are conducted to understand and expose ourselves to various issues regarding car modification. Questions pertaining to various subjects are studied and researched upon. The main objective in literature review is to obtain an understanding in all the system needs in terms of technical and documentation. Information that relates to concepts, software and tools and techniques are gathered to develop the system and points to ponder are listed. Some of the existing systems are provided in this chapter to make comparisons among them and to determine basic aspects that should be included in one's system.

2.2. Sources of survey

In order to gain useful information in this project, several resources have been used to supply this project with sufficient and accurate information. These includes:

- **The Internet**

  The main source of this project. Most of the information in each topic are collected and downloaded from here. Helps a lot in observing existing systems and software reviews.

- **Documents room**

  Thesis done by senior students have been studied and reviewed from time to time to gain skills in developing a system and documentation.
• **Printed media**

Additional knowledge can be retrieve from newspapers, magazines and reference books. The local bookshop helps a lot in providing these books.

• **Meetings with the supervisor**

Meetings with the supervisor are carried out at least two times a week to discuss about each aspect in the system. This is to make sure that the progress of the project will lead to its objectives.

• **Auto parts company and car workshop**

Meetings with Auto parts company representative and car mechanics to have their view about car modification and any issue concern about car modification.

From the meetings we can have clearer view about car modification.

### 2.3. Car Parts and Modification Issue

**Car Parts**

Before going into modification, we need to know about car. There many things to know to understand car and its functionality. This is important in order to design a system which base on car. There are hundreds parts of car. Each must be known.

For this, refer to appendixes, which was collected from www.car-part.com. The figure list all parts of car which from that list, we identified car part. For this project we use the list to help us to identify car parts.
From that collected information, the decomposition of a car have been list below:

1. Engine
2. Tire and Wheel/Rim
3. Suspension
4. Body kit
5. Body Part
6. Interior furnishing
7. Steering
8. Dashboard
9. Brake

Modification Issue

From research and interview been made, there are some issue that concern about car modification.

1. Used part
Car modifier usually goes for used parts because it is cheaper. Car modifier usually modifies their older version car to another car model. With some modified parts the car will look like another model.

2. Half-cut
Half-cut mean parts of car usually come from original car. It’s usually come from Japan. Japan practices a law to demolish car after certain years. The demolished car usually had been cut into two. This where the term half-cut come. The half-cut been export to other countries. Usually half-cut have a lot of parts can be used by car modifier. Half-cut also come from crashed car.
3. Turbo/Supercharger

Engine modifier eager to convert their regular engine to Turbo/Supercharger. Turbo/Supercharger is engine-booster to get more power produce from their engine. Upgrading to this type of engine require more additional car parts.

4. Car lowering

Beside get engine boost up, car lowering also affect car stability and performance. On the other hand car lowering also make car look sportier.

5. Custom made kit

Custom made kit usually the final choice of the modifier when they can not get the original kit. The kit, like spoiler and lips, can be custom made using glass-fiber. The price usually depends on how difficult to make and how rare requested kit is.

2.4. Project Requirement

Project requirement have been done through few study on available tool and technology. Below are the requirements list divided into few categories:

2.4.1. Platform

- Windows 98
- Windows NT Workstation
- Windows 2000 Advanced Server
2.4.2. Server

- Windows 2000 Advanced Server

IBM PC or compatibles with the following configurations

- Intel Pentium II 333MHz processor
- 64MB SDRAM
- 500MB Hard disk space

2.4.3. Client

- Windows 98/NT Workstation

IBM PC or compatibles with the following configurations

- Intel Pentium 166MHz processor
- 32MB SDRAM
- 20MB Hard disk space

2.4.4. Database

- Microsoft SQL Server 2000

2.4.5. Software

- Microsoft Visual Studio
- Microsoft SQL Server 2000
- Aurigma Graphics Processor

2.4.6. Network

Local Area Network for Development

Internet Connection
2.5. Existing System

The search of similar system has been done massively from the internet and software released. There still no exactly the same system like this system.

