CAR PLATE NUMBER RECOGNITION (CPNR) DATABASE SYSTEM



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

BORANG PENGESAHAN STATUS TESIS

JUDUL: Car Plate Number Recognition (CPNR) Database System

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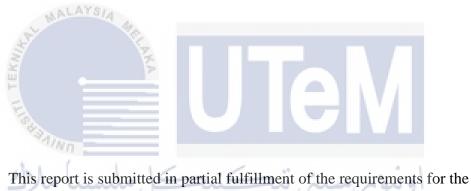
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CAR PLATE NUMBER RECOGNITION (CPNR) DATABASE SYSTEM

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Bachelor of Computer Science (Database Management)

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY UNIVERSITI TEKNIKAL MALAYSIA MELAKA 2016

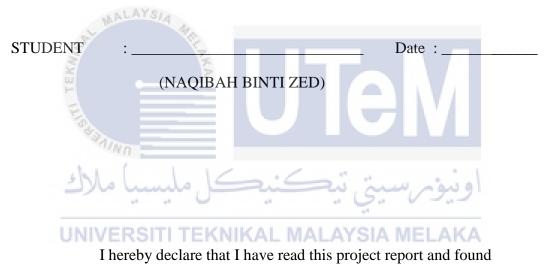
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DEDICATION

This dedication I dedicate to the people who helped in preparing this final year project. All guidances from them are given many benefits to me until the project is completed. Thanks to my mother Maimun binti Abd Talib as well as families and friends of the Faculty of Information Communication and Technology who involved directly or indirectly. Encouragement and passion that has given cause me to do this project well from beginning until the end. Next, thanks also for the recommendations which are very creative in producing a useful system. Besides that, do not forget to my supervisor, Dr Nurul Akmar binti Emran whose provides useful insights, advice and critism to build Car Plate Number Recognition (CPNR) database system that has many functions to the public. Finally, thanks to all attentions that has been given throughout under supervision Dr Nurul Akmar.



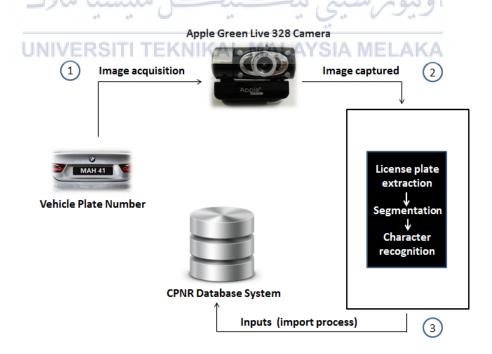
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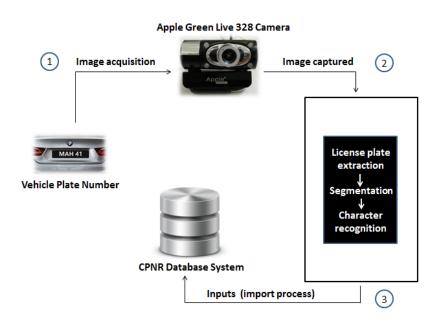
ABSTRACT

Car Plate Number Recognition (CPNR) database system is developed to help the security guard to monitor that every vehicle that arrived at UTeM is a registered vehicle. This system provides detailed information about the vehicle and its owner while the number after the plate number is detected. So, in order to enable this process to run smoothly, some information must be stored in the database. Among them are vehicle owner information, sticker registration and time in and time out. Thus, this system provides a number of forms to be filled online. Users also can make sticker registration through this system at any time. In addition, this system also has the functions to check summons, owner information management, sticker registration management, send an alert via email and generate reports. Furthermore, this system is used by two different users, which are staff and owner. Owners are student, staff or outsiders who work in UTeM for a certain time, while the staff is who managing the information. Overall, this system should be developed to ensure all the vehicles entered in UTeM are registered. Below is the framework of the integration between recognition camera and the database system.



ABSTRAK

Sistem Pengecaman Plat Kereta dibangunkan adalah bertujuan untuk membantu pihak keselamatan untuk memastikan setiap kenderaan yang masuk di UTeM adalah kenderaan berdaftar. Sistem ini akan memberikan maklumat terperinci mengenai kenderaan dan pemiliknya semasa nombor plat dikesan. Bagi membolehkan proses ini berjalan dengan lancar, beberapa maklumat perlu disimpan di dalam pangkalan data. Antaranya maklumat pemilik kenderaan, pendaftaran pelekat kenderaan dan waktu keluar dan masuk UTeM. Jadi, sistem ini menyediakan beberapa borang yang perlu diisi atas talian. Pengguna juga boleh membuat pendaftaran pelekat kenderaan melalui sistem ini pada bila-bila masa. Selain itu, sistem ini turut berfungsi untuk menyemak saman, pengurusan maklumat pengguna, pengurusan maklumat pelekat kenderaan, menghantar amaran melalui e-mel dan menghasilkan beberapa laporan. Disamping itu, sistem ini digunakan oleh dua pihak yang berbeza iaitu pengguna dan staf keselamatan. Pengguna adalah pelajar, staf atau orang luar yang bekerja di dalam UTeM manakalan staf adalah pihak keselamatan yang menguruskan maklumat-maklumat pengguna. Secara keseluruhannya, sistem ini wajar untuk dibangunkan bagi membantu pihak keselamatan memastikan kenderaan yang masuk di UTeM adalah berdaftar. Di bawah adalah rangka integrasi antara kamera dan sistem pangkalan data.



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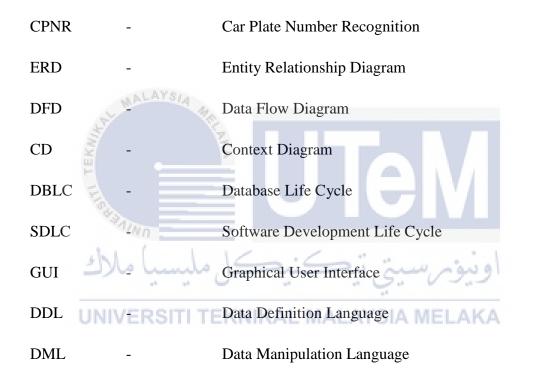
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LIST OF ABBREVIATIONS



CHAPTER I



1.1 Project Background

The main purpose of this system is to develop a database in order to organize the information of vehicles and its owner. Nowadays, the access system by using license plate recognition has been done but the information only display in the monitor at the guard house. This information is limited because it can display the information at one place only and only security guard at there can know that information. According Tran *et al* (2005), any system that usually used in real-time systems, it requires not only accuracy but also fast processing. If this system is completed with online status monitoring application, it will be more efficient in term of checking the availability of

sticker by security guard. All of the security guard can monitor the movement in and out of the vehicles although they are not at the guard house.

The data is growing rapidly and require a management system for managing data properly. The challenging of management data is also one important aspect that needs to take into account. For example, the data comes from different data source of different types. So, with this database, it can be synchronized and put in one place that can later be retrieved by many people. Therefore, it is required to have one place to store all kinds of information which is called a database.

According to Robert (1994), a database is a persistent, logically coherent collection of inherently meaningful data, relevant to one aspects of the real world. Meanwhile, a database management system (DBMS) is a collection of programs that enables users to create and maintain a database.

In this project, a database for the information of vehicles and user will be built to make the data is available when needed. All the information of the vehicles will display via online. This will result in a better improvement in a current access system.

1.2 Problem Statement

There are many problems occur on the existing system, particularly in the access system management. Difficulty accessing data at a maximum level is often happens because of the data on paper and only be in one place only. Due to the inefficient access system management, there are some problems occur such as: i. Having congestion at the main entrance.

The security guard still used the manual access system which is by checking the sticker on the vehicles to identify user identity by differentiate a student, staff or an outsider. As a result, this system will take a long time for the security to check the vehicles one by one. Besides that, it would cause difficulties to the various parties, especially to the security to know the user information based on the vehicle's number plate.

ii. No online database to keep all the information such as vehicle, user, summons and others

The efficiency to retrieve information is essential to ensure all the processes are running properly. So it is important if the database is realized in the form of online mode. The difficulty of obtaining data manually will also cause some problems such as the duplication of data, incorrect information, a slow process and will take a long time.

iii. Staff need to view and analyze the data on paper

The information also difficult to analyze because of the information is not in online mode. Staff needs to check the whole information on the paper of every sentence and make a report. This way will takes time and cause other errors that may occur from the dropout information. Based on the problem statement that has been stated above, the objectives of this project are:

i. To develop a database for storing the data in organized and be managed systematically.

The system need to store the information of vehicle and its user after the registration. User need to register the system to be authorized person. Then, they can insert their vehicle information as the way for vehicle registration in UTeM.

ii. To allow user to search for the availability of person in UTeM by searching using the plate number.

The purpose of the database is storing useful information to the end user. In this case, users easily make search in a situation where they want to know availability of person in this university.

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iii. To allow online registration of owner's vehicle in anytime and at anywhere.

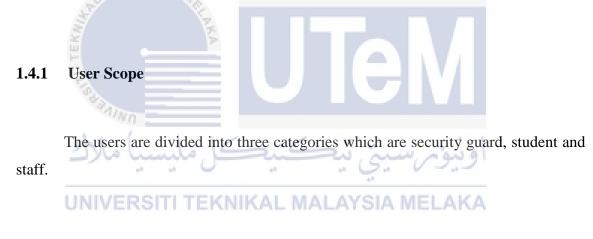
The system is developed to simplify many things. Among them is the registration sticker for those who bring vehicles into UTeM. Car Plate Number Recognition (CPNR) database system also provide registration stickers using this system in order to avoid congestion at the security office, making it easier for those who want to register at any time and improve the quality of the registration process.

iv. To produce a report by day and year

This system will help to produce a report from the various of information. Data collected will be presented in the graphic form and will help the user to better understand.

1.4 Scope

The scope for this system is divided into two categories which are system scope and user scope. The system scope explains about the functionality of what the system can do while the user scope is about the type of user and their tasks.



• Security guard

The security guard is responsible for detect sticker on vehicle by themselves. By using this system, it will simplify their task. For example, the camera will recognize the plate number and do some processing until it becomes readable text. Next, using the text it will search for user information and give a notification to the security guard. Then, Car Plate Number Recgnition (CPNR) database system provides access to the security guard in order to help them doing their work more effective and to avoid congestion at the main gate. • Student and staff

The student and staff are allowed to use this system for several functions. There are sticker registration, search for user availability and view summons information. Car Plate Number Recognition (CPNR) database system provides a form for user to register the vehicle. Other than that, they are able to check the status availability of other person in UTeM. This function is provided especially for students to find the lecturer. They just need to enter some information needed by the system such as plate number to get the information required.

1.4.2 System Scope

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The system scope is divided into seven modules which are login, user registration, plate number registration, vehicle information, staff and user information, summons and reporting.

1.4.2.1 Login

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Login module is developing for all users of this system. They need to log into the system by key in their identity number and password. Login will authenticate the user either they are allowed to use the system or not. This module will be used by student and staff.

1.4.2.2 User registration

User registration module is developing for users who want to access the system need to be registered. For security guard or other staff they will be registered by the admin of this system for security reason. This module will be used by student and staff. User registration module also used stored procedure to join at least two tables to display information. Other than that, it used trigger to create unique id start with REG0.

1.4.2.3 Plate number registration

Plate number registration module allows every person who brings the vehicle into UTeM need to be registered in every year to allow only an authorized vehicle enters the UTeM. This system also provides the registration form in order to help them register in any time at anywhere. This module will be used by owner of the vehicle in order to register their vehicle.

UNIVERSITI TEKNIKAL MALAYSIA MELAKA 1.4.2.4 Vehicle information

Vehicle information module allows user to view their vehicle information throughout this system. Besides that, they are able to search the status of vehicle whether it is in or outside UTeM. This module will be used by admin and user of the system. They can insert, update or delete the information. Vehicle information module also used stored procedure to join two tables, insert and delete.

1.4.2.5 Staff and user information

Staff and user information module shows a list of staff and user that register the system in order to get the right access. There are several information that be kept into database such as name, address, phone number, matric or staff number, email and image. This module will be used by user of the system. They are allowed to view and update the information. Staff and user information modules also used stored procedure to view, insert, update and delete. A trigger also executed for table staff to generate unique id that start with S00.

1.4.2.6 Summons

Summons module is developing to help the security to report on drivers who break the rules. Summons's form is provided in the system. Users also are allowed to view their summons information in details. This module will be used by security to insert summons and owner to view the summons. The summons module also used trigger to generate summons id and a trigger to generate unique id that start with SMO.

1.4.2.5 Reporting

Reporting module is develop for staff to track which user get into UTeM, how many times per day user entrance in UTeM, and the number of registration per year. These reporting will help staff to view the trend day to day and make analysis on that. The reporting also used stored procedure in order to generate the graph in term of data to be viewed.

1.5 Project Significant

Throughout some study for the development of Car Plate Number Recognition (CPNR) database system, it will benefit to everyone, especially the students and staff at UTeM. They are the main consumers of help in developing useful information.

In addition, this Car Plate Number Recognition (CPNR) database system enables them to register a vehicle in a systematic and process will be rapidly. This system provides a form to be filled on the vehicle information as well as the owners. The information has been filled will be saved into the database and so on admin will continue the registration process. Through this system, users can also find out the status of vehicle registration and stickers start and end dates. Besides that, the system will notify the user to renew their license if the expiration date has been reached.

Next, it is useful to staff who manage this system. Through this Car Plate Recognition Database System, all the information are easier to manage, especially taking care of a lot of information and may be the information is likely to overlap. The staff also can check whether the vehicle has been registered or not. Finally, it simplifies the search process.

1.6 Expected Output

- Output 1: List of reports that can be generated from the input data.
- Output 2: An automatic notification for the license expiry.
- Output 3: Searching result based on one or more tables which is generated by join queries

1.7 Conclusion

At the end of the project, the developer needs to achieve the objectives that have been list out in the objectives section in this proposal. There are to develop a database to store the users and vehicles information in able to manage data systematically, to allow user to know the availability of person in UTeM by searching using the plate number and to help person in registration their vehicle in anytime and at anywhere. This system should be developed in more systematic way to make user easy to use so that any problems occur can be avoided. Throughout this database driven, the information can be retrieve by any authorized user. Therefore, database design as well as user interface need to perform in order to clarify the requirements of the system.



CHAPTER II



2.1 Introduction ITI TEKNIKAL MALAYSIA MELAKA

This chapter covers the description on development methodology that is used in this project. Many methodologies outside there such as Agile, Waterfall, Rapid Application Development, System Development Life Cycle (SDLC) and Extreme Programming (EP) are useful in developing a system and it is depends on someone who want to work with. In this project, the methodology is based on the Database Life Cycle (DBLC). The method is use to achieve the objectives of the project that will accomplish a correct result. Generally, the steps are database initial study, database design, implementation and loading, testing and evaluation, operation and maintenance and evolution.

2.2 **Project Methodology**

This project used four major steps to implement project starting from database initial study until the evaluation. All the methods used for finding and analyzing data regarding the project related.

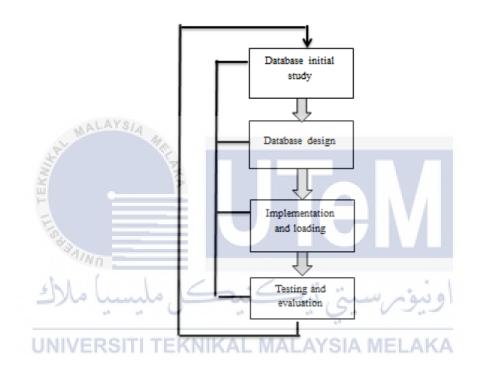


Figure 2.1 Database Life Cycle (DBLC)

2.2.1 Database Initial Study

In this step is to identify all the requirements and information such as hardware, software and planning must be done in the proper manner. This stage also requires analyzing the existing of car plate number system, defining what are the problems occur from the current system, state the objectives, scope and boundaries.

2.2.2 Database Design

Design is the process which is to visualizing the flow or data of the system by using Data Flow Diagram (DFD). Design is the alternate solution to give the explanation of the system workflow. In this case, to achieve the objectives, design can be part of the solution. It is easy to understand, manage and simple to work.

The database design phase is divided into three steps. There are conceptual database design, logical database design and physical database design. The purpose of conceptual database design is to build a conceptual model of Car Plate Number Recognition (CPNR) database system which the output of this step is Entity Relationship Digram (ERD) and normalized relation.

The second step is logical database design which is an agreement of definition and business logic. CPNR database system is logically explained through this stage by specifying data and queries based on information that user want. The output for this stage is relational data model. This step also includes the selection on DBMS that will be used.

The last step is physical database design that represents core business rules and data relationships at a detailed level. CPNR is presented in tables, columns, indexes, sequences and constraint after grouping attributes from the logical database. The output for this stage is technical specifications used during the implementation phase.

2.2.3 Implementation and Loading

In this phase, the DBMS software is selected earlier during logical design. The Entity Relationship Diagram (ERD) needs to be translated to the targeted DBMS that will be installed into the computer. The DBMS used is PostgreSQL while the language is Hypertext Preprocessor (PHP). The database produced and data is put into the database tables. Then, user will add some future advantages such as set up the security standard, data integrity enforcement and place the backup and recovery procedures.

2.2.4 Testing and Evaluation

The database is tested for the performance to ensure all of the requirements achieved and to make sure the system is working well. It is tested during implementation and loading. However it is tested again and fine-tuned during testing. Lastly, the Car Plate Number Recognition (CPNR) database system will be evaluated its database and its application programs by the specific tester and be given a form to give the feedback.

2.3 **Project Schedule and Milestones**

Table 2.1 shown the project schedule and milestones for this project

Table 2.1 Project Schedule and Milestones

Milestones	Expected Documents	Dates
CPNR Project	1. Identify all the requirements for	22 February 2016
Planning	CPNR system	
	2. State the problem, objective, scope	
	and purpose	
CPNR Project	1. Analyst the project requirements in	2 March 2016
Analysis	details	
	2. Prepare the project schedule and	
	Gantt Chart	
	3. Analyst the current system in	

		market		
	Δ	Decide the hardware and software		
	т.			
		needed in the development of the		
		project		
CPNR Project	1.	Design the data flow of the project	29	April 2016
Design		by design the Entity Relationship		
		Diagram (ERD) and Data Flow		
		Diagram (DFD)		
	2.	Design the flowchart of the project		
CPNR Project			19	May 2016
Development		Start with design interface and		
and	1SIA	develops the project coding		
Implementation	A.	2		
CPNR Project		Test the system whether it is fulfill	1 J	une 2016
Testing		at the requirements of the project		
CPNR Project		Final phase that have complete all		8 June 2016
Completion		functional, documentation and		
يا ملاك	مليسه	ongoing system through the life of the service	اوه	

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Figure 2.2 shows the Gantt chart for the project schedule of Car Plate Number Recognition (CPNR) database system

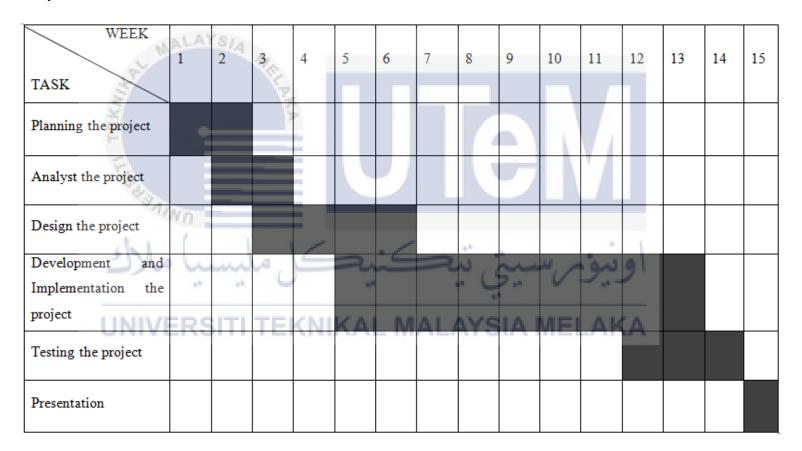


Figure 2.2 Gantt Chart

2.4 Conclusion

As a conclusion, every project has a different methodology that is being used to make the project success and working well. This project used Database Life Cycle (DBLC) as database system development methodology to achieve the objectives of the project that will accomplish a perfect result. This project methodology and planning explains in details all the DBLC stages that are used for this project.



CHAPTER III



3.1 Introduction

Database system in analysis phase is concerned with the identification and problems of the data element which is needed to support the data processing system of an organization, the placing of these elements into logical groups and the relationships between the resulting groups. System analysis often goes directly from fact finding to implementation dependent data analysis. Thus, Car Plate Number Recognition (CPNR) system is chosen to be the fact finding source. From the information provided by the respondent, the data is analyzed and build a system representation in the form of a conceptual data model which specifies the structure of the data and the processes which use the data.

3.2 Problem Analysis

The vehicle sticker is a good way to categorize a person registered or not registered. Each person must register vehicles to enable vehicle brought into the UTeM area. Security guard also needs to ensure that every vehicle that comes in is registered by checking the sticker affixed to the windscreen of the cars or motorcycle.

But, there are some problems occur from the old system where there is no data that can be retrieving at that time. The security guard manually checks the vehicle one by one and it will cause congestion if there are many vehicles at the same time. This system will provide an effective way for them to recognize the vehicle and avoid some problems there. Below is the flow how this old system works

3.2.1 Flowchart description

Based on the flow of the current system, there are two categories which are student site and staff site. Each of them has different flow of process and will be explained below.

Figure 3.1: Sticker registration by user

The process of car's owner registers a sticker. Each registration sticker, users must register at the security office. They have to fill in the form provided. In addition, copies of IC and licenses must be submitted with this form and they will be charged a fee of RM1 for each application. The form is sent to the officers. When all processes are complete then the sticker will be given to the user.