However there are so much site offer search engine for auto parts.

www.car-part.com

![www.car-part.com](image)

Figure 2.1 www.car-part.com

This site offers a search engine from various types of cars, years, and every auto parts. The data collection is more than enough. But as been mentioned before this site could not offer user to preview their desired parts into their desired car.
This however is better than the previous. It offers a picture for each part, but this site is exclusively for Proton parts. Just like the previous, it still does not have the graphical module.

There are also other systems which are similar to the graphical module on this system. Its can be found in interactive games. Its can be found in car modification module in Gran Turismo 2 and F1 Manager. The idea of car modification simulation also had been use in the movie, Fast and Furious, where all the idea of this system comes.
Figure 2.4 F1 Manager
<table>
<thead>
<tr>
<th></th>
<th>Cart Search</th>
<th>Part Preview (Graphical)</th>
<th>3D Presentation</th>
<th>Variety of Part</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="http://www.carparts.com">www.carparts.com</a></td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td><a href="http://www.protonpart.com.my">www.protonpart.com.my</a></td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Gran Turismo 2</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>F1 Manager</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Proposed Systems</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

Table 1.2 Comparison
Chapter 3
Methodology

3.1. Introduction

In this chapter, all the info gathered and collected in literature review are analyze and put into use to define the system goal. The most suitable system development module is chosen depending on the level of complexity of the system and the time limitations. There are two categories of requirements for the system: functional requirements and non-functional requirements. Functional requirements describe all the functions that make up the whole system; meanwhile, non-functional requirements are the limitations placed on the system that narrow the choices that can be made for implementation.

3.2. Methodology

Methodology is a step-by-step procedure that provides guidance in developing a system. It is also known as a blueprint. Here, we will then define the activities, techniques, system development assumption, system deliverance and system maintenance. Process modeling is important to:

- Acquire an overall understanding of the development processes.
- Detect inconsistencies, omissions and omissions.
- Generate general processes in situations where it is needed.
3. Methodology

3.1. Introduction

In this chapter, all the info gathered and collected in literature review are analyze and put into use to define the system needs. The most suitable system development module is chose depending on the level of complexity of the system and the time limitations. There are two categories of requirements for this system: functional requirements and non-functional requirements. Functional requirements describe all the functions that make up the whole system meanwhile non-functional requirements are the limitations placed on the system that narrow the choices that can be made for implementation.

3.2. Methodology

Methodology is a sequence of formal and consistent processes in developing a system. It is also known as process modeling. These processes will then define the activities, techniques, system development automation tools, system deliverance and system maintenance. Process modeling is important to:

- Acquire an overall understanding of the development processes.
- Detect inconsistencies, redundancies and omissions.
- Generate general processes in situation where it is needed.
There are a few known models:

- Waterfall model
- Waterfall model with prototype
- V model
- Prototype model
- ‘Operation specification’ model
- Transformation model
- Unified Process Life Cycle/RUP

Choosing the right model to develop a system will determine the smoothness of the system development besides meeting the objectives. This project is an object-oriented system. Throughout the research have been made, the best methodology for object-oriented is Unified Process Life Cycle. So this methodology had been choosing for this project.

Unified Process Life Cycle/RUP

Widely known as **Rational Unified Process (RUP)** because of Rational is the leading software vendor for Unified Process.

*Jacobson et. al develop and evolved a process that has become known as the Unified process and which utilizes UML for modeling [1]*

What exactly is the Rational Unified Process, or RUP? Here are several answers to this question, from different perspectives:
What is the purpose of the RUP?

It is a software engineering process, aimed at guiding software development organizations in their endeavors. [2]

How is the RUP designed and delivered?

It is a process product, designed like any software product, and integrated with the Rational suites of software development tools. [2]

What is the structure of the RUP?

The RUP has a very well-defined and regular structure, using an object-oriented approach for its description. [2]

RUP is a use-case driven modeling, architecture centric, iterative and incremental. It been design from spiral model. Its can be divide into 4 phases, which are:

1. Inception
2. Elaboration
3. Construction
4. Transition
There are 9 core process workflows in RUP:

1. Business modeling – Literature Review

2. Requirements - Translating the need into the behaviors of an automated system.

3. Analysis and design - Translating requirements into a software architecture.

4. Implementation – Creating software that fits within the architecture and has the required behaviors.

5. Test - Ensuring that the required behaviors are correct, and that all required behaviors are present.

6. Deployment - Everything needed to roll out the project.

7. Configuration and change management - Keeping track of all the different versions of all the work products.

8. Project management - Managing schedules and resources.

9. Environment - Setting up and maintaining the development environment.
3.3. **Information collecting technique**

There are two types of data that can be collected which are primary data and secondary data. Primary data are the data "collected specifically for the purpose of the investigation at hand" [3]. For example, Automobile Terms. Secondary data are the data which basically to support investigation such as, survey of buying power and government data.

Secondary data can be collected through interview, survey and observation. Primary data basically can be collected from written document such like books, journal, and internet publishing.
Chapter 4
Analysis Design

4. System Requirement Analysis

4.1 Introduction

System requirement analysis covers the areas of functional and non-functional requirements of the ModisCARtor. Functional requirements are modules that make the system work. The existences of each of these modules are crucial in achieving the system's main objective. On the other hand, non-functional requirements are definition of system properties and constraints under which a system must operate.

4.2 System Requirements

ModisCARtor is developed in which use ASP, Active Server Pages and additional features of ModisCARtor consists of few modules which will be as follows:

4.2.1 Functional Requirements

1. Auto Parts Search

This module will let user to search auto parts whether new parts or used parts. The search engine will let user to search from various parameters such as year, model, type and price. This module is a common module for many auto part web sites.

2. Make-up Studio

This graphical module will let user to choose the car they want to modify. The user will be prompt to choose which part to modify and choose desired part from the database to fit in their chosen car. The system
4. System Requirement Analysis

4.1. Introduction

System requirements analysis covers the areas of functional and non-functional requirements of the ModifiCARtor. Functional requirements are modules that make the system works. The existences of each of these modules are crucial in achieving the systems main objective. On the other hand, non-functional requirements are definition of system properties and constraints under which a system must operate.

4.2. System Requirement

ModifiCARtor is developed in Microsoft Visual Studio which use ASP (Active Server Pages) and additional component. ModifiCARtor consist of few module which will be describe below:

4.2.1. Functional Requirement

1. Auto Parts Search

This module will let user to search auto parts whether new parts or used parts. The search engine will let user to search from various parameter such as year, model, type and price. This module is a common module for many auto part web site.

2. Make-up Studio

This graphical module will let user to choose the car they want to modify their car look. User will be prompt to choose which part to modify and choose desired part from the database to fit in their chosen car. The system
will suggest compatible part for their car. User also can customize the part if the part they desire is not available or they like to customize existing part. This module will be connected with Performance Studio module.

3. Autotips

Information collected from various sources about automobile and modification tips will be provided here to guide user and for their knowledge.

4. Modify Pundit

User can also get expert view for modification tips. Successfully modified car also be reviewed here. Here also user can get budget advisor which user can put their budget and system suggest the most optimum selection following criteria inserted by user.

5. Shopping Cart

User virtually has a cart while logging on the system. This will enable user to pick any part from any module and review the price.

4.2.2. Non-Functional Requirement

The following are the system's non-functional requirements. These non-functional requirements are very subjective. Much less these requirements plays an important role in supporting the systems survival. These non-functional requirements are as important as the functional requirements mentioned earlier.

- User friendly

This factor is important to be considered. A user friendly system has a high level of interaction with the user. But interaction without the ease of use is no good anyway,
in fact it's annoying. The system has to be user friendly thus offers ease of use, as most users are first timers.

- **Reliability**

The system should be reliable in performing its functions and operations and does not produce dangerous or costly failures when used in a reasonable manner. It should not cause unnecessary and unplanned downtime of the overall system environment.

- **Accuracy**

The system should provide accuracy measures such as precision of computations and control. This will enable the smooth interaction between the user and the system.

- **Maintainability and expandability**

Maintainability is the degree to which architectural, data and presentation design can be extended. As such the system should be easy to maintained, corrected or enhanced. It is design to be expandable in the future as more functions will be added.