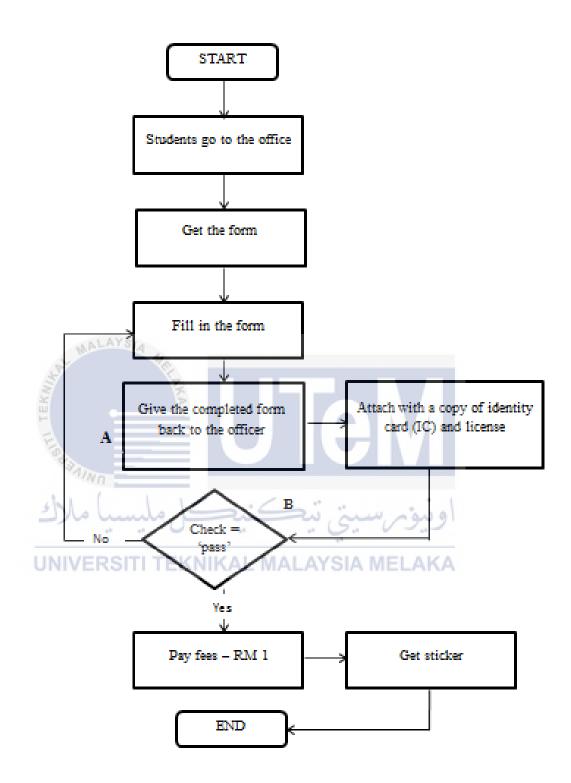


Figure 3.1 Flow Chart of Current System (Sticker Registration by User)

The process to manage the sticker. First, employees must provide registration forms where on the form contains a space to be filled in as the user information, vehicle, license and other information. Forms that have been printed will be given out to users to complete. Then, once completed, the form will be reviewed and if all the information, students make a payment of RM1. The forms will be put in one place for use when necessary.



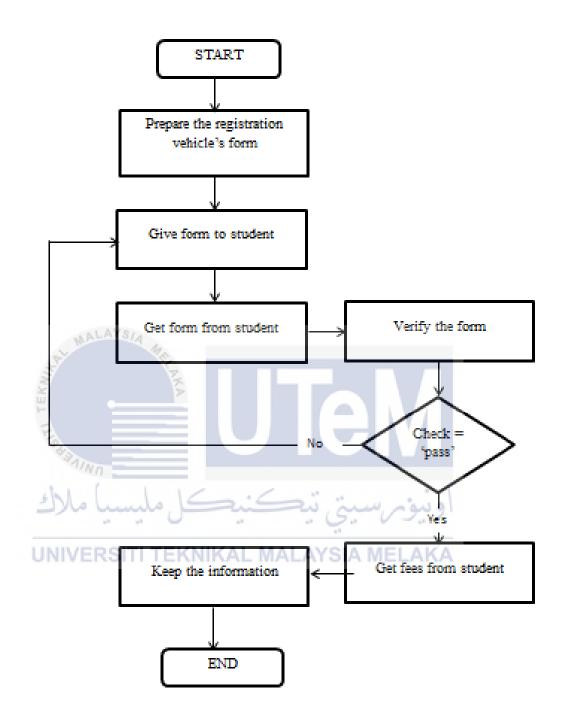


Figure 3.2 Sticker management by staff

Figure 3.3: Sticker Identification by Security Guard

This process is initiated by security guards who manage the online identification of sticker. According to current system, there is no online database system to store user information. So, it is hard for security guard to identify an authorized user. The current system shows the vehicles move into UTeM gate and security guard will recognize each of the vehicles by checking the availability of the sticker. Any user who has the sticker is permitted to enter UTeM area while on the other hand, they are asked to provide an explanation.



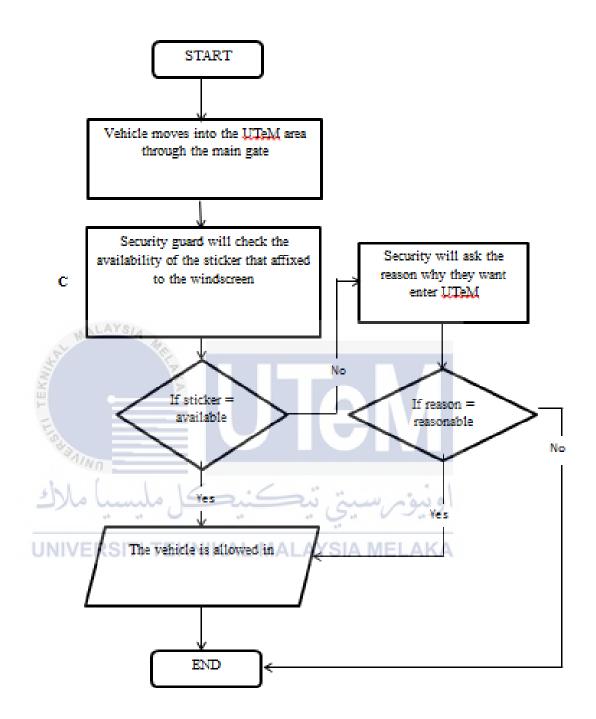


Figure 3.3 Flow Chart of Current System (Sticker Identification by Security Guard

3.3 The proposed improvements or solutions

According to the current manual system, a database system should exist to deal with the problems that occur. In addition, this CPNR Database System is able to store and manage data to support an orderly management. So a centralized system should be established to solve these problems. From the current system, there are some processes need to improve on its management. Below are the identify problem and suggestion for improvements:

A - Give the completed form back to the officer

Problem:

It is start from users need to go to security office. Users get the form and fill the requested information. After that, submit it to the officer and pay.

Suggestion of improvement:

To avoid wasting time and speed up the process, a system should be developed for systematic data management purposes. The system will facilitate access to information from the user and the information can be better managed.

B - Check = "pass"

Problem:

Officer themselves need to check one by one the registration form that given by users. It is takes time and possibility of mis-check.

Suggestion of improvement:

Officer does not need to check the information otherwise the system will process the information based on criteria that are required. The criteria will be added into the system so that each form is reviewed in accordance with the guidelines that have been set.

C - Security guard will check the availability of the sticker that affixed to the windscreen

Problem:

The problem occurs when there is no centralized data so that the security guard needs to check the vehicle on by one.

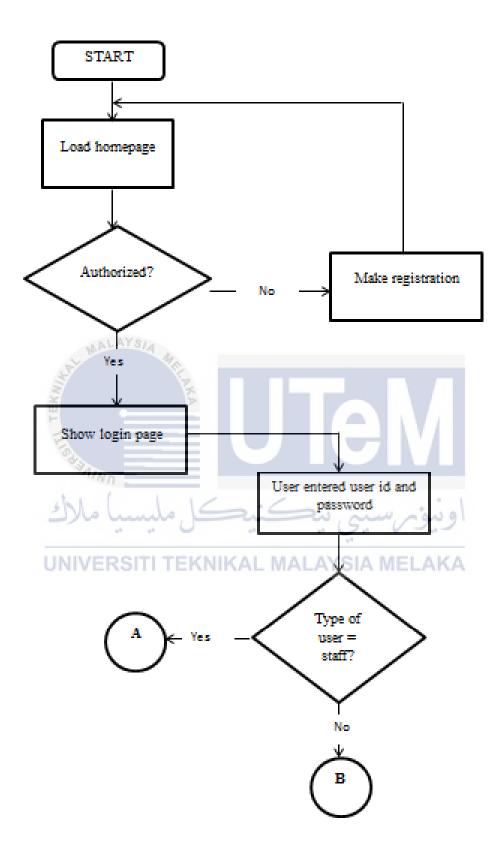
Suggestion of improvement:

Make a system in order to centralize the data. Security only needs to monitor the vehicles from inside through the system. The system also provides information on registered user, vehicle information and the record entry and exit.

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Thus, the vehicle management system should be established which aims to manage vehicle data, owner, summons and able to record entry and exit of vehicles in UTeM. This system is mainly designed to simplify security guard to identify vehicles that have been registered or not. In addition, the system will be used by the student, lecturer or other type of staff and this system is managed by staff.

Figure 3.3.1 shows the activity takes in the CPNR Database System. Each module is shown in the diagram for more understanding the flow of the process.



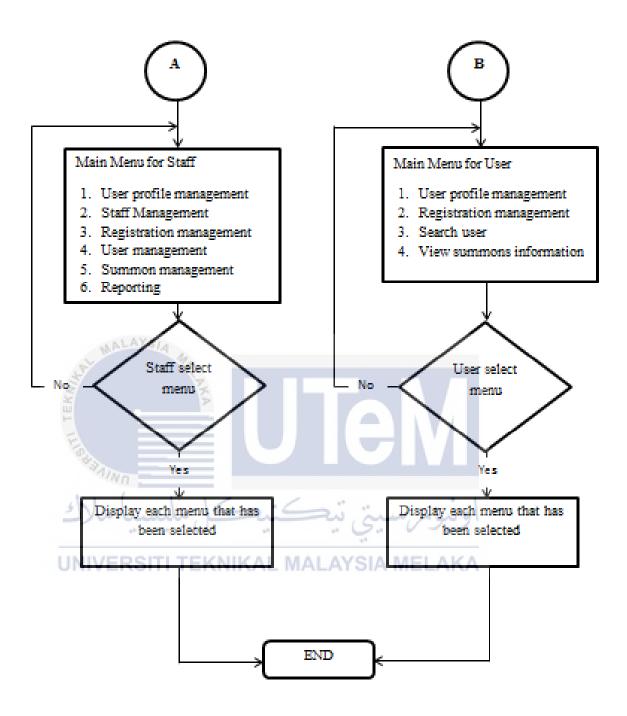


Figure 3.4 Flow Chart of Proposed System (CPNR Database System)

3.4. Requirement analysis of the to-be system

In this section, there are two types of requirement which is functional requirement and non-functional requirement.

3.4.1 Functional requirement (process model)

The functional requirement is a requirement that the main things that user expects from the software or system. It describes the behavior of the system rather than how the system operates.



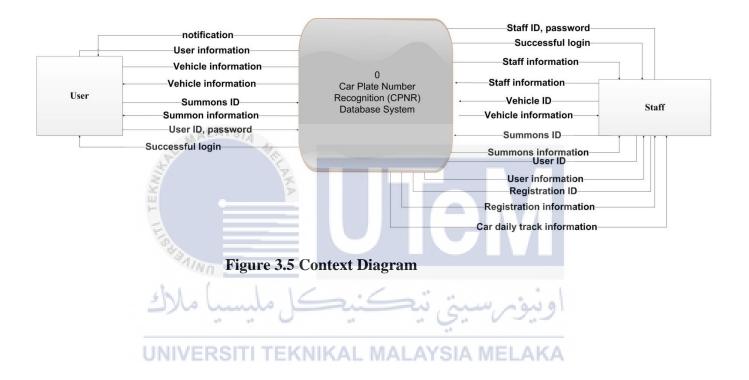
3.4.1.1 Functions of the system

FR_No	Requirement	Description
1	Registration	- The system provide registration for new users
2	Login	- The system provide login before user access the
		information
3	User Profile	- Admin can insert, update, delete and view user
	Management	information
		- User only can register , update and view their
	MALAYS	profile
4	Vehicle's	- The system allows user to make vehicle's
	Registration	registration
	Management	- The system has the functionality of update, view
	No.	and delete the registration information
5	Summons	- The system provide information of summons
	Management	- The system allow user to add, update and delete
		summons's information
6	Car Daily Track	- TEK The system allows user to insert, delete and view
	Management	car daily track
7	Reporting	- The system will generate various type of
		reporting such as bar chart and table.
		- The report will shows many of data in simplified
		way to be more understandable.

Table 3.1 Function of the System

3.5 Data Flow Diagram (DFD)

A Data Flow Diagram (DFD) explains how data is processed and transferred in a system. The graphical depiction identifies each source of data and how it interacts with other data sources to reach a common output.



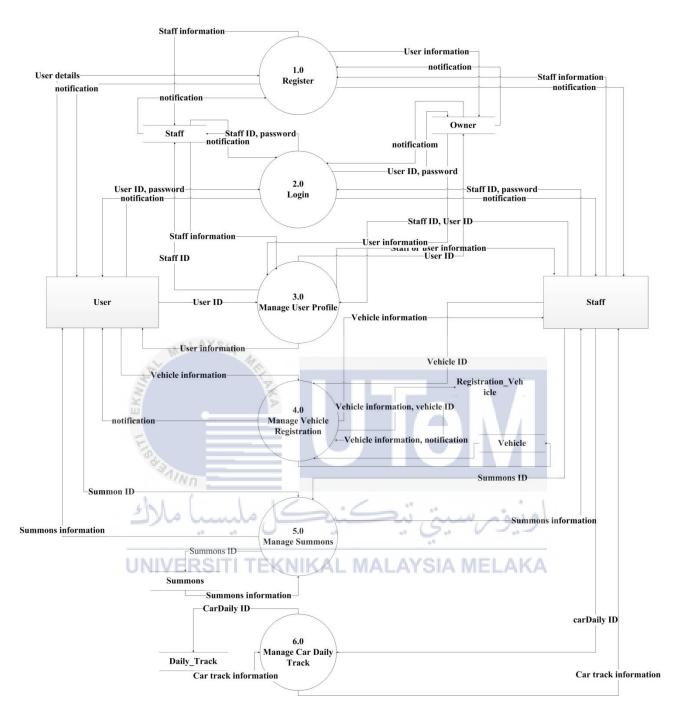
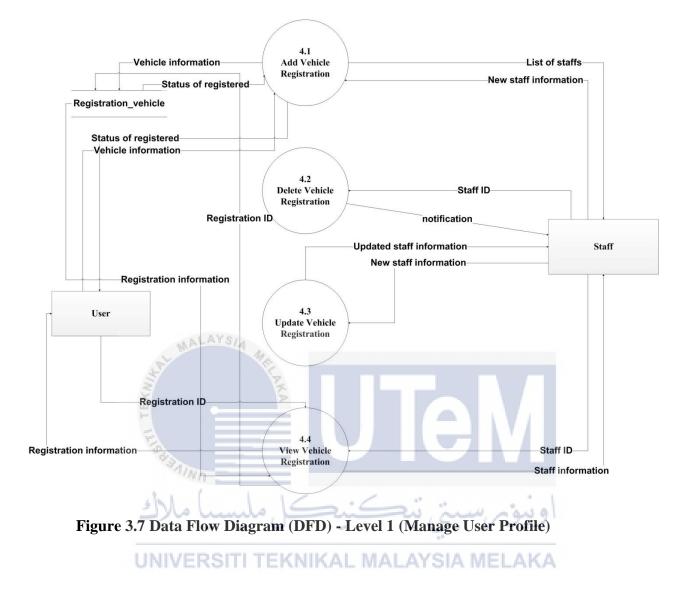


Figure 3.6 Data Flow Diagram (DFD) - Level 0



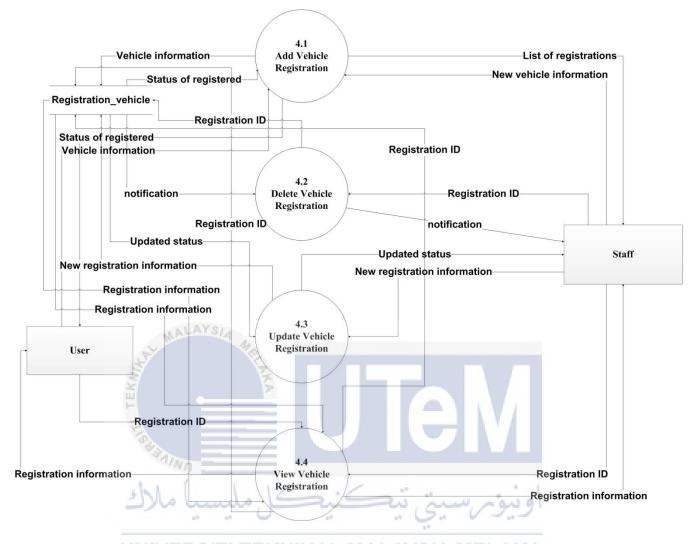


Figure 3.8 Data Flow Diagram (DFD) - Level 1 (Manage Vehicle Registration)

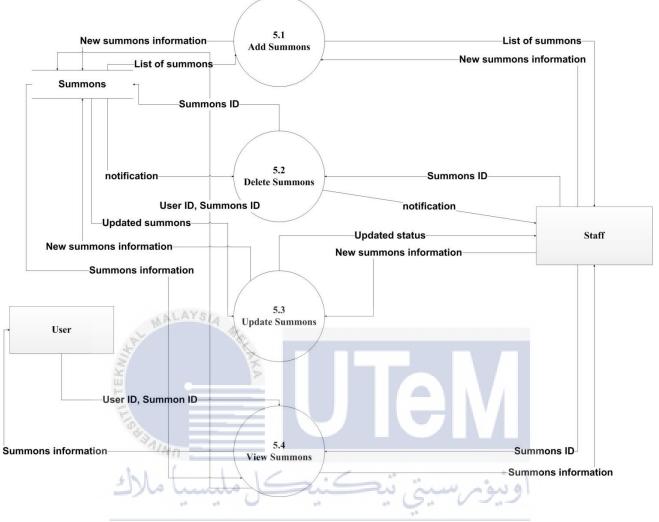
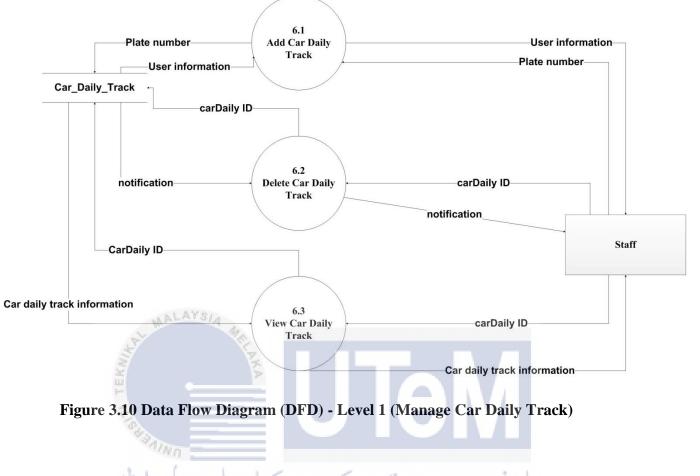


Figure 3.9 Data Flow Diagram (DFD) - Level 1 (Manage Summons)



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3.6 Non-functional requirement

NFR_No	Requirement	Description
1	Response Time	- Time taken to receive information
2	Usability	- System provide user friendly interface by simple flow of any process
3	Integrity	- Avoid any duplicate data by
	MALAYSIA 4	providing unique key
2 TEKNIN	Correctness	- Correct in giving output for end- users
1 Ille a	کل ملیسیا ملا	اونيۈ <i>ر</i> سىتى تىكنىد
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Table 3.2 List of Non-functional Requirement

3.6.1 Others requirement

This section consist of software requirement, hardware requirement and other requirement

3.6.1.1 Software and Hardware requirement

Table 3.3 List of Software and Hardware Requirement

No	Software Requirement	Hardware Requirement
1	Microsoft Word 2010	Printer
2	Microsoft Visio 2010	Laptop
3	Microsoft Excel 2010	Mouse
4	Adobe Photoshop CS6	Hard Disk
5	Microsoft PowerPoint 2010	Thumb Drive
6 U	Notepad++TI TEKNIKAL MA	LAYSIA MELAKA
7	Microsoft project 2010	

3.6.1.2 Other requirement

• Google Chrome

One of the web browsers used to search any information related to this project.

• Internet access

Allow computer to access data from outside and easily to find information.

• Prezi

Slide presentation for final presentation.

3.7 Conclusion

In a conclusion, this chapter explains about the existing system and system to be developed. Some modules were added to make this system more function and interacting besides makes improvements from the existing system. The next chapter will explain about system design which is including the conceptual design, logical design and physical design.

CHAPTER IV



4.1 Introduction

This design phase will give the result of the analysis phase and next will explain more about the design of the system to-be. This chapter is related after completed the Context Diagram (CD) and Data Flow Diagram (DFD). Design is divided into two main categories which are input and output. Both of categories provide initial overview of Car Plate Number Recognition (CPNR) database system. Input is the process where users enter some information requested by the system. Meanwhile, the output is the interfaces that show to the users the information they need or requested. Besides that, design phase helps to solve problems during the process of implementation by giving the structure of the system. The initial impression is important for individuals to add or subtract during the development of the real system.

4.2 Introductory preview to this chapter

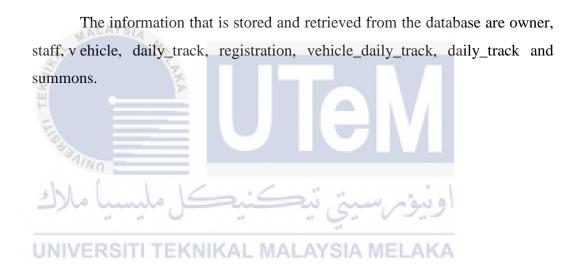
Figure 4.2.1 shows the architecture view for Car Plate Number Recognition (CPNR) database system. The system architecture will cover all the processes. There are several processes in this system which is user registration, vehicle registration by user, summons management and car daily track management by staff. The process starts with user need to register into the system to be able become an authorized user. Then they are able to register their vehicles throughout this system by providing some information needed. The system will process the registration form and if it eligible applications then the user can print out the form. In addition, user will be provided summons information while staff can manage the summons.

The system architecture of this system is two-tier architecture. It refers to client/server in which the user interface runs on the client and the data structure gets stored on the server that comprises the two layers; the client application and data source. On client application side the code is written for saving the data in the PostgreSQL server database. The camera will detect plate number and sent the request to a server. Then it processes the request and sends back with data.

i. Client application: User interface

The interface is divided into two different categories which is administrator interface and user interface. The interfaces that administrator use are manage user profile, manage vehicle's registration, manage summons and manage car daily track which is insert, update and delete data. While the interfaces for user are managing profile, vehicle registration and view summons information. Both are using login and register interfaces.

ii. Data source: PostgreSQL DBMS



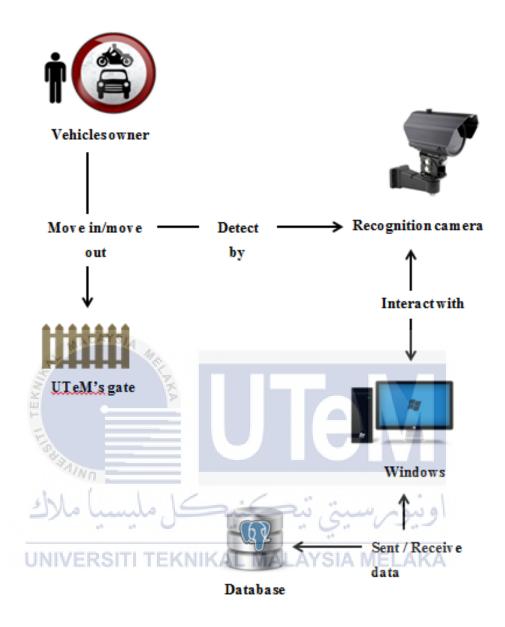


Figure 4.1 System Architecture Design for CPNR Database System

4.3 Conceptual Design

This section consists of two subsections which are Entity Relationship Diagram (ERD) and description by using business rules.

4.3.1 Entity Relationship Diagram

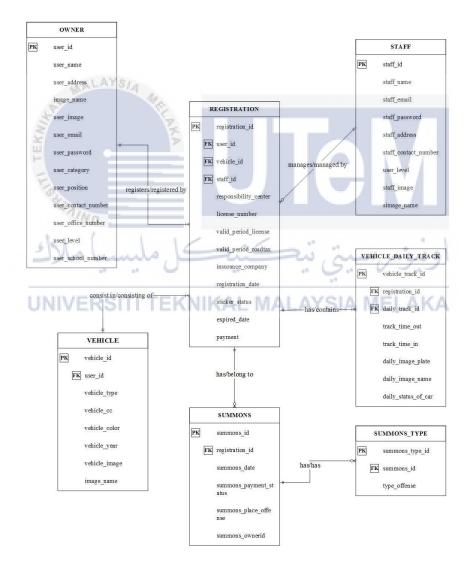


Figure 4.2 Entity Relationship Diagram (ERD)

4.3.2 Business Rules

- One owner owns one or many vehicle.
 One vehicle is owned by one or many owner.
 Registration is the bridge between owner and vehicle.
- One owner can register one or many registration.
 One registration is registered by only one owner.
- One vehicle consists in one or many registration.
 One registration is consisting of only one vehicle.
- 4. One registration has zero or many summons.One summons belongs to only one registration.
- One staff manages one or many vehicle
 One vehicle is managed by one or many staff
 Registration is the bridge between staff and vehicle
- One registration has one or many daily_track.
 One daily_track contains only one registration.
- One registration has one or many vehicle_daily_track.
 One vehicle_daily_track contains only one registration.
- One summons belong to one registration.
 One registration has zero or many summons.

4.4 Logical Design

Logical design is dividing into three categories which are data dictionary, conceptual design using normalization and query design.

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4.4.1 Data dictionary

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shi

 Table 4.1 Data dictionary for vehicle

Table Name	Attribute Name	Description	Type / Size	Format	PK/ FK	Null/Not Null	Related Table
vehicle	vehicle_id	It refers to the plate number of vehicle	Character Varying (20)	AGM 6728	PK	Not null	-
	vehicle_type	Eithercar,motorcycleorothers	Character Varying (20)	Car		Not null	-

V	ehicle_cc	Numberofcubiccentimetersofthe vehicle	Character Varying (20)	660	Null	-
Ve	ehicle_color	Color of vehicle	Character Varying (20)	Silver	Null	-
V	ehicle_year	Number of year of the car that has been used	Character Varying (20)	2008	Null	-

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Table Name	Attribute Name	Description	Type / Size	Format	PK/ FK	Null/Not Null	Related Table
	user_id	Matric number, staff number or worker pas number of the	Character Varying (20)	B031410056	РК	Not null	-
	user_name	owner Name of the owner	Character Varying (50)	Naqibah binti Zed		Not null	-
owner	user_address	Address of the owner	Character Varying (100)	No 75, Jalan DI 17, Taman Desa Idaman, 76100 Durian	ہر سر MEL	Not null	-
	user_ic	Identity card number of the owner	Character Varying (30)	Tunggal 931111-08- 5222		Not null	-

Table 4.2 Data dictionary for owner

user_email	Email of the	Character	naqibahzed@y	Not null	
	owner	Varying (50)	<u>ahoo.com</u>	INOU HUH	-
user_password	Password to log	Character	Naqibah123	Not null	
	into the system	Varying (50)		Not nun	-
user_category	Category of	Character	Outsider	Not null	_
E.	owner	Varying (20)	student	Not hull	-
user_position	Position of	Character	Student	Not null	
H I	owner	Varying (30)		Not nun	-
user_contact_n	Contact number	Character	013-5454123	Not null	
umber	of the owner	Varying (20)		Not nun	-
user_office_nu	Office number	Character		Null	
mber	of the owner	Varying (20)	م سببة تب	au a	-
	44 44		- G. V	1.1	•

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Table Name	Attribute Name	Description	Type / Size	Format	PK/ FK	Null/Not Null	Related Table
	staff_id	Identity number for staff	Character Varying (20)	ST01	РК	Not null	-
	staff_name	Name of the staff	Character Varying (50)	Muhammad Khairullah bin Hassan		Not null	-
	staff_email	Email address of the staff	Character Varying (50)	<u>khairullah@utem.e</u> <u>du.my</u>		Not null	-
staff	staff_password	Password to log into the system	Character Varying (30)	Khairullahhassanp ass	"~	Not null	-
	staff_address	Address of the staff	Character Varying (100)	No 9, Jalan TPJ 7, Taman Permata Jaya, 65454 Ayer Keroh Melaka	MEL	Not null	-
	staff_contact_n umber	Contact number of the staff	Character Varying (20)	019-7878123		Not null	-

 Table 4.3 Data dictionary for staff

Table Name	Attribute Name	Description	Type / Size	Format	PK/ FK	Null/Not Null	Related Table
	daily_track_id	Identity number	Character	DT01	PK	Not null	_
	SY	of daily track	Varying (20)		T IX	i vot nun	
daily_track	daily_image_pl	Image of plate	Bytea	a.jpg		Null	_
dany_nack	ate	number			V .	Ituli	
	daily_status_of	Status of the car	Character	Available	V/	Null	_
	_car		Varying (20)			1 1 11	

Table 4.4 Data dictionary for daily_track



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Table Name	Attribute Name	Description	Type / Size	Format	PK/ FK	Null/Not Null	Related Table
	registration_id	Identity number of registration	Character Varying (20)	REG01	РК	Not null	-
	responsibility_ center	Owner's responsibility center	Character Varying (30)	FTMK		Not null	-
	license_numbe r	License number of the owner	Character Varying (50)	11547014		Not null	-
registration	valid_period_li cense	Period of validity of licenses	Character Varying (50)	02/05/2015 رانسینی دیا	ونبوبه	Not null	-
	valid_period_r oadtax	Period of validity of road tax	Character Varying (50)	August 2016	LAK	Not null	-
	insurance_com pany	Insurance company name	Character Varying (50)	Alliance		Not null	-

Table 4.5 Data dictionary for registration

registration_dat	Date of vehicle	Timestamp	24/04/2016			
e	registration	without time			Not null	-
		zone				
sticker_status	Status of the	Character	Valid		Null	
L MALA	sticker	Varying (50)			INUII	
expired_date	Sticker valid	Character	31 December		Null	
K	date Ş	Varying (50)	2016		INUII	-
payment	Payment	Character	No	VI	Null	
E	information	Varying (20)			INUII	-
user_id	Identity number	Character	B031410056	FK	Not null	Owner
- Win	for owner	Varying (20)		ГК	Not null	Owner
vehicle_id	Identity number	Character	AGM 6728	FK	Not null	Vehicle
	for vehicle	Varying (20)	- G V		Not nun	Venicie
staff_id	Identity number	Character	ST01	FV	Not null	Staff
UNIVER	for staff	Varying (20)	AT SIA ME	FK		Stall

Table Name	Attribute Name	Description	Type / Size	Format	PK/ FK	Null/Not Null	Related Table
	vehicle_track_i d	Identity number for vehicle track	Character Varying (20)	VDT01	РК	Not null	-
	track_date	Date of track	Timestamp without time zone	13/05/2016		Null	-
vehicle_daily _track	track_time_out	Vehicle's time out	Timestamp without time zone	09:15	· ·	Null	-
	track_time_in	Vehicle's time in	Timestamp without time zone	AYSIA ME	وييونه LAK	Null	-
	registration_id	Identity number of registration	Character Varying (20)	REG01		Not null	Registratio n
	daily_track_id	Identity number of track	Character Varying (20)	DT01		Not null	Daily_trac k

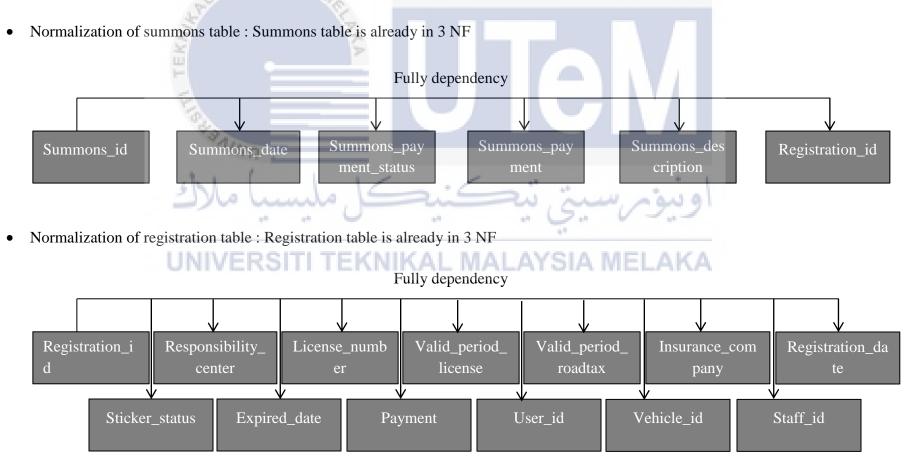
 Table 4.6 Data dictionary for vehicle_daily_track

Table Name	Attribute Name	Description	Type / Size	Format	PK/ FK	Null/Not Null	Related Table
	summons_id	Identity number	Character	SM01	PK	Not null	-
	S. T	of summons	Varying (20)		T IX	i tot nun	
	summons_date	Date Sof	Character	09/03/2016		Not null	-
	E C	summons	Varying (30)				
	summons_pay	Payment date of		12/03/2016		Null	-
summons	ment_date	summons	Varying (30)	20			
	summons_pay ment	Total payment of summons	Character Varying (30)	30		Not null	-
	summons_desc	Description of		Parking in a	- 0.0 0	1	
	iption	the summons	Varying (100)	prohibited place	5.0	Not null	-
	registration_id	Identity number	Character	REG01	LAK/	Not null	Registratio
		of registration	Varying (20)			1 tot null	n

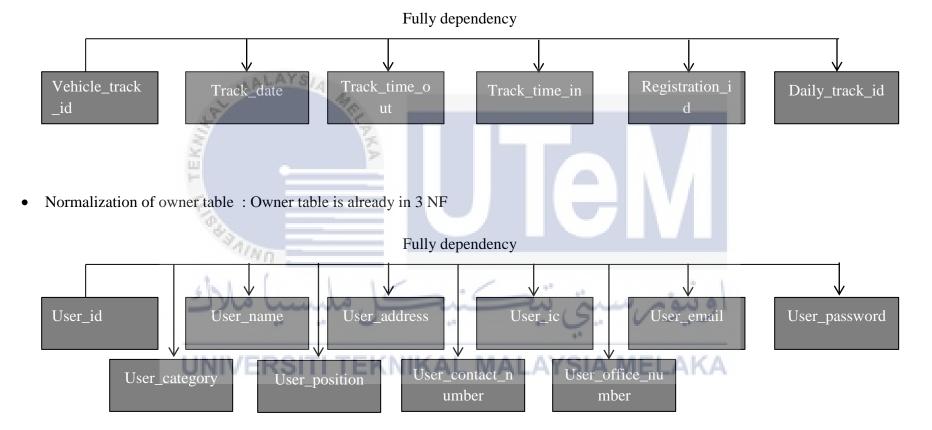
Table 4.7 Data dictionary for summons

4.5 Conceptual Design using Normalization

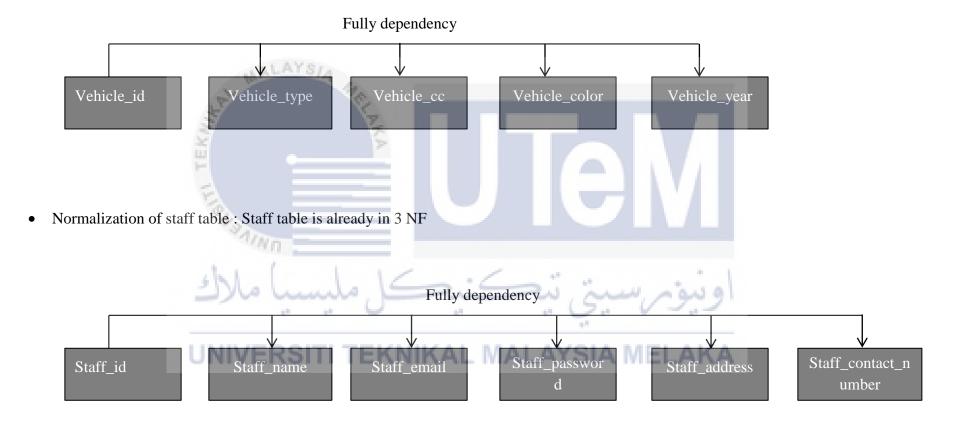
The conceptual design using normalization is displayed using relational schema. Each table shows attributes, primary key and foreign key.



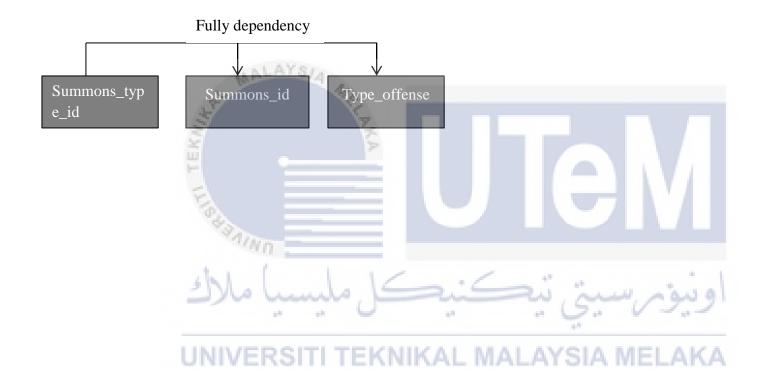
• Normalization of vehicle_daily_track table : Vehicle_daily_track table is already in 3 NF



• Normalization of vehicle table : Vehicle table is already in 3 NF



• Normalization of summos_type table : Summons_type table is already in 3 NF



4.5.1 Query Design

There are many query design that can be carried out to produce many different output. Each query is based on the requirement on user's need and it has its own reason and purpose. Table 8 shows the example of query design.

Type of Query	Query	Description
Simple SQL query Joint multiple table SQL query	<pre>Select * from summons; select r.registration_id, r.vehicle_id, r.user_id, r.valid_period_license, r.valid_period_roadtax from owner o, vehicle v, registration r where r.user_id= o.user_id AND r.vehicle_id = v.vehicle_id</pre>	View all data in summons table Join between owner, vehicle, registration to view the selected data that related each other
Subquery SQL	<pre>select daily_track_id from daily_track where daily_track_id = (select max(daily_track_id) from daily_track)</pre>	Select max daily track id first to select daily track id from daily track table if one user got more than one daily track id

Table 4.8 Example of Query Design

Aggregate query	SELECT v.vehicle_id,	Using of count to
	count(his.registration_id) AS	calculate total of
	total,	registration per
	<pre>date_part('day',</pre>	person
	track_time_in) as	
	<pre>day,date_part('month',</pre>	
	<pre>track_time_in) as month,</pre>	
	<pre>date_part('year',</pre>	
	track_time_in) as year	
	FROM	
	history_vehicle_daily_track	
	his, registration r, vehicle v	
Att Mar	WHERE his.registration_id	
line and the second sec	= r.registration_id AND	
T.	r.vehicle_id = v.vehicle_id AND	
11.81	operation ='UPDATE'	
" anine"	GROUP BY v.vehicle_id,	
able	his.registration_id,	Inite
2/4	date_part('day',	100
UNIVE	<pre>track_time_in), date_part('month',</pre>	AKA
	<pre>track_time_in),</pre>	
	<pre>date_part('year',</pre>	
	track_time_in)	
	ORDER BY	
	<pre>date_part('day',</pre>	
	<pre>track_time_in),</pre>	
	<pre>date_part('month',</pre>	
	<pre>track_time_in),</pre>	
	<pre>date_part('year',</pre>	
	track_time_in)	

4.6 Physical Design

Physical design consists of four categories which are selection of DBMS, trigger and stored procedure.

4.6.1 Selection of DBMS

Database is used primarily for data storage and retrieval. It handles a large amount of data and the data itself need to be retrieved and updated frequently. Database also allows orderly data storage, rapid data analysis and complex data analysis. Most databases like MySQL, SQL Server, PostgreSQL and Oracle 10g has been review one by one. Through the review process, some information about databases has gain like description of each of them, when it is useful and the benefits when use it. For this project, the most suitable is PostgreSQL based on a number of factors and specific reasons which mention in paragraph below.

PostgreSQL is open source software. The priority for this software is data integrity and reliability. As this project is using Windows, PostgreSQL also support this operating system. It supports highly performance and even on complex queries. In term of data storage, PostgreSQL provides many different data types for managing data beyond the basic Numeric, Text and Data types.

push, marg

4.6.2 Trigger

There are some types of trigger that can be implemented in this system and it gives different meaning and process.

4.6.2.1 Trigger Before

No	Function WALAYSIA	Trigger	Description
1	CREATE OR REPLACE FUNCTION	CREATE TRIGGER	To produce a
	<pre>staff_id()</pre>	staff_id_trigger	primary key start
	RETURNS trigger AS	BEFORE INSERT ON	with character for
	\$BODY\$DECLARE	staff	table staff
	ID int; BEGIN Alter Select	FOR EACH ROW EXECUTE PROCEDURE	
	<pre>NEXTVAL('staff_id_seq') into ID;</pre>	staff_id() MALAYSIA MELAKA	а В
	NEW.staff_id := ('S00'		
	ID);		
	RETURN NEW;		
	END;		
	\$BODY\$		
	LANGUAGE plpgsql VOLATILE		
	COST 100;		

Table 4.9 Example of Trigger Before

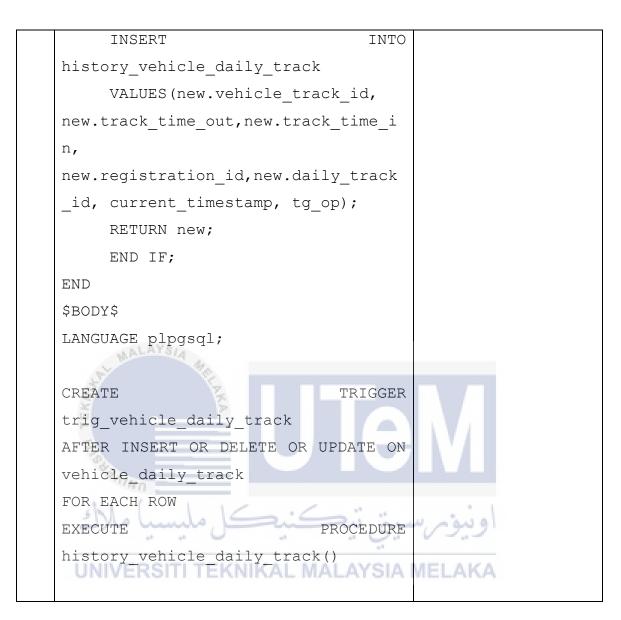
2	create function	create trigger	To produce o
2			_
	daily_track_id() RETURNS	_	primary key start
	trigger AS \$ daily_track		with character for
	_id_TRIGGER	BEFORE INSERT ON	table daily_track
	\$DECLARE	daily_track	
	ID int;	FOR EACH ROW	
	BEGIN select	EXECUTE PROCEDURE	
	<pre>NEXTVAL(daily_track _seq')</pre>	<pre>daily_track _id ();</pre>	
	into ID; NEW. daily_track		
	_id := ('DTO' ID);		
	RETURN NEW;		
	END;		
	<pre>\$ daily_track _id_TRIGGER\$</pre>		
	LANGUAGE plpgsql;		
3	create function	create trigger	To produce a
	registration_id() RETURNS	registration	primary key start
	trigger AS \$ registration	_id_TRIGGER	with character for
	_id_TRIGGER	BEFORE INSERT ON	table registration
	\$DECLARE	registration	
	ID int;	FOR EACH ROW	
	BEGIN select	EXECUTE PROCEDURE	
	NEXTVAL(registration _seq')	registration _id	
	into ID; NEW. registration	();	
	_id := ('REG0' ID);		
	RETURN NEW;		
	END;		
	<pre>\$ registration _id_TRIGGER\$</pre>		
	LANGUAGE plpgsql;		
			l]

4	create function	create trigger	To produce a
	<pre>vehicle_daily_track_id()</pre>	vehicle_daily_track	_
	RETURNS trigger AS \$		with character for
	vehicle daily track	– – BEFORE INSERT ON	
	id TRIGGER	vehicle_daily_track	vehicle daily track
	\$DECLARE	FOR EACH ROW	
	ID int;	EXECUTE PROCEDURE	
	BEGIN select	vehicle_daily_track	
	NEXTVAL(vehicle_daily_track	_id ();	
	_seq') into ID;		
	NEW. vehicle_daily_track		
	_id := ('VDT0' ID);		
	RETURN NEW;		
	END;		
	<pre>\$ vehicle_daily_track</pre>		
	_id_TRIGGER\$ LANGUAGE		
	plpgsql;	/	
	نيكل مليسيا ملاك	وىيۆمرسىيتى ىيك	
5	UNIVERSITI TEKNIKAL	MALAYSIA MELAKA	To produce a
Č	summons type id() RETURNS		primary key start
	trigger AS \$	TRIGGER	with character for
	summons_type_id _TRIGGER	- BEFORE INSERT ON	table
	\$DECLARE	summons type	summons_type
	ID int;	FOR EACH ROW	
	BEGIN select	EXECUTE PROCEDURE	
	NEXTVAL(summons_type _seq')	<pre>summons_type_id ();</pre>	
	into ID; NEW.		
	<pre>summons_type_id:= ('SUMTY0'</pre>		
	ID);		