### 4.3. Result of Analysis of Development Kit

After a series of research and analysis, the hardware and software requirements to develop ModifiCARtor are identified. The following lists are the hardware and software required for implementation of the system.

#### 4.3.1. Software

Each of these system and application software is vital to the development of ModifiCARtor. Each plays a part in one or several module production. The list of softwares is as follows:
• Operating system: Microsoft Windows 2000 Advanced Server
• Macromedia Dreamweaver MX
• Microsoft Visual Studio
• Microsoft SQL Server 2000
• Adobe Photoshop 7.0

4.3.2. Hardware

The list of hardware below is the minimal requirements in developing the system:

• Intel Pentium III 800Mhz
• 256 MB SDRAM
• ATX VA motherboard
• 64 MB Geforce2 graphic card
• At least 3GB free hard disk space
• 48x CD-RW drive
• Input device: keyboard, mouse, microphone, digital camera
• Output device: 800 x 600 digital monitor, color printer
Chapter 5
System Design

5. System Design

5.1. Introduction

System design has been deriving from requirement analysis that has been made.

From the requirement we decided how the system will be designed structural and behavior.

For this purpose, UML had been used as the method to design the system.

A non-programmer's visual generation modeling language: The Unified Modeling Language is an open method and specific, powerful, comprehensive, and consistent tool used for object-oriented software-intensive system and development. [1]
5. System Design

5.1. Introduction

System design had been deriving from requirement analysis that has been made. From the requirement we decided how the system will be design structural and behavioral.

For this purpose, UML had been use as the method to design the system.

*A non-proprietary, third generation *modeling language*. The Unified Modeling Language is an open method used to specify, visualize, construct and document the artifacts of an *object-oriented* software-intensive system under development.[4]

Referring to use case diagram (see Reference), that are all the case and the relationship. There are 2 actors, CarModifier and WebAdmin. CarModifier is the user who use the system. WebAdmin meanwhile is the user who have access to maintain the system.
5.2. UML use case diagram

Refering to use case diagram (see Reference), that are all use case and the relationship. There are 2 actors, CarModifier and WebAdmin. CarModifier is the user who use the system. WebAdmin meanwhile is the user who have access to maintain the system.
For CarModifier, the use cases as follow:

- View Tips
- View Car
- Search Part
- View Engine
- Login Car
  Extend to
  + Modify Car
- Login Cart
  Extend to
  + Add to Cart
  + Delete from Cart
  + View Cart
- Login Engine
  Extend to
  + Modify Engine

For WebAdmin, the use cases as follow:

- Login
  Extend to
  + Add Data
  + Delete Data
  + Update Data
5.3. UML class diagram

Referring to class diagram (see Reference), all class needed for the system deriving from use case diagram been drawn. This class been identified based on requirement.
5.4. UML deployment diagram

Referring to deployment diagram, that is how this system will be deployed after implementation. A server is needed to run the system, and internet user may access the system through the internet browser from the client. Server and client requirements are described in System Analysis.
Interface Design

Figure 5.1 Interface
6. Implementation

Installation Strategy

The following steps need to be performed to install the application system components in the production environment.

1. MAP THE DEFAULT WEB SITE

This step can be performed using "Internet Service Manager" also known as IIS.

2. Active Server Pages — All pages that contain web application including script

3. Images — All images used

4. Style Sheets — Document the

5. COPYING AND INCORPORATING

Copying all component needed for the application

6. CREATE ANOTHER SUB DIRECTORY (COM)

This step involves several steps to create the database, stored procedures, tables and populating the look-up tables.

- Creating an empty database
- Executing SQL Scripts
- Inserting the minimum data required
- UPDATING GLOBAL...ASA

Setting for global variables in server
6. Implementation

Installation Strategy

The following steps need to be performed to install the application system components in the production environment.

- **MAPPING THE DEFAULT WEBSITE**

This step can be performed using "Internet Service Manager" also known as IIS.