	RETURN NEW;		
	END;		
	<pre>\$ summons _id_TRIGGER\$</pre>		
	LANGUAGE plpgsql;		
6	create function	create trigger	To produce a
	summons_id() RETURNS	summons _id_TRIGGER	primary key start
	trigger AS \$ summons	BEFORE INSERT ON	with character for
	_id_TRIGGER	summons	table summons
	\$DECLARE	FOR EACH ROW	
	ID int;	EXECUTE PROCEDURE	
	BEGIN select	summons _id ();	
	NEXTVAL(summons _seq') into		
	ID; NEW. summons _id :=		
	('SM0') ID);		
	RETURN NEW;		
	END;	/	
	<pre>\$ summons _id_TRIGGER\$</pre>	وىيۇمرسىتى يېڭ	
	LANGUAGE plpgsql;	MALAYSIA MELAKA	

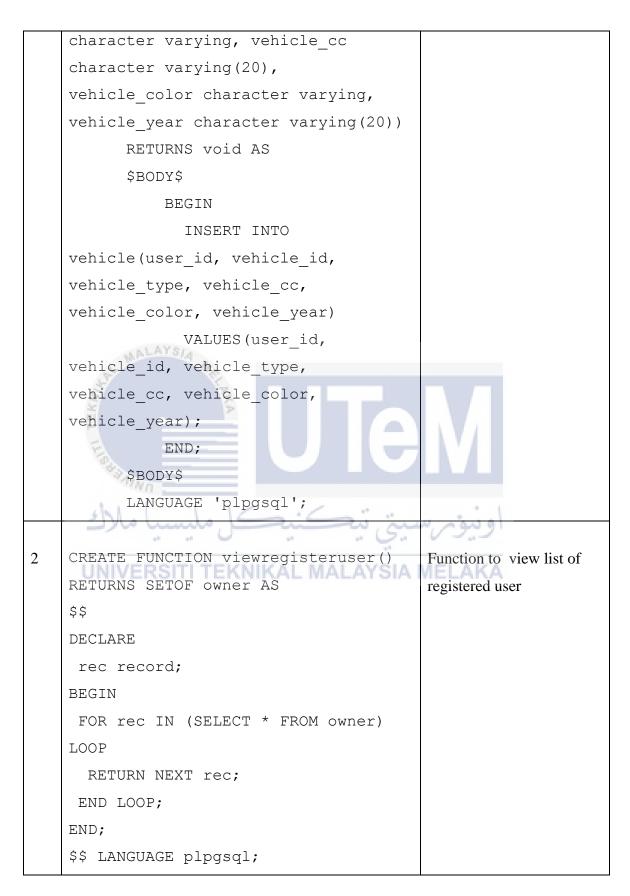
```
1
    CREATE
               OR
                      REPLACE
                                   FUNCTION
                                              A trigger to insert, delete
    history vehicle daily track()
                                              and update any data into
    RETURNS trigger AS
                                              table
    $BODY$
                                              history_vehicle_daily_trac
    BEGIN
                                              k. Any new data, updated
          IF tg op = 'DELETE' THEN
                                              data or deleted data will be
          INSERT
                                        INTO
                                              recorded
                                                               into
    history vehicle daily track
                                              history_vehicle_daily_trac
         VALUES (old. vehicle track id,
                                              k table.
    old.track time out,old.track time i
    n,
    old.registration id, old.daily track
     id, current timestamp, tg_op);
         RETURN old;
     UNIENDRIF;TI TEKNIKAL MALAYSIA
          IF tg op = 'INSERT' THEN
          INSERT
                                        INTO
    history vehicle daily track
         VALUES (new.vehicle track id,
    new.track time out, new.track time i
    n,
    new.registration id, new.daily track
    id, current timestamp, tg op);
         RETURN new;
         END IF;
          IF tg op = 'UPDATE' THEN
```

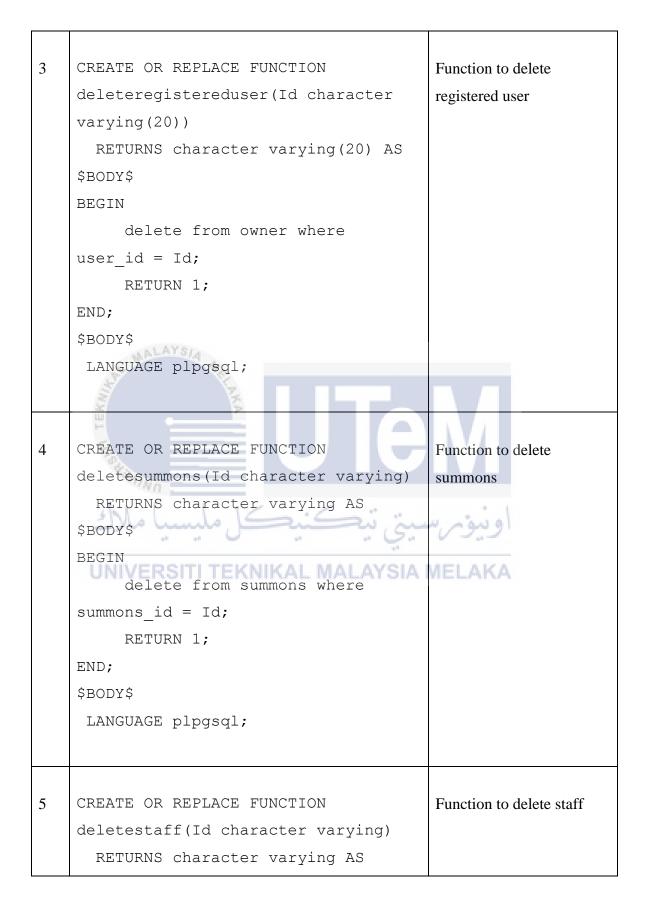
 Table 4.10 Example of Trigger After Insert, Delete and Update



4.6.3 Stored Procedure / Function

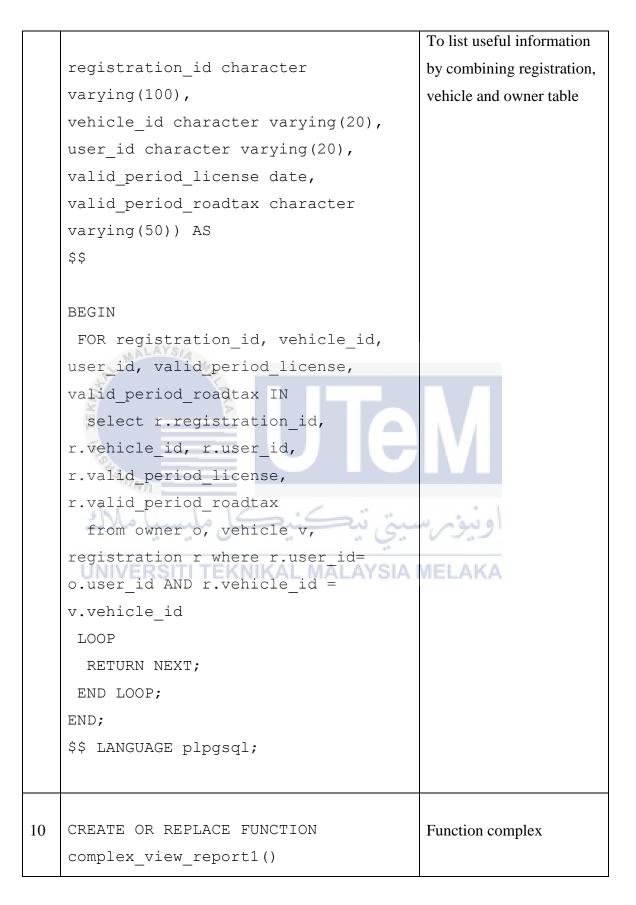
1	CREATE OR REPLACE FUNCTION	Function to view list of	
	Insert_register_vehicle(user_id	vehicle	
	character varying, vehicle_id		
	character varying(20), vehicle_type		





<pre>\$BODY\$ BEGIN delete from staff where staff_id = Id; RETURN 1; END; \$BODY\$ LANGUAGE plpgsql;</pre>	
<pre>delete from staff where staff_id = Id; RETURN 1; END; \$BODY\$</pre>	
<pre>staff_id = Id;</pre>	
RETURN 1; END; \$BODY\$	2
END; \$BODY\$	2
\$BODY\$	2
LANGUAGE PIPGSQI;	2
	ð
	e.
6 CREATE OR REPLACE FUNCTION Function to delete vehicle	0
deletevehicle (Id character varying)	
RETURNS character varying AS	
\$BODY\$	
BEGIN	
delete from registration where	
registration id = Id;	
RETURN 1;	
اونور سيخ تكنك ملسبا ملا	
\$BODY\$	
UNIVERSITI TEKNIKAL MALAYSIA MELAKA LANGUAGE plpgsql;	
7 CREATE OR REPLACE FUNCTION Function to delete user	
deletelogin(Id character varying) from login verify table	
RETURNS character varying AS	
\$BODY\$	
BEGIN	
delete from verify_login where	
user_id = Id;	
RETURN 1;	

	END;	
	\$BODY\$	
	LANGUAGE plpgsql;	
8	CREATE OR REPLACE FUNCTION	Function to update
	updateregistereduser(id character	registered user
	varying(20), address character	
	varying(100), jawatan character	
	varying(30), contactno character	
	varying(20), schoolno character	
	varying(30))	
	A BALATSIA 40	
	RETURNS void AS	
	\$BODY\$	
	BEGIN	
	update owner	
	set	
	user_address = address,	اويىۋىرىم
	user_position = jawatan; UNIVERSITITEKNIKAL MALAYSIAI user_contact_number =	MELAKA
	contactno,	
	user_school_number =	
	schoolno	
	<pre>where user_id = id;</pre>	
	END; \$BODY\$	
	LANGUAGE plpgsql;	
9	CREATE OR REPLACE FUNCTION	Function to joint at least
	viewownervehicle()	two tables
	RETURNS TABLE (
L	1	1



```
RETURNS TABLE (vehicle id character
                                       To shows how many time
varying(100), total character
                                       every vehicle move into
varying(40),
                                       UTeM and its information
day character varying (100), month
character varying(40), year
character varying(40)) AS
$$
BEGIN
FOR vehicle id, total, day, month,
vear IN
     SELECT v.vehicle id,
count (his.registration id) AS
total,
     date part('day',
track time in) as
day, date part ('month',
track time in) as month,
  date part('year',
track time in) as year
 UNIVERSITI TEKNIKAL MAL
                                  SIA
history vehicle daily track his,
registration r, vehicle v
     WHERE his.registration id =
r.registration id AND r.vehicle id
= v.vehicle id AND operation
='UPDATE'
     GROUP BY v.vehicle id,
his.registration id,
     date part('day',
track time in),
```

<pre>date_part('month',</pre>	
<pre>track_time_in),</pre>	
<pre>date_part('year',</pre>	
track_time_in)	
LOOP	
RETURN NEXT;	
END LOOP;	
END;	
\$\$ LANGUAGE plpgsql;	



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

4.7 Graphical User Interface (GUI) Design

Graphical user interface is an interface that allow user to interact with it. User will key in information as an input into the system throughout the form on interface. The objectives of user interface are to get input from user and save it into database and to display output or any query based on user requirement.

The main interface for this system is account registration, login, user profile, vehicle registration, car daily track and summons. Both staff and owner can view all the interfaces but owner has some limitation on management of it.

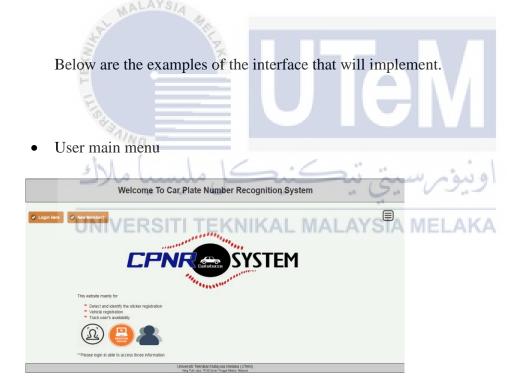


Figure 4.3 Web Interface for Main Menu

• User registration form

Create an account	
I/C or Passport Number	1
Name	
Address	
Matric or Staff Number	
Email	
Student	•
Position	
Contact Number	1
Office Number	
Password (at least > 6)	
Confirm Password	1
 User login form Welcome to CPNR Data 	اونيۈمرسىتى تېكن <mark>ى tabase</mark>
System	
UNIVERSITI TE	KNIKAL MALAYSIA MELAKA
User password	
Log in	
[Forgot]	Password?]

Figure 4.5 Web Interface for Login

• Admin site: User Profile



Figure 4.6 Web Interface for Admin - User Profile



Figure 4.7 Web Interface for Admin - Upload Photo

• Admin site: Update Profile

CPNR	SYSTEM	Welcome ZHAFRAN AZKA BIN MOHD AZWAN Redirect to Vehicle In Vehicle Out Import File
HOME	[Back]	
- HOPIE	Staff id : S003	
STAFF	Name	
	ZHAFRAN AZKA BIN MOHD AZWAN	
VEHICLE	Address	
	NO 9 JALAN 17 BUKIT KATIL 2300 MELAKA	
USERS		
SUMMONS	Email Address	
	Zhafran@utem.edu.my Contact Number	
REPORTS	0197612222	
	ALAYS/A	
	Update	
S	10	
Element 1 9 Wa	h Interfore for Admin Unde	to Duofilo
Figure 4.8 we	b Interface for Admin - Upda	ate Profile
F		
F		
PA		
• Admin site:	List of staff	
in the second		
		ويور سيد ب
and the second		HAFRAN AZKA BIN MOHD AZWAN Vehicle In Vehicle Out Import File
UNIV	ERSITI TEKNIKAL M	ALATSIA MELAKA
HOME	List of Staff _{Staff Registration}	
	Total staff is: 7	
STAFF	NO Staff NAME EMAIL ADDRESS CONT	TACT # PICTURE
VEHICLE	ZHAFRAN NO.0 IAI AN 17	
VEITICHE	1 S003 AZKA BIN MOHD zhafran@utem.edu.my BUKIT KATIL 2300 MELAKA	512222 🗱 🧭
USERS		Upload Photo
SUMMONS	No 33 Jalan MJ 11 Taman Murai 2 Soog bin Mohd amin@utem.edu.my Jaya 76100 01995	934712 😪 🖊
	Aiman Durian Tunggal Melaka	
REPORTS		Upload Photo
	No 79 Jalan DI 17 Muhammad Taman Desa	
	3 Soo4 Haikal bin Baharum haikal@utem.edu.my Idaman Durian 01790 Melaka Melaka	511404
	PACINING PACING	Upload Photo

Figure 4.9 Web Interface for Admin - List of Staff

• Admin site: Registration form for staff

		2.0	
LPNR	SYSTEM		
Contraction of the second	Abbres a second	Welcome ZHAFRAN AZKA BIN MOHD AZWAN Redirect to Vehicle In Vehicle Out Import File	
HOME	List of Staff Staff Registration		
	Name		
 STAFF 			
	Email		
VEHICLE	Eg: name@utem.edu.my Address		
LIGING			
USERS	Contact Number		
CI DADAONIC	Eg: 0198922212		
SUMMONS	Password		
REPORTS			
KEPOK15	Confirm Password		
	Create Account Clear		
	MALMISIA		
S.			
Figure 4.10 V	Veb Interface for Adr	nin - Staff Registration	
	5		
<u> </u>	-		
E			
• Admin si	te: List of registered ve	chicle	
	1/WD		
	and the second s	/	
CPNR	- SYSTEM	2	او يوم ;
111	an estimate and the second	Welcome ZHAFRAN AZKA BIN MOHD AZWAN	1 - 4 -
	PENNE MARKET	Redirect to Vehicle In Vehicle Out Import File	
HOME	Import CSV File	Export as CSV File ALAYSIA M	ELAKA
HOPIL	Choose File No file chosen Import File	Export File	
STAFF			
onar	Total registration is: 11		
•VEHICLE	NO PLATE # OWNER VALL ID LI	D FERIOD VALID PERIOD CENSE ROADTAX	
		16-08-19 2016-09-30 🗱 🗸 🔤	
USERS		15-03-05 2015-10-16 🀱 🧹 💁	
		13-10-09 2014-03-06 🕷 🗸 📆	
SUMMONS		17-05-02 2016-12-12 😂 🦯 😎	
		17-09-17 2017-04-25 🗱 🧹 📆	
REPORTS		17-12-15 2016-07-22 🗱 🗸 🔤	
		16-05-27 2016-05-27 🗱 🗸 🔜 17-01-10 2016-11-10 😂 🗸 💽	
		17-01-10 2016-11-10 • 2016-11-10 17-02-10 2016-10-26 · 2016-10-26	
		15-12-31 2016-02-25 🗱 🦯 🍕	

Figure 4.11 Web Interface for Admin - List of Registered Vehicle

CPNR 20 SYSTEM Welcome ZHAFRAN AZKA BIN MOHD AZWAN Redirect to Vehicle In | Vehicle Out| Import File Sticker Registration | Owner Details | Vehicle Details HOME STAFF •VEHICLE Registration : REG017 Registration ID USERS Responsibility Center : FKM License Number : dasd SUMMONS Valid Period License : 2016-08-19 Valid Period Roadtay : 2016-09-30 REPORTS Insurance Company : dasd Registration Date : 2016-08-01 Sticker Expired Date : 2017-08-01 MALAYSIA





Figure 4.13 Web Interface for Admin - More Information on Registered User II

• Admin site: More Information on Registered Vehicle



Figure 4.14 Web Interface for Admin - More Information on Registered User III

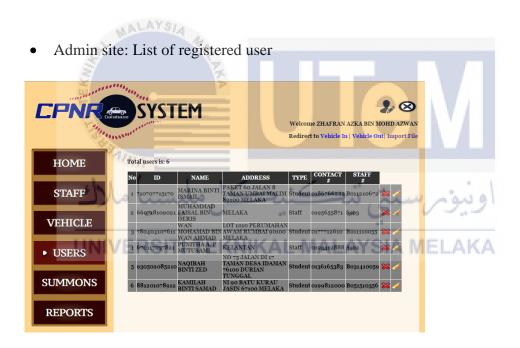


Figure 4.15 Web Interface for Admin - List of Registered User

• Admin site: List of summons history

Welcome ZHAFRAN AZKA BIN MOHD AZWAN Redirect to Vehicle In Vehicle Out Import File				
HOME	Summons History _{Su}	mmons Form		
STAFF		E OFFENSE PLATE # MCD 6736	TYPE OF OFFENSE PAT Click Here	PAID 🗱
VEHICLE	2 2016-08-12 FTMK 3 2016-08-12 BULAT	WHV 1010 AN LIBRARY CCD 1100	Click Here	PAID SS
USERS	4 2016-08-12 CAFE : 5 2016-05-28 FKE	PHP 8910	Click Here	PAID XX
SUMMONS	6 2016-08-12 CAFE 1 7 2016-08-12 CANSE 8 2016-08-12 CAFE 1	ELORI PHP 4044	Click Here	PAID 🗱
REPORTS				

Figure 4.16 Web Interface for Admin - List of Summons History

Admin site	e: Summons form		
E			
	····		
CPNR	SYSTEM	20	8
<u>الالار</u>	کل ملیستا ہ	Welcome ZHAFRAN AZKA BIN MOHD A Redirect to Vehicle In Vehicle Out Impo	
HOME	Summons History Summons Form	a a Qa	02.2
STAFF	Date : 12 Aug 2016 Plate Number	KAL MALAYSIA I	MELAKA
MELLICIE	Ex: AGM 6728		
VEHICLE	Place of Offense		
USERS	Type of offense		
SUMMONS REPORTS	 Laid in the prohibition place Putting of parcel/yellow parcel Blocking the path No driving license / expired License (L) carry a pillion No valid readtax / expired No sticker Reddees driving 		
	Submit Clear		

Figure 4.17 Web Interface for Admin - Summons Form

• Admin site: Report of user login

	SYSTEM & S
	Welcome ZHAFRAN AZKA BIN MOHD AZWAN
1100 000 C	Redirect to Vehicle In Vehicle Out Import File
HOME	Login Information List of Reports
STAFF	NO USER ID LEVEL TYPE 1 930502085210 1 Owner #
VEHICLE	2 670117037821 1 Owner ** 3 660718109021 1 Owner ** 4 881201078912 1 Owner **
USERS	5 780404107611 1 Owner 🗱 6 710707715170 1 Owner 🗱
SUMMONS	7 S009 2 staff 🗱 8 S004 2 staff 🗱
•REPORTS	9 S003 2 staff 10 S006 2 staff 11 S003 2 staff 32
	12 S007 2 staff 🗱
	sa Soo8 ₂ staff 🏁
2	eb Interface for Admin - Report of User Login
TEK	
• Admin site	e: Report of number of entrance per person in UTeM
	linin
CPNR	SYSTEM Welcome ZHAFRAN AZKA BIN MOHD AZWAN Redirect to Vehicle Int / Vehicle Ont/ Import File
HOME NIV	Togin Information List of Reports IKAL MALAYSIA MELAKA
STAFF	Click any to view report : 1. Report 1 - User entrance by person 2. Report 2 - Stummons per owner 3. Report 3 - Sticker Registration
VEHICLE	4. Report 4 - License Information
USERS	Total owner in and out based on vehicle NO PLATENUMBER TOTAL ENTRANCE DATE 1 AGM 6728 1 5-8-2016
SUMMONS	2 CCD 1100 1 7-8-2016 3 JFK 8712 1 7-8-2016
	4 WBU 8911 1 7-8-2016
•REPORTS	5 WHV 1010 2 7-8-2016 6 CCD 1100 15 26-5-2016
	7 PHP 8910 2 26-5-2016
	8 CCD 1100 9 28-5-2016 PHP 8910 5 28-5-2016
	9 PHP 8910 5 28-5-2016