**Active Server Pages** – All pages that contain web application including script

**Images** – All images used

**Style Sheets** – Document that support web presentation

- **COPYING AND INSTALLING COM COMPONENTS**

Copying all component needed for the application.

- **CREATE ANOTHER SUB DIRECTORY (COM)**

This step involves several steps to create the database, stored procedures, tables and populating the look up tables.

  - Creating an empty database
  - Executing SQL Scripts
  - Inserting the minimum data required

- **UPDATING GLOBAL.ASA**

Setting for global variables in server.
Chapter 7
Testing
7. Testing

Web Testing

Testcases exercise each of the following functions:

- **Links**—Navigate every link from the Home page to the rest of the website pages.
- **User interface**—Make sure all graphics appear properly (i.e. size, colour, and resolution).
- **Search options and criteria** (i.e. searching by item category, item description)
- **Shopping options**—Select size, colour, number, etc.
- **Calculation of the total value and number of shopping cart items.**

**Sample Test-case**

**Objective:** To verify that customers can pick item from the catalog database, and that item information and totals are recorded correctly, using a representative sample of browser and workstation configurations (i.e., operating system/browser/modem speed/screen resolution, etc.).

**Setup:**

1. Set up a test website with production-level server hardware and database content.
2. Configure the workstations and browsers.
3. Distribute testscripts to participating testers, for each selected configuration.

**Test Steps (repeated on each configuration):**

1. Browse the catalogue database for an item.
2. Select the item.
3. Add the item to the shopping cart.
4. Verify the Total amount in the shopping cart.

**Expected Results:**

1. No broken page links are encountered.
2. Product catalog picture quality is satisfactory.
3. Correct item is added to picklist, and inventory count is reduced appropriately.
4. Shopping cart total value is correct.

**Stress Testing**

The tester generates the trade volume (transactions per second) that is expected during the first few opening minutes, checking the speed of response and that totals and counts are properly accumulated.

**Sample Testcase**

**Objective:** To confirm that the system responds within an acceptable time during a period of high trade volume.

**Setup:**

1. Set up a complete system with production level hardware and software.
2. Ensure that the system is clear and clean of any other activity.
3. Set up all monitoring components (to monitor CPU usage, network traffic, and queue size).

**Script:**

1. Start all components of the system.
2. Run any pre-production jobs that are used to initialize a trading day.
3. Start the system stress tester
4. At a predetermined time, start the system stress tester and execute the expected number of transactions.
5. Shut down the system stress tester.
6. Ensure that all trades have completed.
7. Ensure that all logging processes have completed.
8. Shut down the other monitoring components.
9. Remove and save all statistics.

**Expected Results**

1. Response time for the average transaction is within acceptable limits.
2. The count of logged transactions is equivalent to the number of trades sent through.
3. Network traffic does not exceed 50%.
4. Network traffic does not show too many errors (as determined by the business).
5. Queues never exceed 200 items, and are cleared within a reasonable time after the completion of the test.
8. Conclusion

8.1. Project Strength and Limitation

The strength

As the whole analysis, requirement and design have been describe before, the project strength definitely the idea of combining car simulation and auto parts search engine. Like before, car modifiers need to know what type of parts they going to search and what are its use. By using this system they can know less about the auto parts, because this system will help them with information about auto parts. It could be parts with simulation rather than using search engine alone.

There structure of this system also has been design not to depend on specific car. This system concerns about if there is need to add more type of car.

The limitation

For this purpose of study, there are limitations for this system. This system will only cover one type of car which is Proton Sprint due to it’s widely been modified by car owner. This is because the data must be collected for this car alone is bulk. The data consist of every detail of parts, all angle pictures and the compatibility of the parts. However the system been design to make easy if there new car model data want to be include.
8. Conclusion

8.1. Project Strength and Limitation

The strength

As the whole analysis, requirement and design have been describe before, the project strength definitely the idea of combining car simulation and auto parts search engine. Like before, car modifier need to know what type of parts they going to search and what are its use. By using this system they can know lease about the auto parts, because this system will help them with information about auto parts. It could be much enjoyable to search auto parts with simulation rather than using search engine alone.