Figure 4.19 Web Interface for Admin - Report of Number User Entrance

- 2, 😣 **CPNR** SYSTEM Welcome ZHAFRAN AZKA BIN MOHD AZWAN Redirect to Vehicle In | Vehicle Out| Import File HOME Login Information | List of Reports Click any to view report : STAFF 1. Report 1 - User entrance by person 2. Report 2 - Summons per owner 3. Report 3 - Sticker Registration 4. Report 4 - License Information VEHICLE Summons per persons Year 2016 • Month All month • Display USERS PLATE NUMBER SUMMONS DATE TOTAL SUMMONS MCD 6736 2016-08-12 SUMMONS 1 WHV 1010 2016-08-12 1 CCD 1100 2016-08-12 1 REPORTS PHP 8910 2016-08-12 1 PHP 8010 2016-05-28 1 JFK 8712 2016-08-12 1 PHP 4044 2016-08-12 1 LAYSIA
- Admin site: Report of number of summons per person

Figure 4.20 Web Interface for Admin - Report of Number of Summons

• Admin site: Report of owner's valid period license information

CPNR SYSTEM Welcome ZHAFRAN AZKA BIN MÖHD AZWAN Redirect to Vehicle out i Import File	نبوبه
HOME Login Information List of Reports	4.
STAFF NI V Click any to yiew report	LAK
VEHICLE 3. Report 3 - Sticker Registration 4. Report 3 - Licker Registration Owner's Valid Period License Information	
USERS From Date To Date Search	
Plate Valid Period Responsibility User ID Number License Conter	
Plate Number Valid Period License Responsibility Center User ID SUMMONS PHP 80:0 2017-12-45 FTT 670117037821	
SUMMONIS Number License Center	
SUMMONS Number Liceuse Center Center HIP 800 2007-09-17 CANSELORI 78040407011 HIP 2017-09-17 CANSELORI 78040407011 HIP 2017-09-00 HIP WF 8804078011	
Number License Center PHP 8910 2017-12-15 FPT 670117037821 JLT 8900 2017-09-17 CANSELORI 780404107611	
Number Liceuse Center PHP 8910 2017/12-15 FPTT 670117037821 JLT 8900 2017/02-15 FPTT 670117037821 JLT 8900 2017/02-15 PHP 4044 2017/02-02 FKEKK 881201078912 801201078912	
Number License Center SUMMONS Number Center FIP 800 2007-92-45 FIT JLT 8000 2017-99-17 CANSELORI PREPORTS PHP 8044 2017-05-02 MCD 6736 2017-02-02 CANSELORI SUMMONS MCD 6736 2017-02-02	
SUMMONS Number License Center PHIP 8910 2017/42.45 FPT 670117037821 JLT 8900 2017/42.45 FPT 670117037821 PREPORTS PHP 4044 2017/02.02 FKEKK 88120078912 MUD 6736 2017/02.02 FKEKK 88120078912 MD 6736 JK 5511 2017/02.02 FKEKK 660718109021 MD 6736	
Number License Center • Center Center Center • FIF 80:0 2007-92-3 FIT 67017037821 • JLT 80:0 2007-90-07 CANSELORI 78404107611 • PHP 80:0 2007-90-02 FEEK 8812007/8912 • MCD 67:56 2007-00-10 CANSELORI 66071809021 • BK 5311 2007-00-10 CANSELORI 66071809021 • AGM 67:8 2007-00-10 FTMK 6701017037821	

Figure 4.21 Web Interface for Admin - Report of Valid Period License

• Admin site: Report on Number of Sticker Registration

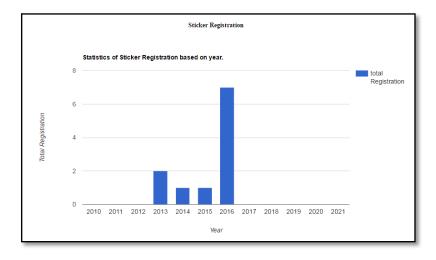


Figure 4.22 Web Interface for Admin - Report of Number of Sticker Registration

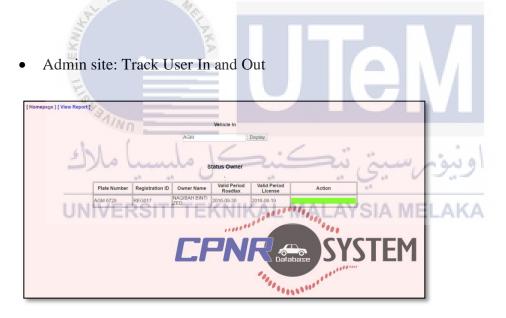


Figure 4.23 Web Interface for Admin - Track User Entrance I

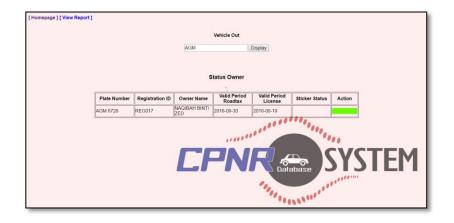


Figure 4.24 Web Interface for Admin - Track User Entrance II

	LEK)	Daily Track Record	
	The second	Now Other Record	JEN
N0	PLATE NUMBER	TIME IN	TIME OUT
1	AGM 6728	2016-08-07 14:05:00	2016-08-08 13:04:00
2	MCD 6736	2016-08-07 17:30:00	2016-08-08 09:14:00
3	WBU 8911	2016-08-07 14:05:00	2016-08-08 13:04:00
4	JFK 8712	2016-08-07 17:30:00	2016-08-08 09:14:00
5	JJU 5612	2016-08-07 14:05:00	2016-08-08 13:04:00
6	PHP 4044	2016-08-07 17:30:00	2016-08-08 09:14:00
7	CCD 1100	2016-08-07 14:05:00	2016-08-08 13:04:00
8	BJK 5511	2016-08-07 17:30:00	2016-08-08 09:14:00

• Admin site: Record on daily entrance

Figure 4.25 Web Interface for Admin - Daily Track Record I

Other Track Record			
Now Other Record			
N0	PLATE NUMBER	TIME IN	TIME OUT
1	CCD 1100	2016-05-26 15:12:01.435	2016-05-26 15:12:35.439
2	CCD 1100	2016-05-26 15:17:43.091	2016-05-26 15:24:57.466
3	CCD 1100	2016-05-26 15:26:40.7	2016-05-26 15:27:00.323
4	CCD 1100	2016-05-26 15:29:01.621	2016-05-26 15:29:24.656
5	CCD 1100	2016-05-26 15:29:01.621	2016-05-26 15:29:51.311
6	CCD 1100	2016-05-26 15:32:14.28	2016-05-26 15:32:40.749
7	PHP 8910	2016-05-26 16:24:32.531	2016-05-26 16:26:42.577
8	CCD 1100	2016-05-26 16:26:00.299	2016-05-26 16:27:20.671
9	CCD 1100	2016-05-26 16:29:23.88	2016-05-26 16:30:32.723
10	PHP 8910	2016-05-26 16:29:42.465	2016-05-26 16:35:08.815

Figure 4.26 Web Interface for Admin - Daily Track Record II

MALAYSIA	
• Admin site: Import csv file that contain user entrance	
	V/
	1
Import Daily Track File	
C Open	
Coverage water γ (4) Search import ρ n extraction from file	
Organize New folder	
Terrores	1000
Downloads Downloads	- a
🖉 vehicleimport.stax 11/8/2816 1242 AM Microsoft 2016-08-08 13:04:00 AVAILABLE DTR0146	
2016-08-08 09:14:00 NOT AVAILABLE DTR0147 🚟	
	ΔΚΔ
8 Videos 2016-08-08 09:14:00 NOT AVAILABLE DTR0149 88	
að Homennum 🔹 👘 👘	
7 CCD 1100 2016-08-07 14:05:00 2016-08-08 13:04:00 NOT AVAILABLE DTR0152	
8 BJK 5511 2016-08-07 17:30:00 2016-08-08 09:14:00 NOT AVAILABLE DTR0153	

Figure 4.27 Web Interface for Admin - Import CSV File

• Owner site: Owner Profile Details

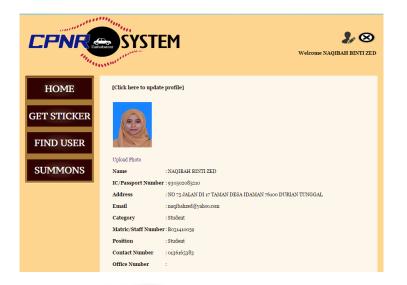


Figure 4.28 Web Interface for User - Profile Details

TEKNING TEKNING	M
Owner site: Update Profile	7 I V I
and the state of the	
SYSTEM SYSTEM HOME I Back 1	اونيۆمرسى
GET STICKER	A MELAKA
FIND USER Address No 75 Jackin DE 17 TAWAN DESA TEANWAY 75580 DURLINI TUNGGAL SUMMONS	
Email Address	
maqbahazo@yahoo.com	
Category * Student © Staff © Others	
Matric/Staff Number	
8031410059	
Position	
Budent Contact Number	
D136165383	
Office Number	
Gree Information	

Figure 4.29 Web Interface for User - Update Profile

• Owner site: Upload Photo



Figure 4.30 Web Interface for User - Upload Photo



Figure 4.31 Web Interface for User - List of Sticker Registration

• Owner site: Vehicle registration form I

CPNR	Welcome NAQIBAH BINTI ZED	
HOME GET STICKER FIND USER SUMMONS	Registration Information Form - Vehicle Registration Igen 19 939502083210 Please select vehicle type Please select vehicle type Please select vehicle type Please select vehicle type Please select vehicle type Please select vehicle type Please select vehicle type Please select vehicle type Please select vehicle type Please select vehicle type Please select vehicle type Please select vehicle type Please select vehicle type Please select vehicle type Please select vehicle type Please select vehicle type Please select vehicle type Please select vehicle type Please select vehicle type Please type type type type type type type typ	
T ITING	Veb Interface for User - Vehicle Registration Form I e: Vehicle registration form II	
	SYSTEM SYSTEM Welcome NAQUEAH BINTI ZED WEICOME NAQUEAH BINTI ZED	
HOME GET STICKER FIND USER SUMMONS	Registration Information Form - Vehicle Registration User ID ::930502085210 Sticker Expired Date ::Aug 2017 Registration Date ::12 Aug 2016 Plate Number: . Choose your whide . Responsibility center . Hease select responsibility center . License Number: .	
	Valid Period License dd/m/yyyy Valid Period Roadtax dd/m/yyyy Insurance Company Eg Aliance Register Stoker	

Figure 4.33 Web Interface for User - Vehicle Registration Form II

• Owner site: Find user page



Figure 4.34 Web Interface for User - Find User



Figure 4.35 Web Interface for User - Summons Information I

• Owner site: Owner summons information II

HOME	[Back]
GET STICKER	Summons Information for Vehicle Number: CCD 1100 No DATE SUMMONS ID TYPE OF OFFENSE
FIND USER	1 2016-08-12 SM031 Laid in the prohibition place
SUMMONS	

Figure 4.36 Web Interface for User - Summons Information II



The design phase is one of the key elements to the project. Without a detailed design, the system cannot be constructed, implemented or operated. Based on the physical and logical design that has been providing in this document, the structure of the database has been created within specific modules that will develop using PostgreSQL. The overall view of conceptual design shows the relationship for each entity that depending with each other. Thus, for the next chapter will discuss on implementations for the database and system that can be support the proposed objectives.

CHAPTER V



5.1 Introduction

The implementation phase concerns about describing how the information system will be deployed as an operational system. This phase includes efforts required to implement, identified and resolve system problems and plan for sustainment. The activities comprised in the framework implementation are system coding and debugging.

This chapter is an assurance that the system is developed to meet all the prerequisites that have been set out in the last chapter. The system will be produced stage by stage according to the requirements of module.

The main objective of this implementation phase is to define all planned activities in order to ensure successful implementation to production operations within of the requirements and duration of time.

5.2 Software Development Environment Setup

Software development environment should be set up before the system is developed. It enables to write programs for a particular language or platform. Management system for CPNR database system is a web based. The system and the database organization will be presented in the system which will be the essential access point.

The web server used is Wamp Server while PHP is the language to write software and Windows is a platform where the environment begins to set up. PostgreSQL connector integrates between information that is inserted through interface and the PostgreSQL database. Figure 5.2 shows the system framework for CPNR database system.

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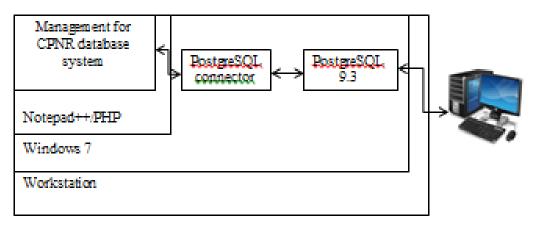


Figure 5.1 System Framework for CPNR Database System

There are several steps in order to install PostgreSQL in Windows Platform successfully.

• Installation of Web Server

Step 1: Downloading WampServer from the available free software

Step 2: Installing WampServer in the computer

- 2.1 Open the WampServer folder and double click on the installer file
- 2.2 Click **run** to start the installation process

2.3 Setup – WampServer 2 screen will appear. Click Next button to continue

😡 Setup - Wa	mpServer 2			
Powe Alter The F Open Service	Server red by Way RS rench Source Provider .alterway.fr : 2.4.2 : 5.5.24 : 5.5.24 : 5.4.3 : 3.5.1 : 1.3.3 : 2.2.0	Welcome to the WampSer Setup Wizard This will install WampServer 2.2 on your comp It is recommended that you dose all other app continuing. Click Next to continue, or Cancel to exit Setup	uter. Dications before	اونيوم ELAKA
		Next >	Cancel	

2.4 License Agreement screen will appear. Tick on the **I accept the agreement** and click **Next** button

🐻 Setup - WampServer 2	J
License Agreement Please read the following important information before continuing.	
Please read the following License Agreement. You must accept the terms of this agreement before continuing with the installation.	
** WampServer	
by Creator : Romain Bourdon Maintainer / Upgrade/Roadmap : Herve Leclerc - herve.leclerc@alterway.fr GNU GENERAL PUBLIC LICENSE	
Version 2, June 1991	
Copyright (C) 1989, 1991 Free Software Foundation, Inc.	
 I do not accept the agreement 	
< Back Next > Cancel	
Short MALAYSIA ANE	
2.5 Select Destination Location screen will appear.	Choose the
WampServer and click Next button	111
Setup - WampServer 2	
Select Destination Location Where should WampServer 2 be installed?	ونيونر

location for

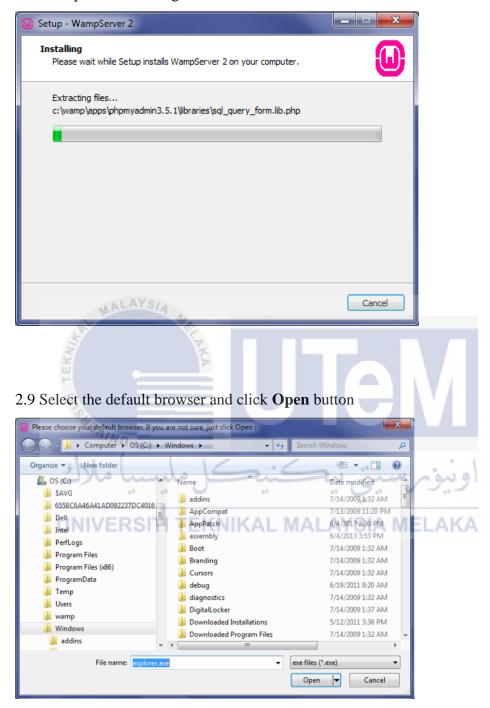
Setup - WampServer 2	
Select Destination Location Where should WampServer 2 be installed?	اونيۈس
Setup will install WampServer 2 into the following folder. MALAYSIA	IELAKA
To continue, click Next. If you would like to select a different folder, click Browse.	
c:\wamp Browse	
At least 258.7 MB of free disk space is required.	
< Back Next > Cancel	

2.6 Select Additional Tasks screen will appear. Select either one of the option and click Next button

Setup - WampServer 2
Select Additional Tasks Which additional tasks should be performed?
Select the additional tasks you would like Setup to perform while installing WampServer 2, then dick Next.
Additional icons:
Create a Quick Launch icon
Create a Desktop icon
< Back Next > Cancel

2.7 Ready to Install screen will appear. Click **Install** button to continue installation

Setup WampServer 2 Ready to Install Setup is now ready to begin installing WampServer 2 on your computer.	M
Click Install to continue with the installation, or click Back if you want to review or change any settings. Destination location:	ونيومر
UNIVERSITI TEKNIKAL MALAYSIA I	IELAKA
< Back Install Cancel	



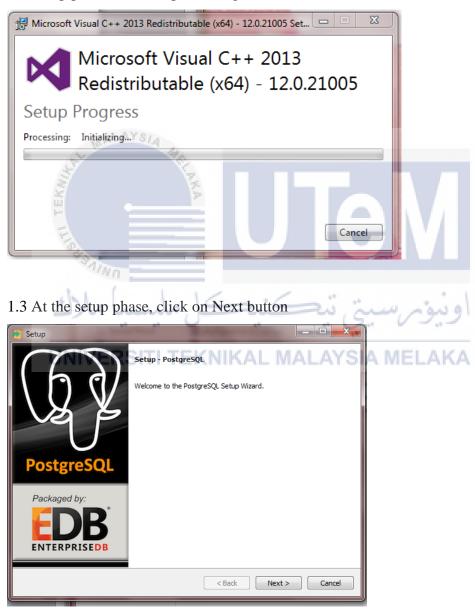
2.10 Then, setup screen will appear

Setup - WampServer 2		
Installing Please wait while Setup in	stalls WampServer 2 on your computer.	ω
Finishing installation		
MALAY	e .	Cancel
MALA	*14 478	
AT TEKUNA		TeM
2.11 Finally, the inst	allation has complete	
Setup - WampServer 2		×
O	Completing the Wamp Setup Wizard	ويوم سية Server
WampServer	Setup has finished installing WampServe The application may be launched by sele icons.	r 2 on your computer. MELAKA
Powered by Alter Way	Click Finish to exit Setup.	
The French Open Source	Launch WampServer 2 now	
Service Provider http://www.alterway.fr		
Apache : 2.4.2 MySQL : 5.5.24 PHP : 5.4.3		
PHPMyAdmin : 3.5.1 SqlBuddy : 1.3.3 XDebug : 2.2.0		
	< Back Finis	sh

• Installation of PostgreSQL

Step 1: Install PostgreSQL, GUI Administration and PHP Based Web Application Site

- 1.1 Double click on the installer icon
- 1.2 Setup process will be processing



1.4 Choose the installation directory

Setup	
Installation Directory	1
Please specify the directory where PostgreSQL will be installed.	
Installation Directory C: \Program Files\PostgreSQL \9.4	
InstallBuilder	Cancel
Look Next	
Browse For Folder	
Select a Directory	
shi 1.16.	
Naqiba_Toshiba	ويور شبق
Computer	SIA MELAKA
🛃 d39974917feea24dd72c6440	
PerfLogs	
Program Files	
Program Files (x86)	
D D TC	3
D D D temp	
Make New Folder OK Cancel	

🛐 Setup		_ _ ×
Installation Direct	ory	
Please specify the dir	ectory where PostgreSQL will be installed.	
Installation Directory	C:\wamp\apps	
InstallBuilder	< Back Next >	Cancel

MALAYSIA

1.5 Continue installation by click on Next button

Setup Data Directory Please select a directory under whi	ch to store your data.			M
Data Directory C:\wamp\apps\dat	a 🔊			
سيا ملاك	یکل ملیہ	، تيڪ	سيتي	ونيوبر
LINIVEDS	TI TEKNIKA	MALAV	CIA M	
InstallBuilder	< Back		Cancel	ELANA

- 1.6 User need to set the login password for the root user postgres
- 1.7 Continue installation by click on Next button

🛐 Setup					. 🗆 🗙
Password					
Please provide a p	assword for the database	superuser (post	gres).		
Password	••••				
Retype password	••••				
TastallD. (Jaar					
InstallBuilder			< Back	Next >	Cancel
	AVEL				

1.8 Then, port number screen will be displayed. Set the port number and make sure it does not conflict with the MySQL port 3306.

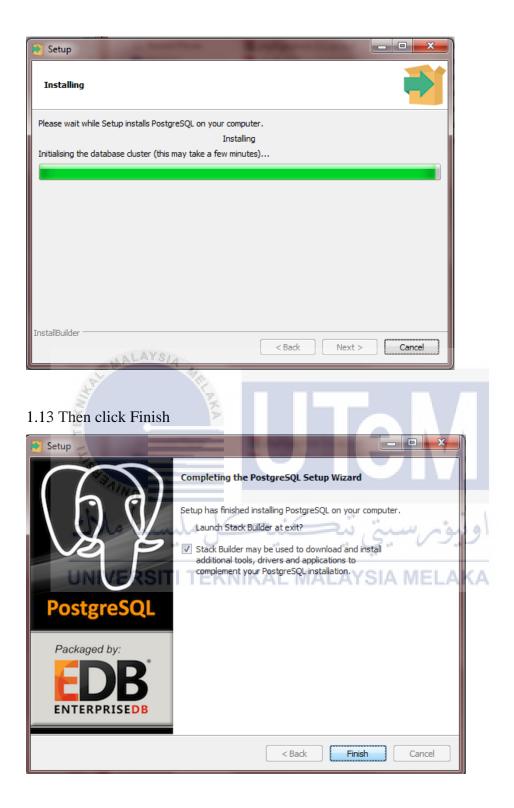
1.9 Continue installation by click on Next button

Setup John Junio Science in the	اور
Port In Contract I	<u> </u>
UNIVERSITI TEKNIKAL MALAYSIA MELA	KA
Please select the port number the server should listen on. Port 5432	
InstallBuilder Cancel	

1.10 Set the Default Locale

1.11 Continue installation by click on Next button

Setup	
Advanced Options	1
Select the locale to be used by the new database duster. Locale	
InstallBuilder	Cancel
1.12 Now click Next to begin installation	اونيومرجيو
Ready to Install UNIVERSITI TEKNIKAL MALAYS Setup is now ready to begin installing PostgreSQL on your computer. Setup is now ready to begin installing PostgreSQL on your computer.	ELAKA
InstallBuilder Cart	Cancel



Step 2: Copy phpPgAdmin-5.1 into computer

2.1 Copy phpPgAdmin 5.1 into Computer – Local Disk (C:) – wamp folder – apps

Copying 391 items (2.96 MB)	
Copying 391 items (2.9	96 MB)
from postgresql (C:\Users\\	postgresql) to apps (C:\wamp\apps)
ALAYSIA	
More details	Cancel
Freesanna	
2.2 Go to Computer – Local Dis	sk (C:) – wamp folder – alias

Make one file phppgadmin.conf into alias folder. This file contain the code as shown on the right

```
Alias /phppgadmin "C:/wamp/apps/phpPgAdmin-5.1/"

<Directory "C:/wamp/apps/phpPgAdmin-5.1/">

Options Indexes FollowSymLinks MultiViews

AllowOverride all

Order Deny,Allow

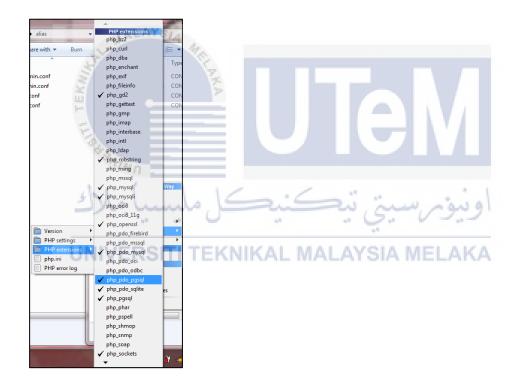
Allow from all

</Directory>
```

🕒 🔿 🗢 🕌 « Local Di	sk (C:) ▶ wamp ▶ alias	
Organize 🔻 📄 Ope	n Burn New folder	
🔆 Favorites	Name	Date modified Type
🗼 Downloads	phpmyadmin.conf	17/9/2014 6:41 AM CONF File
📃 Recent Places	phppgadmin.conf	14/10/2015 8:21 AM CONF File
🧮 Desktop	sqlbuddy.conf	17/9/2014 6:41 AM CONF File
	webgrind.conf	17/9/2014 6:41 AM CONF File

2.3 Then, go to wamp tray icon – click php – choose php extensions

Thick php_pgsql and php_pdo_pgsql



2.4 Then, go to Computer – Local Disk (C:) – wamp folder – bin – php 5.4.3

Copy the libpq.dll and paste into Computer – Local Disk (C:) – wamp folder – bin – apache2.2.22 – bin

Organize 🔻 🔳 Ope	n with Burn New folder				- 0
organize + 💼 ope	<u>^</u>			0	• 🛄 😈
🔆 Favorites	Name In abs.exe	Date modified 13/5/2012 1:32 PM	Type Application	Size /b KB	
🐌 Downloads	ApacheMonitor.exe	13/5/2012 1:32 PM	Application	35 KB	
📃 Recent Places	apr dbd odbc-1.dll	13/5/2012 1:30 PM	Application extens	21 KB	ſ
📃 Desktop	apr_dbd_0dbC-1.dll	13/5/2012 1:31 PM	Application extens	12 KB	
	dbmmanage.pl	13/5/2012 1:30 PM	PI File	9 KB	
词 Libraries	the second	13/5/2012 1:30 PM	Application	57 KB	
Documents	http://www.exe	13/5/2012 1:30 PM	Application	80 KB	
👌 Music	htdigest.exe	13/5/2012 1:30 PM	Application	66 KB	
E Pictures	https://www.exe	13/5/2012 1:30 PM	Application	77 KB	
🛃 Videos	httpd.exe	13/5/2012 1:30 PM	Application	18 KB	
	http://www.exe	13/5/2012 1:30 PM	Application	52 KB	
🚳 Homegroup	libapr-1.dll	13/5/2012 1:32 PM	Application extens	132 KB	
	libapriconv-1.dll	13/5/2012 1:32 PM	Application extens	27 KB	
퇲 Computer	libaprutil-1.dll	13/5/2012 1:32 PM	Application extens	177 KB	
🏭 Local Disk (C:)	libeay32.dll	8/5/2012 2:11 AM	Application extens	996 KB	
💼 Data (D:)	libhttpd.dll	13/5/2012 1:32 PM	Application extens	262 KB	
💼 System (F:)	libpg.dll	8/5/2012 2:11 AM	Application extens	96 KB	
	Iogresolve.exe	13/5/2012 1:30 PM	Application	11 KB	
陣 Network	openssl.exe	13/5/2012 12:37 PM	Application	406 KB	
	php.ini	14/10/2015 8:23 AM	Configuration sett	69 KB	
	a ha farmai all	0 /E /2012 2:11 AM	A	10 1/12	

2.5 PhpPgAdmin is ready to use



5.2.2 Database Creation and Database Object Creation

Database creation

In order to create a database, the PostgreSQL server must be up and running. Database is created with the SQL command:-

CREATE DATABASE CPNR **WITH OWNER** = naqibah;

Database name must follow the usual rules for SQL identifiers. Owner is a super user or has the special CREATEDB privilege. Besides that, create database cannot be executed inside a transaction block.

Database Object Creation

Database objects in PostgreSQL consist of tables, views, functions, indexes and etc. There are eight tables for this CPNR database system which are owner, registration, staff, vehicle_daily_track, daily_track, summons, summons_type and vehicle. Other than that, there are several database objects that have been implemented in this system such as sequences, functions and triggers. The example will be shown below and in the next sub-title.

Example of create sequences

A sequence is used for generating a unique numeric identifier that is typically used to generate the primary key. Sequences are implemented in daily_track, registration, staff, summons, summons_type and vehicle_daily_track table to make auto generated numbers when data is inserted. Create sequence dailyTrackId_seq
 CREATE SEQUENCE "daily_track_dailyTrackId_seq" INCREMENT BY 1 START WITH 1;

• Create sequence registration_seq

CREATE SEQUENCE registration_seq INCREMENT BY 1 START WITH 1;

• Create sequence staff_id_seq

CREATE SEQUENCE staff_id_seq INCREMENT BY 1 START WITH 1;

Create sequence summons_seq

CREATE SEQUENCE summons_seq_MALAYSIA MELAKA INCREMENT BY 1 START WITH 1;

• Create sequence summons_type_id_seq

CREATE SEQUENCE summons_type_id_seq INCREMENT BY 1 START WITH 1; • Create sequence vehicle_track_id_seq

CREATE SEQUENCE vehicle_track_id_seq INCREMENT BY 1 START WITH 1;

5.3 Database Implementation

In the database implementation, the database will be tested using database queries, for example, restricting information, joins, aggregate functions and sub-query to verify the flow of information in the database is correct.

5.3.1 Data Definition Language

Data Definition Language (DDL) consist of script for create table and constraint that include in database implementation for CPNR database system.

5.3.1.1 Create Table

CPNR database system consists of eight tables which are Owner, Registration, Staff, Vehicle_Daily_Track, Daily_Track, Summons, Summons_Type and Vehicle table. These tables are used to stored related information in order to implement CPNR database system.

• Create table Owner

```
CREATE TABLE owner
(
user_id character varying(20) NOT NULL,
user_name character varying(50) NOT NULL,
user_address character varying(100) NOT NULL,
user_email character varying(50) NOT NULL,
user_password character varying(256) NOT NULL,
user_category character varying(20) NOT NULL,
user_category character varying(20) NOT NULL,
user_position character varying(30) NOT NULL,
user_contact number character varying(20),
user level character varying(10),
user_school_number character varying(30),
CONSTRAINT "OWNER_pkey" PRIMARY KEY (user_id)
);
```

```
UNIVERSITI TEKNIKAL MALAYSIA MELAKA
```

Create table Registration

```
CREATE TABLE registration
(
  registration id character varying(100) NOT NULL,
  responsibility center character varying (30) NOT NULL,
  license number character varying (50) NOT NULL,
  valid period license date NOT NULL,
  valid period roadtax character varying (50) NOT NULL,
  insurance company character varying (50) NOT NULL,
  registration date date NOT NULL,
  sticker status character varying(50),
  expired date character varying,
  payment character varying (20),
  user id character varying(20) NOT NULL,
  vehicle id character varying (20) NOT NULL,
  staff id character varying(20),
  CONSTRAINT registration pkey PRIMARY KEY
(registration id),
  CONSTRAINT registration staff id fkey FOREIGN KEY
                 TEKNIKAL MALAYSIA MI
(staff id)
  REFERENCES staff (staff id) MATCH SIMPLE
  ON UPDATE CASCADE ON DELETE RESTRICT,
  CONSTRAINT registration user id fkey FOREIGN KEY
(user id)
  REFERENCES owner (user id) MATCH SIMPLE
  ON UPDATE CASCADE ON DELETE RESTRICT,
  CONSTRAINT registration vehice id fkey FOREIGN KEY
(vehicle id)
  REFERENCES vehicle (vehicle id) MATCH SIMPLE
  ON UPDATE CASCADE ON DELETE RESTRICT
);
```

• Create table Staff

```
CREATE TABLE staff
(
staff_id character varying(20) NOT NULL,
staff_name character varying(50) NOT NULL,
staff_email character varying(50) NOT NULL,
staff_password character varying(26) NOT NULL,
staff_address character varying(100) NOT NULL,
staff_contact_number character varying(20) NOT NULL,
user_level character varying(10),
staff_image oid,
CONSTRAINT staff pkey PRIMARY KEY (staff_id)
);
UNIVERSITI TEKNIKAL MALAYSIA MELAKA
```

• Create table Vehicle_Daily_Track

```
CREATE TABLE vehicle daily track
(
 vehicle track id character varying NOT NULL,
  track time out timestamp without time zone,
  track time in timestamp without time zone,
  registration id character varying NOT NULL,
  daily track id character varying NOT NULL,
  CONSTRAINT vehicle daily track pkey PRIMARY KEY
(vehicle track id),
CONSTRAINT vehicle daily track daily track id fkey FOREIGN
KEY (daily track id)
REFERENCES daily track (daily track id) MATCH SIMPLE
ON UPDATE RESTRICT ON DELETE CASCADE,
CONSTRAINT vehicle daily track registration id fkey FOREIGN
KEY (registration id)
REFERENCES registration (registration id) MATCH SIMPLE
ON UPDATE RESTRICT ON DELETE CASCADE
);
     UNIVERSITI TEKNIKAL MALAYSIA MELAKA
```

• Create table Daily_Track

```
CREATE TABLE daily_track
(
    daily_track_id character varying NOT NULL,
    daily_status_of_car character varying(20),
    daily_image_name character varying(100),
    daily_image_plate character varying,
    CONSTRAINT daily_track_pkey PRIMARY KEY (daily_track_id)
);
```



• Create table Summons

```
CREATE TABLE summons
(
  summons id character varying NOT NULL,
  summons payment status character varying(30),
  summons payment character varying (30) NOT NULL,
  summons place offense character varying(100) NOT NULL,
  registration id character varying NOT NULL,
  summons ownerid character varying(100),
 summons date date,
CONSTRAINT summons pkey PRIMARY KEY (summons id),
CONSTRAINT summons registration id fkey FOREIGN KEY
(registration id)
REFERENCES registration (registration id) MATCH SIMPLE
ON UPDATE RESTRICT ON DELETE CASCADE
);
     UNIVERSITI
                 TEKNIKAL MALAYSIA MELAKA
```

• Create table Summons_Type

```
CREATE TABLE summons_type
(
   summons_type_id character varying(100),
   summons_id character varying(100),
   type_offense character varying(200),
CONSTRAINT summons_type_summons_id_fkey FOREIGN KEY
(summons_id)
   REFERENCES summons (summons_id) MATCH SIMPLE
   ON UPDATE RESTRICT ON DELETE CASCADE
);
```



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

• Create table Vehicle

```
CREATE TABLE vehicle
(
 vehicle id character varying (20) NOT NULL,
 vehicle type character varying(20),
 vehicle cc character varying(20),
 vehicle color character varying(20),
 vehicle year character varying(20),
 user_id character varying,
 CONSTRAINT "VEHICLE pkey" PRIMARY KEY (vehicle id),
 CONSTRAINT vehicle user id fkey FOREIGN KEY (user id)
 REFERENCES owner (user id) MATCH SIMPLE
 ON UPDATE RESTRICT ON DELETE CASCADE
);
     UNIVERSIT
                 TEKNIKAL MALAYSIA MEL
                                            ΔΚΔ
```

Constraint is used to control over data in tables as any condition stated. Constraint can be not null, check, unique, primary key and foreign key that can be apply in the column in a table. Each of them has its own meaning and implementation.

```
• Not null constraint
```

```
CREATE TABLE summons
(
    summons_id character varying NOT NULL,
    summons_payment_status character varying(30),
    summons_payment character varying(30) NOT NULL,
    summons_place_offense character varying(100) NOT NULL,
    registration_id character varying NOT NULL,
    summons_ownerid character varying(100),
    summons_date date,
);
```

Check constraint TEKNIKAL MALAYSIA MELAKA

ALTER TABLE vehicle_daily_track
ADD CONSTRAINT track_time_out CHECK
(track_time_out>track_time_in);

• Unique constraint

ALTER TABLE summons_type ADD CONSTRAINT summons_type_id **UNIQUE**(summons_type_id); • Primary key

```
CREATE TABLE daily track
(
  daily track id character varying NOT NULL,
  daily status of car character varying(20),
  daily image name character varying(100),
  daily image plate character varying,
  CONSTRAINT daily track pkey PRIMARY KEY (daily track id)
);
     Foreign key
CREATE TABLE summons type
(
  summons type id character varying(100),
  summons id character varying(100),
  type_offense character varying(200),
 CONSTRAINT summons type summons id fkey FOREIGN KEY
(summons id)
  REFERENCES summons (summons id) MATCH SIMPLE
 ON UPDATE RESTRICT ON DELETE CASCADE
);
```

5.3.2 Data Manipulation Language

Data Manipulation Language (DML) consist of script for insert, update and delete that include in database implementation for CPNR database system.

- Insert into Owner
- INSERT INTO owner VALUES ('930502085210', 'NAQIBAH BINTI ZED', 'NO 75 JALAN DI 17 TAMAN DESA IDAMAN 76100 DURIAN TUNGGAL', 'naqibahzed@yahoo.com', '03ac674216f3e15c761ee1a5e255f067953623c8b388b4459e13f978 d7c846f4', 'Student', '-', '013-6165383', '000', '1', 'B031410059');
- > INSERT INTO owner VALUES ('950409078921', 'MOHD QAYYUM BIN ABD JALIL', 'NKJKA', 'BCSJH', '03ac674216f3e15c761ee1a5e255f067953623c8b388b4459e13f978 d7c846f4', 'Student', 'C,KBSI', 'CBDK', 'BCSDK', '1', 'BCSK');
- INSERT INTO owner VALUES ('670117037821', 'PUNITHA A/P MUTUSAMI', 'KELANTAN', 'punitha@yahoo.com', '03ac674216f3e15c761ee1a5e255f067953623c8b388b4459e13f978 d7c846f4', 'Staff', 'LECTURER', '019-3412888', '2040', '1', 'S102');
- Insert into Registration
- INSERT INTO registration VALUES ('REG01', 'FTMK', '989787', '2016-05-10', '2016-05-19', 'ALLIANCE', '2016-05-18', 'Not available', 'May 2017', 'not done', '930502085210', 'AGM 6728', 'null');

- INSERT INTO registration VALUES ('REG02', 'FPTT', '343434', '2016-05-27', '2016-05-27', 'ADSD', '2016-05-20', 'Not available', 'May 2017', 'not done', '930502085210', 'CCD 1100', 'null');
- INSERT INTO registration VALUES ('REG03', 'FPTT', 'W 327077', '2017-12-15', '2016-07-22', 'ALLIANCE', '2016-05-26', 'Not available', 'May 2017', 'not done', '670117037821', 'PHP 8910', 'null');
- Insert into Staff

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INSERT INTO staff VALUES ('S001', 'NUR MAISARAH ALIA BINTI KAMARUDDIN', 'maisalia@gmail.com', '03ac674216f3e15c761ee1a5e255f067953623c8b388b4459e13f97 8d7c846f4', 'NO 67 JALAN PANDAN INDAH 8 TAMAN KRUBUNG 67120 MELAKA ', '019-67125441', '2', NULL);

INSERT INTO staff VALUES ('S003', 'ZHAFRAN AZKA BIN MOHD AZWAN', 'Zhafran@yahoo.com', 8d969eef6ecad3c29a3a629280e686cf0c3f5d5a86aff3ca12020c9 23adc6c92', 'NO 9 JALAN 17 BUKIT KATIL 2300 MELAKA', '019-7612222', '2', NULL);

- Insert into Vehicle_Daily_Track
- > INSERT INTO vehicle_daily_track VALUES ('VDT082', NULL, '2016-05-29 11:32:13.248', 'REG02', 'DTR081');
- > INSERT INTO vehicle_daily_track VALUES ('VDT084', NULL, '2016-05-29 11:32:45.296', 'REG04', 'DTR083');

- INSERT INTO vehicle daily track VALUES ('VDT085', NULL, '2016-05-29 11:33:10.473', 'REG01', 'DTR084');
- Insert into Daily_Track
- INSERT INTO daily track VALUES ('DTR081', 'AVAILABLE', NULL, ' CCD 1100 ');
- INSERT INTO daily track VALUES ('DTR083', 'AVAILABLE', NULL, ' JJC 9845 ');
- > INSERT INTO daily track VALUES ('DTR084', 'AVAILABLE', NULL, ' AGM 6728 ');
- Insert into Summons
 - > INSERT INTO summons VALUES ('SM023', NULL, 'NOT PAID', 'FKE', 'REG03', '670117037821', '2016-05-28');
 - aua > INSERT INTO summons VALUES ('SM024', NULL, 'NOT PAID', 'HEPA', 'REG04', '950409078921', '2017-01-17');

. -

- INSERT INTO summons VALUES ('SM022', NULL, 'PAID', 'FTMK', 'REG01', '930502085210', '2016-05-26');
- Insert into Summons_Type

5 N 1

- > INSERT INTO summons type VALUES ('SUMTY020', 'SM022', 'Blocking the path');
- INSERT INTO summons type VALUES ('SUMTY026', 'SM024', 'Reckless driving');

- Insert into Vehicle
- > INSERT INTO vehicle VALUES ('AGM 6728', 'Car', 'KANCIL 660', 'SILVER', '2008', '930502085210');
- > INSERT INTO vehicle VALUES ('CCD 1100', 'Motorcycle', '', 'BLACK', '2012', '930502085210');
- > INSERT INTO vehicle VALUES ('PHP 8910', 'Motorcycle', '', 'BLACK', '2013', '670117037821');

5.3.2.2 Update Statement

• Update Vehicle_Daily_Track

UPDATE vehicle_daily_track

SET track_time_out = now()AL MALAYSIA MELAKA
WHERE daily_track_id = daily_track_id AND registration_id =
registration_id;

• Update Daily_Track

```
UPDATE daily_track
SET daily_status_of_car = "AVAILABLE"
WHERE daily_track_id = daily_track_id AND daily_image_plate
= daily_image_plate;
```

• Update Summons

```
UPDATE summons
SET summons_payment = "PAID"
WHERE summons_id = summons_id AND registration_id =
registration_id;
```

5.3.2.3 Delete Statement

• Delete Vehicle_Daily_Track

```
DELETE FROM vehicle_daily_track
WHERE daily_track_id = daily_track_id;
```

5.3.3 Stored Procedure / Function

Function in PostgreSQL also known as Stored Procedure. Function allows carrying out operations that take several queries and round trips in a single function. Besides that, database can reuse the function instead of a middle-tier or duplicating code. There are several functions that are created in this Car Plate Number Recognition (CPNR) database system including function that used complex query, join at least to table, view, update, delete and insert. Below shows examples of each function used.