The limitation

For this purpose of study, there are limitations for this system. This system will only cover one type of car which is Proton Satria due to it’s widely been modified by car owner. This is because the data must be collected for this car alone is bulk. The data consist of every detail of parts, all angle pictures and the compatibility of the parts. However the system been design to make easy if there new car model data want to be include.
The simulation of the car will be present in 2 dimension format. It's just a manipulation of conventional picture with accurate positioning. There will be no rendering or 3 dimension display.

The other limitation is the shopping cart is just for user to view their budget if they choose the parts. There will be no online transaction from the shopping cart. However, user can print out their selected item as reference.

8.2. Project enhancement

Display

Since the system just using 2 dimension displays, the enhancement of course the implementation of 3 dimension display for simulation. The rendering of car would be more attractive for user. More modules such as car tour can be implemented too.

Online transaction

The shopping cart can be extending to online transaction form. This require more business analysis to be done.

8.3. Lesson learned during project period.

A lot of new thing learn during developing this system.

Time management

This is the most crucial aspect. Since there are so many process involved and time frame given are short, time management and scheduled work must be put into priority.

Skill set

From this project we know that software development task is not easy. It's requiring various set of skill. It gives me a picture on how a software
development company running their business. The effort given must be huge to get perfect result.

**Human interaction**

Early stage of software development process requires a lot of interaction with people. This gives me new experience to communicate with people and how to deal with people and to manage their expectation.

8.4. Summary

So many experiences absorb in completion of this system. Like doing other thing, planning is the most important thing. A proper planning gives much benefit. In industry where cost always a main factor, a proper planning will absolutely reduce cost.
Chapter 9
User Manual
Main Page

When user get into ModifiCARtor site the page as above will be displayed. User need to select one of the menu provided as below.
This menu user will be able to view various tips on car modification.
The airflow meter is a very important part of the engine. Its purpose is to calculate the volume of air coming into the intake manifold and pass this signal to the ECU. The ECU then determines how much fuel to be injected based on the input from the airflow meter. So, if the airflow meter gives a wrong reading, the ECU would make a wrong decision and your car would not perform properly.

In most cars, the airflow meter is located near the butterfly after the air filter. After sometime, the meter gets dirty. This is especially the case when you are using aftermarket air filters like K&N or Power Flow. These aftermarket air filters contain oil to trap the dust. This oil after some time may be sucked in the intake and cause it to stick to the meter. This will prevent the meter from reading the airflow correctly.

It is therefore advisable to clean the meter from time to time. Open
Main Menu – Modify Pundit

From this menu user will be able to view some excellence modified car.
From this menu user will be able to search all parts available through conventional search.
For logged in user, user will have a cart service that make easier for them to calculate the price from what ever part they choose.
<table>
<thead>
<tr>
<th>Product Id</th>
<th>Product Name/Description</th>
<th>Quantity</th>
<th>Price</th>
<th>Shipping</th>
<th>Remove</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Abacucta</td>
<td></td>
<td>RM100.00×2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Abacucta</td>
<td></td>
<td>RM150.00×1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>SUBTOTAL</strong></td>
<td></td>
<td><strong>RM250.00</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Main Menu - Login

User will be redirect to next page.
User will enter user name in text box 'Username' and password in text box 'Password'.

Then user can submit login when click button 'Submit'.

If user first time using the system they need to register and click 'Click here' will redirect them to register page.
Register Page

User need to enter text box no 1 to 5 which are:-

- User name
- Password
- Password confirmation
- Name
- E-mail

After user fill the entire text box, user can submit application with click ‘Submit’ button.

User can also reset all text box by clicking button ‘Reset’.
Logged in User Page

There's a few differences for logged in user function. As been mention above for 'Auto Part Search' logged user will be able to use cart service. Other difference for logged user, logged in user will be able to use 'Make-up Studio Page'.

Make-up Studio Page

From user information, the existing car setup own by user will be displayed in table.

User can view their car by clicking view image and will be view in new window.

User also can set up by clicking 'Setup new car'

By clicking Setup column user can edit their existing car setup.

User also will be able to delete their existing car setup.
References


Appendixes