• Function to display report using complex query

```
CREATE OR REPLACE FUNCTION complex_view_report1()
RETURNS TABLE (vehicle_id character varying(100), total
character varying(40),
day character varying(100), month character varying(40),
year character varying(40)) AS
$$
```

```
BEGIN
```

```
FOR vehicle id, total, day, month, year IN
SELECT v.vehicle id, count(his.registration id) AS total,
date part('day', track time in) as day, date part('month',
track time in) as month, date part('year', track time in) as
year
FROM history vehicle daily track his, registration r,
vehicle v
WHERE his.registration id = r.registration id AND
r.vehicle id = v.vehicle id AND operation ='UPDATE'
GROUP BY v.vehicle id, his.registration id,
date part('day', track time in),
date part('month', track time in), date part('year',
track time in)
LOOP 💾
RETURN NEXT;
END LOOP;
END;
$$ LANGUAGE plpgsql
                             MAL
```

```
Function to display owner vehicle using joint at least two tables
```

```
CREATE OR REPLACE FUNCTION viewownervehicle()
RETURNS TABLE (
```

```
registration_id character varying(100),
vehicle_id character varying(20),
user_id character varying(20),
valid_period_license date,
valid_period_roadtax character varying(50)) AS
$$
```

BEGIN

```
FOR registration id, vehicle id, user id,
valid period license, valid period roadtax IN
select r.registration id, r.vehicle id, r.user id,
r.valid period license, r.valid period roadtax
from owner o, vehicle v, registration r where r.user id=
o.user id AND r.vehicle id = v.vehicle id
LOOP
RETURN NEXT;
END LOOP;
END;
$$ LANGUAGE plpgsql;
     Function to display user information
CREATE FUNCTION viewregisteruser()
RETURNS SETOF owner AS
$$
DECLARE
rec record;
                          AL MALAYSIA MEL
BEGIN
FOR rec IN (SELECT * FROM owner) LOOP
RETURN NEXT rec;
END LOOP;
END;
```

\$\$ LANGUAGE plpgsql;

• Function to insert vehicle information

CREATE OR REPLACE FUNCTION Insert_register_vehicle(user_id character varying, vehicle id

```
character varying(20), vehicle type character varying,
vehicle cc character varying(20), vehicle color character
varying, vehicle year character varying(20))
RETURNS void AS
$BODY$
BEGIN
INSERT INTO vehicle (user id, vehicle id, vehicle type,
vehicle cc, vehicle color, vehicle year)
VALUES (user id, vehicle id, vehicle type, vehicle cc,
vehicle color, vehicle year);
END;
$BODY$
LANGUAGE 'plpgsql';
     Function to delete user information
CREATE OR REPLACE FUNCTION deleteregistereduser (Id
character varying(20))
RETURNS character varying(20) AS
$BODY$
                  TEKNIKAL MALAYSIA MELAKA
      INIVERSITI
BEGIN
delete from owner where user id = Id;
RETURN 1;
END;
$BODY$
LANGUAGE plpgsql;
```

• Function to update user information

CREATE OR REPLACE FUNCTION updateregistereduser(id character varying(20), address character varying(100),

```
jawatan character varying(30), contactno character
varying(20), schoolno character varying(30))
RETURNS void AS
$BODY$
BEGIN
update owner
set
user address = address,
user position = jawatan,
user contact number = contactno,
user school number = schoolno
where user id = id;
END;
$BODY$
 LANGUAGE plpgsql;
     Function to record old data, new data and update data in table
history_vehicle_daily_track
CREATE OR REPLACE FUNCTION history_vehicle_daily_track()
RETURNS trigger AS
$BODY$
BEGIN
IF tg op = 'DELETE' THEN
INSERT INTO history vehicle daily track
VALUES (old.vehicle track id, old.track time out,
old.track time in, old.registration id, old.daily track id,
current timestamp, tg op);
RETURN old;
END IF;
IF tg op = 'INSERT' THEN
INSERT INTO history vehicle daily track
```

```
VALUES (new.vehicle track id, new.track time out,
new.track time in, new.registration id, new.daily track id,
current timestamp, tg op);
RETURN new;
END IF;
IF tg op = 'UPDATE' THEN
INSERT INTO history vehicle daily track
VALUES (new.vehicle track id, new.track time out,
new.track time in, new.registration id, new.daily track id,
current timestamp, tg op);
RETURN new;
END IF;
          ALAYS!
END
$BODY$
LANGUAGE plpgsql;
     Function to add character for primary key
      iN
CREATE OR REPLACE FUNCTION staff id()
RETURNS trigger AS
                              MALAYSIA MEL
$BODY$DECLARE
ID int;
BEGIN select NEXTVAL('staff id seq') into ID;
NEW.staff id := ('S00'|| ID);
RETURN NEW;
END;
$BODY$
LANGUAGE plpgsql;
```

Table 5.1 Summary of Stored Procedure

	Table Description			
Complex query	History_vehicle_daily_track,	To display a report total		
	registration, vehicle	in and out per owner in		
		daily		
Joint at least two tables	Owner, registration, vehicle	To display owner and its		
		related vehicle and		
		registration information		
	Owner, registration, vehicle	To display list of user		
I AVA.		with expired license		
DML insert	Vehicle	To insert vehicle		
Ĩ	Ex .	information into vehicle		
		table		
DML view	Owner	To list all registered		
43Amn		owner		
DML delete	Owner	To delete data of owner		
ليسيا ملاك	Summons	To delete data of		
UNIVERSITI	TEKNIKAL MALAYSI/	summons		
	Staff To delete data of			
	Vehicle	To delete data of vehicle		
DML update	Owner	To update data of owner		

Stored Procedure / Function

•

Triggers in PostgreSQL are automatically invoked when a specified database event occur. PostgreSQL trigger can be stated before the operation is attempted, after operation has completed or instead of the operation. There are some triggers that applied for CPNR database system such as trigger after insert, update and delete and trigger before insert. Below shows examples of trigger used.

• Trigger after insert, update, delete on history_vehicle_daily_track table

CREATE TRIGGER trig vehicle daily track AFTER INSERT OR DELETE OR UPDATE ON vehicle daily track FOR EACH ROW EXECUTE PROCEDURE history vehicle daily track(); Trigger before insert on table staff CREATE TRIGGER staff id trigger BEFORE INSERT ON staff SIA FOR EACH ROW EXECUTE PROCEDURE staff id();

Table 5.2 Summary of Trigger

Trigger

	Table	Description
		-
After insert,	History_vehicle_	The trigger will fire after user insert, update
update, delete	daily_track	or delete data in vehicle_daily_track table. It
		will update any action into
		history_vehicle_daily_track table
Before insert	Registration	The trigger will fire before user inserts
		information into registration table. It will
		create unique and not null id starting with
		REGO
MA	Staff	The trigger will fire before user inserts
sol.	Stall	
KIII	A.K.A	information into staff table. It will create
T.E.	•	unique and not null id starting with S00
ER	Summons	The trigger will fire before user inserts
A A IN		information into summons table. It will
the last		create unique and not null id starting with
ملاك	کل ملیسیا	اويور سېتې پېه
	Summons_type	The trigger will fire before user inserts
UNIVE	RSITI TEKNIK/	information into summons type table. It will
		create unique and not null id starting with
		SUMTYO
	Vehicle_daily_tra	The trigger will fire before user inserts
	ck	information into vehicle_daily_track table. It
		will create unique and not null id starting
		with VDT0
	Daily_track	The trigger will fire before user inserts
		information into daily_track table. It will
		create unique and not null id starting with
		DTR0

5.3.5 Data Loading Process

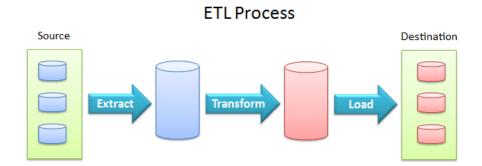


Figure 5.2 Diagram of Data Loading Process

CPNR database system is a system for obtaining and processing data in order to establish useful information to the user. Data is taken from a camera that captures images of license plates and converts it to text. After the process is carried out, this text will be transferred to the database in real time so the security guard will know whether the car has been registered or not.

Other than that, the data load from user input. The user will enter the required data to be processed by the system. Some of the data will be saved into tables in the database where a process of data transformation will carried out. Here, the data will transform into standardizing data entry by applying a set of rules or functions, making the data uniform.

5.4 Conclusion

As a conclusion, this part examined about the software development environment setup including installation and database creation and also database implementation that describes on DML, DDL, stored procedure, trigger and data loading process. It incorporates the stage, software to be utilized to develop the application and other software used to help the running application.

The following chapter will discuss about the test plan, test strategy, test design, test result and analysis of the project. The testing phase will verify that the system meets the functional and non-functional requirements before it will be implemented to the end user and error can be avoided.



CHAPTER VI



6.1 Introduction

The last activity to be carried out amid the advancement of this system is testing. The testing stage will be explained in detail in this chapter of Car Plate Number Recognition (CPNR) database system. The objective of testing is to point out the defects and errors that were made during development phase. Next, the defects and errors will be corrected for an effective performance of system application.

Next, testing is conducted to clarify the functional and non-functional requirement of the system. Testing is done by user that will use the system in a given time. It is required to get the feedback from the user to improve the system. Testing the functional requirement is test on the ability the system to produce right output while testing the non-functional requirement is described how the system should do.

Besides that, the testing stage also will explain about test plan which comprises of test organization, test schedule and test environment. Meanwhile, test strategy covers the classes of tests. Test description and test data are included for testing. For more clarification will be explained in the sub-point of this part.

6.2 Test Plan

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Test plan is the project plan for the testing work to be done. It is also helps to validate the acceptability of a software product and necessary to have written test plan in regulated environment. It includes test organization, test environment and test schedule. In general, test organization involved everyone including organization, person or company that tests the system to agreed requirements. Test environment comprise the area where software and hardware are setup to perform the testing while test schedule defines how many cycles and duration of test.

6.2.1 Test Organization

Test organization is a group of person who is responsible for testing the system through testing process. Testing should be performed by different individuals because the generated output also affects the quality system. The test for Car Plate Number Recognition (CPNR) database system will be carried out by system developer, project supervisor and student or staff.

System developer is a person who is responsible for developing Car Plate Number Recognition (CPNR) database system. Project supervisor is responsible for assisting and supervising the work of system developer while the system is being developed. Student or staff is act as a client to test this system. Table 6.1 shows the list of the tester of this system and their tasks.

Table 6.1 Test Organization Chart

UN	VERSITI TEKN	IKAL MALAYSIA MELAKA		
Tester ID	Title/Position	Responsibilities		
Tester 1	System developer	A person who is responsible for developing Car Plate		
		Number Recognition (CPNR) database system		
		throughout the customer requirements. As a tester,		
		system developer test equipment and programming		
		framework, using innovation and existing systems in		
		addressing specific issues.		

Tester 2	Project supervisor	Act as end client for admin and staff of the system. They will response based on system requirement and all the results will be recorded for enhancing the framework.
Tester 3	Student or Staff	Act as end client that register the vehicle for the sticker throughout the system. Every of the reaction taken will be recorded and take an action in order to improve the system.

6.2.2 Test Environment

A test of an environment is to test Car Plate Number Recognition (CPNR) database system that is going be performed by the testing team. It is a setup of software and hardware. This test will be built on both server and client. It also includes the location for the application software, the tools required to support testing and supporting data to conduct tests for

6.2.2.1 Environment Setup

In order to make a framework can run successfully for Car Plate Number Recognition (CPNR) database system, it need to be supervised and arranging the stage. Table 6.2 shows the application workspace specification.

Table 6.2 Application Workspace Specification

Environment Specification	Description		
Operating system	Window 7		
Processor	Intel Core i3		
Random access memory (RAM)	4 GB		
Database	PostgreSQL		
Server	Wamp Server		
Server scripting	PHP		

6.2.2.2 Software Application

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

The software application includes every of the application that provides in the Car Plate Number Recognition (CPNR) database system. Below is the list of software application for Car Plate Number Recognition (CPNR) database system.

- Testing to authenticate user
- Testing on user registration
- Testing on update user profile
- Testing on vehicle registration
- Testing on sticker registration
- Testing on insert and view summons
- Testing on upload photo
- Testing on import and export file

6.2.2.3 System Software

System software is a program and tools that useful to run a computer's hardware and application programs. Below is the list of system software for Car Plate Number Recognition (CPNR) database system.

- ونيوم سيتي تيكنيكل مليسيا ملاك Windows 7
- PostgreSQL9.31 TEKNIKAL MALAYSIA MELAKA
- WAMPP Server
- Notepad++
- Google Chrome (Web browser)
- Adobe Illustrator CS6

6.2.2.4 System Hardware

System hardware is the equipment used during the process of implementation of this system. Below is shown the list of system hardware for Car Plate Number Recognition (CPNR) database system.

- Laptop
- Mouse
- Printer
- Projector
- External hardisk



The test schedule defines when and by whom the test will be reviewed, tracked and approved. It is also collect all the information in the length of time during testing. A test schedule can be accurate with experience from previous testing effort along with a detailed understanding of the current testing goals. Table 6.3 shows the test schedule for developing of Car Plate Number Recognition (CPNR) database system.

Module	Test Activity	Duration (Days)	Cycle (Times)
Register	Test unit integration, testing and user acceptance	1	5

Table 6.3 Test Schedule for CPNR Database System

Login	Test unit integration, testing and user acceptance	1	10
User profile	Test unit integration, testing and user acceptance	1	6
Vehicle registration	Test unit integration, testing and user acceptance	5	10
Sticker registration	Test unit integration, testing and user acceptance	5	10
Summons management	Test unit integration, testing and user acceptance	4	7
Car daily track management	Test unit integration, testing and user acceptance	3	6
Login reporting	Test unit integration, testing and user acceptance	6	15
Summons reporting	Test unit integration, testing and user acceptance	6	12
Valid period license reporting	Test unit integration, testing and user acceptance	6. او بیو م	12
Error handling UNIVERSITI	Test unit integration, testing and user acceptance MALAYSIA MI	3 ELAKA	15

6.3 Test Strategy

Test strategy is a guideline for a long-term plan of action that explains test design. It will describe how the test has been carried out, the technique to be used and which modules to test. All the partners including developer, designer and customer will together accomplish to achieve the objective through test strategy.

Black-box testing is in which test will carry out without reference to the internal structure and basically test on functional requirement. This testing can be applied at every level of software testing to identify what the normal output will come after the input of data.

While white-box testing is an opposite of black box testing which tests internal structure of an application. The tester determines the output by test through the program code. Today, it can be applied at the unit, integration and system level. The good at this testing is that it empowers us to see what is occurring inside the application.

The strategy to be selected is black-box testing for the Car Plate Number Recognition (CPNR) database system. Table 6.4 shows the difference between white box testing and black box testing.

Table 6	.4 E	lack-l	box vs	Wh	ite-box
---------	------	--------	--------	----	---------

Black-box testing	White-box testing		
Testing without reference to the internal structure	Testing with reference to the internal structure		
Also known as closed box testing	Also known as clear box testing		
Performed by end user, tester and developer	Performed by tester and developer		

6.3.1 Classes of Tests

There are three classes of tests which are security test, error handling test and user acceptance test. There are two test classes that be implemented in the Car Plate Number Recognition (CPNR) database system; security test and error handling test.

i. Security test

The security test is a process to verify that the information system protects the data. It is intended to reveal any flaws that may lead to the security violation. The security test is implemented to check the level of user before they can log into the system, forgot password and encrypted the password in the first user register the system.

ii. Error handling test

Error handling test was utilized to ensure the system to get right data from the customer. The system will give an error message if any incorrect data entered by the customer. This is essential to make sure data entered is correct and filled by them. Error handling test is implemented for all form in the system to check user input before keep it into the database. An error or popup will be given to notify user.

iii. User acceptance test

User acceptance test is tested by the actual user of the system to make sure the system can handle its required tasks in real world scenario. The graphical user interface (GUI) must be comprehension and clear among of variety of

UNIT knowledge level. NIKAL MALAYSIA MELAKA

6.4 Test Implementation

There are two types of test implementation which are test description and test data. Test description is an activity that needs to be done to identify the best process information. At that point, it will describe the test case with an expected result and test data about user acceptance.

6.4.1 Test Description

Test description explains the test case identification; test cases and expected result for each module are designed and documented. A test case is a set of conditions under which a tester in order to verify compliance with a specific requirement. Certain information is needed as an input to test the system.

6.4.1.1 User Authentication Management

UNIVERSIT	TEKNIKAL	MALAYSIA MI	ELAKA
Table 6.5 Test	Description for U	User Authentication	n Management

Test Case	Description	Testing	Expected	Test	Test
ID		Туре	Result	Strategy	Class
TC1_UA_1	Invalid IC	Unit testing	Login failed.	Black	Security
	number or	/ integration	Wrong IC	box/White	test/
	password		number or	box	Error
			password		handling
			popup will		test
			appear.		

TC1_UA_2	Valid IC number	Unit testing	The system	Black	Security
	and password	/ integration	can be	box/White	test/
			accessed.	box	Error
					handling
					test
TC1_UA_3	IC number or	Unit testing	Login failed.	Black	Security
	password is blank	/ integration	Wrong IC	box/White	test/
			number or	box	Error
			password		handling
			popup will		test
			appear.		

6.4.1.2 User Registration Management

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Table 6.6 Test Description for User Registration Management

Test Case	Description	Testing	Expected	Test	Test
ID	- 0- min - 0-	Туре	Result	Strategy	Class
TC2_UR_1	No input for all	Unit testing	Notification	Black	Error
	fields	/ integration	popup will be	box/White	handling
			appeared	box	test
			starting from		
			the first blank		
			field.		
TC2_UR_2	Valid input for	Unit testing	The user	Black	Error
	all fields	/ integration	successfully	box/White	handling
			registers the	box	test
			information.		

6.4.1.3 User Profile Management

Test Case	Description	Testing	Expected	Test	Test
ID		Туре	Result	Strategy	Class
TC3_UP_1	Click on [click	Unit testing	A form for	Black	Error
	here to update	/ integration	update user	box/White	handling
	<i>profile]</i> link		information	box	test
			will appear		
TC3_UP_2	New input for	Unit testing	Information is	Black	Error
	existing data is	/ integration	successfully	box/White	handling
E.	inserted		updated	box	test
TEK					

 Table 6.7 Test Description for User Profile Management

6.4.1.4 Vehicle Registration Management

Table 6.8 Test Description for Vehicle Registration Management

Test Case	Description	Testing	Expected	Test	Test
ID		Туре	Result	Strategy	Class
TC4_VR_1	Click on register	Unit testing	A form for	Black	Error
	<i>vehicle</i> link	/ integration	register the	box/White	handling
			vehicle will	box	test
			appear.		
TC4_VR_2	No input for all	Unit testing	Notification	Black	Error
	fields	/ integration	popup will be	box/White	handling
			appeared	box	test
			starting from		
			the first blank		

			field.		
TC4_VR_3	Valid input for	Unit testing	The user	Black	Error
	all fields	/ integration	successfully	box/White	handling
			registers the	box	test
			vehicle.		

6.4.1.5 Sticker Registration Management

Test	Case	Description	Testing	Expected	Test	Test
ID	3	and the	Туре	Result	Strategy	Class
TC5_	SR_1	Click on register	Unit testing	A form for	Black	Error
	TE	<i>sticker</i> link	/ integration	register the	box/White	handling
	Eg			sticker will	box	test
		Ainn		appear.		
TC5_	SR_2	No input for all	Unit testing	Notification	Black	Error
		fields	/ integration	popup will be	box/White	handling
	UNI	VERSITI TEK	NIKAL MA	appeared	box	test
				starting from		
				the first blank		
				field.		
TC5_	SR_3	Valid input for	Unit testing	The user	Black	Error
		all fields	/ integration	successfully	box/White	handling
				registers the	box	test
				sticker.		

Table 6.9 Test Description for Sticker Registration Management

IDImage: symmetry of the symmetry of	Test Case	Description	Testing	Expected	Test	Test
summons link/ integrationsummons willbox/WhitehandlingTC6_SM_2No input for allUnit testingNotificationBlackErrorfields/ integrationpopup will bebox/Whitehandlingappearedboxtestteststarting fromthe first blankfield.testTC6_SM_3Valid input forUnit testingThe summonsBlackErrorall fields/ integrationinformationbox/Whitehandlingthe first blankfield./ integrationfield.Frorthe first blankfield./ integrationbox/Whitehandlingthe first blankfield./ integrationbox/White <th>ID</th> <th></th> <th>Туре</th> <th>Result</th> <th>Strategy</th> <th>Class</th>	ID		Туре	Result	Strategy	Class
TC6_SM_2No input for all fieldsUnit testingNotificationBlackErrorfields/ integrationpopup will bebox/Whitehandlingappearedappearedboxteststarting fromthe first blankintegrationthe first blankTC6_SM_3Valid input for all fieldsUnit testingThe summonsBlackErrorall fields/ integrationinformationbox/Whitehandlingthe first blankinformationboxtestthe first blankinformationbox/Whitehandlingthe first blankinformationbox/Whitehandling <th>TC6_SM_1</th> <th>Click on add</th> <th>Unit testing</th> <th>A form for</th> <th>Black</th> <th>Error</th>	TC6_SM_1	Click on add	Unit testing	A form for	Black	Error
TC6_SM_2No input for all fieldsUnit testing / integrationNotificationBlackErrorfields/ integrationpopup will be appearedboxteststartingfromitestfield.itestTC6_SM_3Valid input for all fieldsUnit testingThe summonsBlackErrorall fields/ integrationinformationbox/Whitehandlingtestinformationboxtestinformationtesttestinformationbox/Whitetestinformationbox/Whitetestinformationbox/Whitetestinformationboxinformationbox/Whiteinformationbox/Whitetestinformationbox/Whiteinformationboxinformationbox/Whiteinformationinformationbox/Whiteinformationinformationinformationboxinformationinformationinformationboxinformationinf		summons link	/ integration	summons will	box/White	handling
fields / integration popup will be box/White handling appeared box test starting from the first blank / the first blank field. / TC6_SM_3 Valid input for Unit testing The summons Black Error all fields / integration information box/White handling				appear.	box	test
TC6_SM_3 Valid input for all fields Unit testing from the first blank field. Black Error all fields / integration information box/White handling test	TC6_SM_2	No input for all	Unit testing	Notification	Black	Error
TC6_SM_3 Valid input for all fields Unit testing from the first blank field. Error All fields / integration information box/White handling box		fields	/ integration	popup will be	box/White	handling
TC6_SM_3Valid input for all fieldsUnit testing integrationThe summons informationBlackError handling test		MALAYSIA MA		appeared	box	test
TC6_SM_3Valid input for all fieldsUnit testing / integrationThe summons informationBlackError handling test	and the second s	E.		starting from		
TC6_SM_3Valid input for all fieldsUnit testing / integrationThe summons informationBlackError handlingbox/White/ integrationinformationbox/Whitehandlingbox/ integrationsuccessfullyboxtest	EKO	5		the first blank		
all fields / integration information box/White handling test	E			field.		
test local box	TC6_SM_3	Valid input for	Unit testing	The summons	Black	Error
		all fields	/ integration	information	box/White	handling
recorded.	لاك	كل مليسيا ما	کنیک	successfully	box	test
LIMIT/EDGITETER/III/AL MALAVGIA MELARA	LIND			recorded.	A 1/2 A	

 Table 6.10 Test Description for Summons Management

6.4.1.7 Car Daily Track Management

Table 6.11 Test Description for	Car Daily Track Management
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Test Case	Description	Testing	Expected	Test	Test
ID		Туре	Result	Strategy	Class
TC7_CD_1	Click on vehicle	Unit testing	A form for	Black	Error
	<i>in</i> link	/ integration	search and	box/White	handling
			record vehicle	box	test

			in will appear.		
TC7_CD_2	Click on vehicle	Unit testing	A form for	Black	Error
	<i>out</i> link	/ integration	search and	box/White	handling
			record vehicle	box	test
			out will appear.		
TC7_CD_3	No input for all	Unit testing	Please insert at	Black	Error
	fields	/ integration	least 3	box/White	handling
			characters	box	test
			notification		
			popup will		
			appear.		
TC7_CD_4	Valid input for	Unit testing	The	Black	Error
S	all fields	/ integration	information	box/White	handling
KHI	NKA		successfully	box	test
M TEK			records in the		
Lieb			system.		

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6.4.1.8 Login Reporting
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Table 6.12 Test I	Description for	r Login	Reporting
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Test Case	Description	Testing	Expected	Test	Test
ID		Туре	Result	Strategy	Class
TC8_LR_1	Click on login	Unit testing	Login	Black	Error
	<i>info</i> link	/ integration	information	box/White	handling
			page will	box	test
			appear.		
TC8_LR_2	Click delete icon	Unit testing	The	Black	Error
		/ integration	information	box/White	handling
			selected is	box	test

	deleted.	

6.4.1.9 Summons Reporting

Test Case	Description	Testing	Expected	Test	Test
ID		Туре	Result	Strategy	Class
TC9_SR_1	Click on	Unit testing	Summons	Black	Error
	summons per	/ integration	reporting page	box/White	handling
	date link		will appear.	box	test
TC9_SR_2	Valid input for	Unit testing	A table of	Black	Error
KIII	all fields	/ integration	summons	box/White	handling
TE			information	box	test
11160			will be shown.		

6.4.1.10 Valid Period License Reporting

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Table 6.14 Test Description for Valid Period License Reporting

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Test Case	Description	Testing	Expected	Test	Test
ID		Туре	Result	Strategy	Class
TC10_VPR	Click on license	Unit testing	Valid period	Black	Error
_1	<i>information</i> link	/ integration	license	box/Whit	handling
			reporting page	e box	test
			will appear.		
TC10_VPR	Valid input for all	Unit testing	A list of a	Black	Error
_2	fields	/ integration	valid period	box/Whit	handling
			license will	e box	test

					app	bear	bas	ed		
					on		ran	ge		
					pro	ovideo	1.			
TC10_VPR	Click	button	Unit	testing	А	list	of	a	Black	Error
_3	search		/ inte	gration	val	id	perio	od	box/Whit	handling
					lice	ense	W	ill	e box	test
					app	bear	bas	ed		
					on		ran	ge		
					pro	ovideo	1.			

6.4.2 Test Data

Test data is used to affirm the expected result, for example, confirming system behavior towards invalid input data.

6.4.2.1 User Authentication Management

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Table 6.15 Test Data for User Authentication Management

TD1_UA_1	TD1_UA_2	TD1_UA_3
TC1_UA_1	TC1_UA_2	TC1_UA_3
No data is inserted by	Correct data is	Wrong data is
the user	inserted by the user	inserted by the user
IC number:	IC number:	IC number:
Password:	930502085210	901209071223
	Password:1234	Password:12891
	TC1_UA_1 No data is inserted by the user IC number:	TC1_UA_1TC1_UA_2No data is inserted by the userCorrect data is inserted by the userIC number: Password:IC number: 930502085210

Result	Test	Login failed. W	Vrong IC	The system	can be	Logi	n failed.	Wrong
Data		number or p	password	accessed.		IC	numbe	er or
		popup will appe	ear.			passv will a	word appear.	popup

6.4.2.2 User Registration Management

Table 6.16 Test Data for User Registration Management

Column Name	TD2_UR_1	TD2_UR_2
Test Case ID	TC2_UR_1	TC2_UR_2
TEKINE	No data is inserted by the user	Correct data is inserted by the user
E. States	IC or passport number: Name:	IC or passport number: 950110076514
سا ملاك	Address: Matric or staff number:	Name: Dhabitah binti Zed
UNIVERS	Email:KNIKAL MALA	Address: Kampar, Perak Matric or staff number:
	Level: Position:	D031610089 Email: dhabitzed@yahoo.com
	Contact number:	Level: student
	Office number:	Position: student
	Password:	Contact number: 019-5516341
	Confirm password:	Office number: -
		Password: 8978912
		Confirm password: 8978912
Result Test Data	Notification popup will be	The user successfully registers the
	appeared starting from the	information.

first blank field.	

6.4.2.3 User Profile Management

Column Name	TD3_UP_1	TD3_UP_2
Test Case ID	TC3_UP_1	TC3_UP_2
	Users click on click here to	Correct data is inserted by the
	<i>update profile</i> link	user
MALAY	SIA .	Name: Nur Maisarah Alia binti
a shi ta	10	Kamaruddin
KII		Staff ID: S001
F 1		Address: No 67 Jalan Pandan
E.S.		Indah 8 Taman Krubung 67120
SAININ .		Melaka
سيا ملاك	تيكنيكل مليه	Email: maisalia@gmail.com Contact number: 019-67125441
Result Test Data	A form for update user	Information is successfully
	information will appear	updated

Table 6.17 Test Data for User Profile Management

6.4.2.4 Vehicle Registration Management

Column Name	TD4_VR_1	TD4_VR_2	TD4_VR_3
Test Case ID	TC4_VR_1	TC4_VR_2	TC4_VR_3
	Users click o	n Wrong data is	Correct data is
	register vehicle lin	inserted by the user	inserted by the user

Table 6.18 Test Data for	Vehicle Registration Management

		Plate number: Type of vehicle: Vehicle CC: Vehicle color: Vehicle year:	Platenumber:AGM 7812Typeofvehicle:CarVehicle:Cancil850Vehicle:color:SilverVehicle:yeanYehicle:yean
Result Test Data	A form for register	Notification popup	The user
TEKNINALAY	the vehicle will appear.	will be appeared starting from the first blank field.	successfully registers the vehicle.

6.4.2.5 Sticker Registration Management

Table 6.19 Test Data for Sticker Registration Management

Column Name	TD5_SR_1	TD5_SR_2	TD5_SR_3
Test Case ID	TC5_SR_1	TC5_SR_2	TC5_SR_3
	User click on	No data is inserted	Correct data is
	<i>register vehicle</i> link	by the user	inserted by the user
		Plate number:	Plate number:
		Plate number: Responsibility	Platenumber:AGM 7812
		Responsibility	AGM 7812
		Responsibility	AGM 7812

		license:	891291
		Valid period	Valid period
		roadtax:	license: 2017-09-01
		Insurance	Valid period
		company:	roadtax: 2016-12-
			01
			Insurance
			company:
			ALLIANCE
Result Test Data	A form for register	Notification popup	The user
	the sticker will	will be appeared	successfully
MALAY	appear.	starting from the	registers the sticker.
Ser an	A.C.	first blank field.	

6.4.2.6 Summons Management

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Table 6.20 Test Data for Summons Management

Column NameTD6_SM_1TD6_SM_2TD6_SM_3Test Case IDTC6_SM_1TC6_SM_2TC6_SM_3User click on addNo data is insertedCorrect data issummons linkby the userinserted by the userby the userDate:Date: 24 Jul 2016Plate number:Plate number:Plate number:Place of offense:AGM 7812Type of offense:FKEFKEStreet of the setFKEStreet of the setFKE<				
User click on add summons linkNo data is inserted by the userCorrect data is inserted by the userDate:Date:Date:Date: 24 Jul 2016Plate number:Plate number:Plate number:Place of offense:AGM 7812Type of offense:FKEFKEFKE	Column Name RS	TD6_SM_1 KAL	TD6_SM_2	TD6_SM_3
summons linkby the userinserted by the userDate:Date:Date: 24 Jul 2016Plate number:Plate number:Plate number:Place of offense:AGM 7812Type of offense:Place of offense:FKEFKEType of offense:Type of offense:	Test Case ID	TC6_SM_1	TC6_SM_2	TC6_SM_3
Date:Date: 24 Jul 2016Date:Date: 24 Jul 2016Plate number:Plate number:Place of offense:AGM 7812Type of offense:Place of offense:FKEFKEType of offense:FKE		User click on add	No data is inserted	Correct data is
Plate number:Platenumber:Place of offense:AGM 7812Type of offense:Place of offense:FKEFKEType of offense:Type of offense:		summons link	by the user	inserted by the user
Plate number:Platenumber:Place of offense:AGM 7812Type of offense:Place of offense:FKEFKEType of offense:Type of offense:				
Place of offense:AGM 7812Type of offense:Place of offense:FKEFKEType of offense:Type of offense:			Date:	Date: 24 Jul 2016
Type of offense: Place of offense: FKE FKE Type of offense: Type of offense:			Plate number:	Plate number:
FKE Type of offense:			Place of offense:	AGM 7812
Type of offense:			Type of offense:	Place of offense:
				FKE
Blocking the path				Type of offense:
				Blocking the path

Result Test Data	A form for	Notification popup	The summons
	summons will	will be appeared	information
	appear.	starting from the	successfully
		first blank field.	recorded.

6.4.2.7 Car Daily Track Management

10.0	MALAYSIA				
Column S	TD7_CD_1	TD7_CD_2	TD7_CD_3	TD7_CD_4	
Name	NKA				
Test Case ID	TC7_CD_1	TC7_CD_2	TC7_CD_3	TC7_CD_4	
Les .	User click on	User click on	No data is	Correct data	
"PATA	vehicle in link	<i>vehicle out</i> link	inserted by the	is inserted	
ملاك	کل ملیسیا	ني تيڪنيھ	اونيونر سيي	by the user	
UNIVE	RSITI TEKNII	KAL MALAYS	Plate number:	Plate	
				number:	
				AGM 7812	
Result Test	A form for	A form for	Please insert at	The	
Data	search and	search and	least 3	information	
	record vehicle in	record vehicle	characters	successfully	
	will appear.	out will appear.	notification	records in	
			popup will	the system.	
			appear.		

Table 6.21 Test Data for Car Daily Track Management

6.4.2.8 Login Reporting

Table 6.22 Test Data for Login Reporting

Column Name	TD8_LR_1	TD8_LR_2	TD8_LR_3
Test Case ID	TC8_LR_1	TC8_LR_2	TC8_LR_3
	User click on login	User click on delete	
	<i>info</i> link	icon from the	
		selected information	
Result Test Data	Login information	The information	
	page will appear.	selected is deleted.	

6.4.2.9 Summons Reporting

Table 6.23 Test Data for Summons Reporting

Column Name	TD9_SR_1	TD9_SR_2		
Test Case ID	TC9_SR_1	TC9_SR_2		
UNIVERS	User click on summons per	Correct data is inserted by the		
	<i>date</i> link	user		
		Year: 2016		
		Month: 5		
Result Test Data	Summons reporting page will	A table of summons information		
	appear.	will be shown.		

6.4.2.10 Valid Period License Reporting

	1		
Column Name	TD10_VPR_1	TD10_VPR _2	TD10_VPR _3
Test Case ID	TC10_ VPR _1	TC10_ VPR _2	TC10_ VPR _3
	User click on	Correct data is	Click on search
	license information	inserted by the user	button
	link		
		Start date: 11-04-	
		2016	
MALAY	SIA 4.	Last date: 14-07-	
IIIE	E R	2016	
Result Test Data	Valid period license	A list of a valid	A list of a valid
E	reporting page will	period license will	period license will
Sta .	appear.	appear based on	appear based on
the later		range provided.	range provided.
اويتؤم سيتى تتكنيكل مليسيا ملاك			

Table 6.24 Test Data for Valid Period License Reporting

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6.5 Test Result and Analysis

Test result and analysis was included to record all the research on the Car Plate Number Recognition (CPNR) database system whether the test will generate successful or fail condition. All the prediction of this system will determine the system can operate more effectively.

6.5.1 User Authentication Management

Module / Component		Result			
Test Case ID	Test Data ID	Description	7	Success/date	Fail/date
TC1_UA_1	TD1_UA_1		IC or	√ (14/8/16)	
alte	[mulo 1]	password	dia.	mu nai	
TC1_UA_2	TD1_UA_2	Valid	IC	5. 05.	
UNIVE	RSITI TEKNI	number password	or	SI√(14/8/16)	√ (29/7/16)
TC1_UA_3	TD1_UA_3	IC number	or		
		password	is	√ (14/8/16)	
		blank			

Table 6.25 Test Result for User Authentication Management

6.5.2 User Registration Management

Module / Component		Result		
Test Case ID	Test Data ID	Description	Success/date	Fail/date
TC2_UR_1	TD2_UR_1	No input for all fields	√ (14/8/16)	
TC2_UR_2	TD2_UR_2	Valid input for all fields	√ (14/8/16)	

Table 6.26 Test Result for User Registration Management

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6.5.3 User Profile Management

Table 6.27 Test Result for User Profile Management

Μ	Module / Component		Result		
Test	Case	Test Data ID	Description	Success/date	Fail/date
ID	LINU				
TC3_	UP_1	TD3_UP_1	Click on [click here to		
			<i>update profile]</i> link	√ (14/8/16)	
TC3_	UP_2	TD3_UP_2	New input for existing	$\sqrt{(14/9/16)}$	
			data is inserted	√ (14/8/16)	

6.5.4 Vehicle Registration Management

Module / Component		Result		
Test Case ID	Test Data ID	Description	Success/date	Fail/date
TC4_VR_1	TD4_VR_1	Click on		
		register vehicle	√ (14/8/16)	
		link		
TC4_VR_2	TD4_VR_2	No input for all	. (14/9/16)	
		fields	√ (14/8/16)	
TC4_VR_3	TD4_VR_3	Valid input for	. (14/9/16)	
and the second se	CL PX	all fields	√ (14/8/16)	
TER	2			

Table 6.28 Test Result for Vehicle Registration Management

6.5.5 Sticker Registration Management

Table 6.29 Test Result for Sticker Registration Management

Module /	Component	KAL MALAY	Result AK	A
Test Case ID	Test Data ID	Description	Success/date	Fail/date
TC5_SR_1	TD5_SR_1	Click on <i>register</i>	√ (14/8/16)	
		<i>sticker</i> link	V (14/8/10)	
TC5_SR_2	TD5_SR_2	No input for all		
		fields	√ (14/8/16)	
TC5_SR_3	TD5_SR_3	Valid input for	√ (14/8/16)	
		all fields	v (14/0/10)	

6.5.6 Summons Management

Module / Component		Result		
Test Case ID	Test Data ID	Description	Success/date	Fail/date
TC6_SM_1	TD6_SM_1	Click on add	√(14/8/16)	
		summons link	V (14/0/10)	
TC6_SM_2	TD6_SM_2	No input for all	(14/9/17)	
		fields	√ (14/8/16)	
TC6_SM_3	TD6_SM_3	Valid input for	√ (14/8/16)	
at M	LAYSIA	all fields	V (14/8/10)	

Table 6.30 Test Result for Summons Management

6.5.7 Car Daily Track Management

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Table 6.31 Test Result for Car Daily Track Management

Module / C	Component		Result	_
Test Case ID	Test Data ID	Description	Success/date	Fail/date
TC7_CD_1	TD7_CD_1	Click on vehicle in link	√ (14/8/16)	
TC7_CD_2	TD7_CD_2	Click on vehicle out link	√ (14/8/16)	
TC7_CD_3	TD7_CD_3	No input for all fields	√ (14/8/16)	
TC7_CD_4	TD7_CD_4	Valid input for all fields	√ (14/8/16)	

6.5.8 Login Reporting

Module / Component		Result		
Test Case ID	Test Data ID	Description	Success/date	Fail/date
TC8_LR_1	TD8_LR_1	Click on login	√ (14/8/16)	
		<i>info</i> link	(14/0/10)	
TC8_LR_2	TD8_LR_2	Click delete	√ (14/8/16)	
		icon	v (14/0/10)	

Table 6.32 Test Result for Login Reporting

6.5.9 Summons Reporting

Table 6.33 Test Result for Summons Reporting

Module / Component		Result		
Test Case ID	Test Data ID	Description	Success/date	Fail/date
TC9_SR_1 UNIVE	TD9_SR_1 RSITI TEKNI	Click on summons per	SI (14/8/16)	Ą
		<i>date</i> link		
TC9_SR_2	TD9_SR_2	Valid input for all fields	√ (14/8/16)	

6.5.10 Valid Period License Reporting

Module / Component		Result		
Test Case ID	Test Data ID	Description	Success/date	Fail/date
TC10_VPR_1	TD10_VPR_1	Click on		
		license	(14/9/16)	
		information	√ (14/8/16)	
		link		
TC10_VPR_2	TD10_VPR_2	Correct input	√ (14/8/16)	
AL MA	LAYSIA	for all fields	V (14/8/10)	
TC10_VPR_3	TD10_VPR_3	Click on search	√ (14/8/16)	√ (29/7/16)
TEK	× ×	button	V(14/8/10)	(2)///10)
LEBER AND	(1)		GIVI	
ملاکے 6.6 Test analysi	کل ملیسیا	تيكنيه	ونيومرسيتي	9
		IKAL MALAY	SIA MELAK	A
UNIVE	ROTTERN	INAL WALAT	SIA WELAK	A

Table 6.34 Test Result for Valid Period License Reporting

Based on the test result above, there are some errors in the early stages of system development. Among them are all users are able to access the system even uses the ID and password that is not valid. This problem occurs because there is no control of the user in the coding and data entry does not conform to the data stored in the database,

Then there is an error in which data remains on display to the user when the search button is pressed. Once analyzed, this error occurs as a result of which no validation implement in the coding that will notify the user when entering the wrong data.

6.6 Conclusion

As the conclusion, testing is the essential part of every system development. The system developer needs to test the system with the client to verify the requirements in order to guarantee the system work effectively and proficiently. Throughout the testing result, the developer can analyze the system performance and fixed them if any error occurred. Other than that, to achieve customer satisfaction, the developer needs to make sure all the requirements are works and the system is useful for them.

It is very important to have user-friendly system between the customer and the system. The better the communication between the system and database will facilitate all the requests from customer to the system as well as to retrieve and manipulate data which based on authorization setting. Each stage has been explained in detail in this chapter.

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CHAPTER VII



7.1 Introduction

The last chapter will conclude of this project. Car Plate Number Recognition (CPNR) database system was successfully completed within the time given. This chapter will divide into several sub-topics. Firstly, it will explain on the weaknesses and strength of this system. Based on the weaknesses, the developer will take an action to enhance the system to ensure it is more beneficial for everyone. Secondly, recommendation for improvement will be described in the following sub-topic and lastly will state the project contribution for this system.

7.2 Observation on Weakness and Strength

Each system will have a value of its own advantages and disadvantages. The advantage is strength to the system while the disadvantage is a system weakness.

7.2.1 Strength

Below are some strength that have been identified in this system. There are:

- i. As a data repository for various information especially vehicle and owner information. This system will help security guard to recognize vehicle owner that move in and out from UTeM.
- ii. Facilitate the searching for user data through license plate number. A variety of data about the user are recorded in the system and the data are classified by its type. As the data is stored in a centralized database, it allows for data storage and retrieval.
- iii. This system will simplify the process of the sticker registration. Online registration is available all the time for those who want to bring the vehicle into UTeM especially to students and UTeM's staff. It is also very useful to anyone who wants to register at their appropriate time and place.
- iv. Provide useful information to staff, especially with the diversity report. This report helps the management to analyze peak hour and also find out which vehicle often in and out from UTeM.

v. This system is classified into two types of user. One is the management and another is the owner of the car. They have been categorized into two user levels and have different access to the system accordingly to its user level.

7.2.2 Weaknesses

Below are some weaknesses that have been identified in this system. There are:

- i. The system does not have a backup and recovery in the event of any problems. Data is not stored other in the database as well and it makes data easily lost and so causes other problems such as the detection of users who have registered in UTeM and identify incoming vehicles whether they are registered or not.
- ii. The system is not connected with incoming information in a real time. Thus, it makes difficult for the system to generate advances business intelligent to the user of the system.
- **iii.** The system cannot communicate with the device that captures plate number and process it until get useful data in order to identify owner information and validate the registration of the car. When there is no communication between them, data entry must be typed own.

7.3 Proposition for Improvement

There are few suggestions for improvement of this system so that the system run more smoothly and will give beneficial to users. Some of the proposed improvements to be implemented in the future are as below

- i. To solve the problem of data loss and data asynchronous, the system must implement a backup and recovery. It is important to ensure that data is always available at any time. In addition, if data is deleted, modified or stored, it should be recorded in the database.
- ii. In a case of users forgot their passwords, administrators must reset the password and enforce them to change after they managed to get into the system. This improves system security from other users intrudes into the system.

iii. Implement system prediction for future. Using existing information, it allows the system to make the prediction and thus produce very useful data. It also helps the users to develop a strategy for the future based on that prediction.

- iv. Send notification via text messaging and through email in case of a license has expired. This improvement will alert the user at that time and help them to renew their licenses before incurring to any legal action by the authorities.
- v. Link together with the image capture device and can be also implemented in a mobile phone. The security guard can control the system by using the mobile phone and it can be also carry everywhere.

7.4 Project Contribution

There are many project contributions that have been identified by this system. This system mainly contributes to the university as a system to store data of a vehicle registration in UTeM. One of them is, the system helps security guard to identify the authorized vehicles. The system uses the license plate number as input to find user information to replace the manual method in which a security guard must observe the sticker affixed to each vehicle entering.

The second contribution, the system provides registration sticker to those who want to register vehicles without having to go to the security office. After registering online, users need to go to the security office to claim sticker. It will also speed up the process as well as allow users to perform the registration without having to wait their turn.

Finally, this system will generate several of reports. Among them are user entrance by a person, summons per owner, sticker registration and valid license information report. These reports will help management to examine users trends which recorded the number they in and out from UTeM in a day, the number of summons has been charged to the user, place where accidents often occur and many others.

7.5 Conclusion

Overall, this system has achieved all the objectives that have been stated. The objectives consist of to develop a database for storing data in organized and be managed systematically, to allow find out other users availability by searching using plate number and to generate reports that needed by the officer.

After this system has completed, as a conclusion, this system has successfully met all the requirements and objectives that stated in the earlier development of the system. However, there are still some weaknesses in some parts of the system that need to be improved in the future. The improvements are essential to make the system more meaningful to the users. This is based on the factor of time constraints during development of the system.

Nevertheless, as long as this system meets the objectives stated, it indicates the system has reached its goal on why it is produced and be useful to users.

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