

**VEHICLE SERVICE MANAGEMENT SYSTEM
USING PRIORITY SCHEDULING**

NURNADIRAH BINTI NGAH

**BACHELOR OF COMPUTER SCIENCE
(SOFTWARE DEVELOPMENT)
UNIVERSITI SULTAN ZAINAL ABIDIN**

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NURNADIRAH BINTI NGAH

**Bachelor of Computer Science (Software Development)
Faculty of Informatics and Computing
University Sultan Zainal Abidin, Terengganu, Malaysia**

MAY 2018

DECLARATION

I hereby declare that this report is based on my original work except for quotations and citations, which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at University Sultan Zainal Abidin or other institutions.

NAME: NURNADIRAH BINTI NGAH

DATE: MAY 2018

CONFIRMATION

This is to confirm that:

The research is conducted and the writing of this report was under my supervision.

NAME: PUAN ROHANA BINTI ISMAIL

DATE: MAY 2018

DEDICATION

I would like to dedicate my project to my beloved mother and father, who have taught me that everyone is human, no matter what they look like, or where they come from. I would also like to dedicate this to my friends, especially Empire's Member, Syamim Ikhwan who have inspired me to do many things this year and to try things I have never dared to try this year. Not to forget my respectful supervisor, Puan Rohana Binti Ismail, who help me through a lot in my journey of finishing this project.

ABSTRACT

Nowadays, the population of human on earth are increase. Most of them have their own vehicle. So, the vehicle service centre might be busy especially during festive seasons. Unfortunately, the older version of this system used manual guideline which can lead to unsorted task for repairs. Staff also will not have enough hands to handle many customers at the same time. Thus, with the existing of Vehicle Service Management System Using Priority Scheduling, vehicle service centre management can be managed easily. The objectives of this system are to design and develop a new system which can help to manage task in more organize with Priority Scheduling technique. This way, the task can be handling according to priority of booking time. It is also to implement a system where the staffs who handle the repair task and distribute the task accordingly. The system will assign the repair task to the staff that did the least job for the day. This system will use Priority Scheduling technique which is use to distribute job task and job schedule. In conclusion, the system will be able to help the company to manage repairs and staffs compared to the older system which is use manual guideline.

ABSTRAK

Pada masa kini, populasi manusia semakin meningkat. Malahan mereka mempunyai kenderaan sendiri yang akan menyebabkan pusat servis kereta agak sibuk terutama pada musim perayaan dan musim cuti sekolah. Malangnya, pusat servis kereta sebelum ini masih menggunakan garis panduan manual yang akan menyebabkan kerja membaiki kereta di pusat servis kereta tidak tersusun dan tidak terurus. Selain itu, kakitangan atau pekerja pusat servis kereta juga tidak akan menang tangan untuk melayan pelanggan yang ramai pada satu masa yang sama. Oleh itu, dengan adanya Sistem Pengurusan Pusat Servis Kereta menggunakan ‘Priority Scheduling’, pengurusan pusat servis kereta dapat diuruskan dengan mudah. Objektif membangunkan sistem ini adalah untuk membantu pihak pengurusan menguruskan pusat servis kereta dengan sistematik dan teratur menggunakan ‘Priority Scheduling’. Di samping itu, tugas membiki kereta boleh dikendalikan mengikut keutamaan masa tempahan. Sistem ini akan memberikan tugas membaiki kereta kepada mekanik yang melakukan pekerjaan paling sedikit pada hari tersebut. Sistem ini akan menggunakan teknik ‘Priority Scheduling’ yang mengagihkan tugas kerja dan jadual kerja kepada mekanik secara adil. Kesimpulannya, sistem ini dapat membantu syarikat untuk menguruskan pusat servis kereta dengan sistematik berbanding dengan sistem lama yang menggunakan garis panduan manual.

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LIST OF ABBREVIATIONS / TERMS / SYMBOLS

CD	Context Diagram
DFD	Data Flow Diagram
ERD	Entity Relationship Diagram
FCFS	First Come First Serve
ANN	Artificial Neural Network

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CHAPTER 1

INTRODUCTION

1.1. BACKGROUND

The increase of vehicles productions in the domestic and worldwide market have boosted the confidence of auto ancillary units and vehicles servicing sector. As the servicing of existing vehicles population is an essential activity, there is large scope in this area given the increasing number of vehicles of the road year after year. A vehicles services station has to have facilities to service the vehicles, such as necessary equipment facilitating, wheel alignment etc. Automobile Service Management System provides necessary services to the service station for efficient management.

Here in Malaysia, there are lots of holiday festivals throughout the year. People with families will gather around together to celebrate the holidays. Some will have to travel in order to return home to their families. But sometimes, the car service center might be busy especially during festive seasons since a lot of people decide to service their vehicles at the same time.

Unfortunately, the older version of this system used manual guideline which can lead to unsorted task for repairs. Staff also will not have enough hands to handle many customers at the same time. The proposed of the Vehicles Service Centre Management System is to help the staffs to manage the tasking more organize with Priority Scheduling technique. Besides, all the data will be kept in a database of the system. Information can easily be retrieved in lesser time. Document and report preparation can also be prepared in lesser time as well. It solves the problem of the existing system and provides better information support for management.

This system involved four users which are admin, clerk, mechanic and customer. Admin has authority to add new staff to the system. They also can view all the reports that involved in this system. The clerk will manage customer that came to vehicles service center and confirm the repair schedule. The clerk also will manage all the payment and print the receipts for the customer. The mechanic will manage the given task by repairing the vehicles that will be assigned by using Priority Scheduling Technique. When the repaired task was done, they will update the repair status. After the login process, they need to punch the card through this system which indicates that they are already at the service centre and ready for the task. They also can manage their profile and change the password. The customer can register and log into the system. After that, they can book a date to service their vehicle. They also can view their vehicle's report.

1.2. PROBLEM STATEMENT

Nowadays, most of the vehicles service centers are currently done manually and our time to consume. Files are kept in file cabinets, which is hard to search for. The same information must be written many times for different documents, that is redundant work. Furthermore, the manual system also can lead to unsorted task for repairs. The normal repair process will usually be done by first in first out order and sometimes can lead to inefficient schedule management which could be handled better. One more problem with the current manual management system, the staff will not have enough hands to handle many customers at the same time. The distributions of works among the workers are not done efficiently based on the even number of tasks already done that day.

1.3. OBJECTIVES

The objectives of the Vehicle Service Centre Management System are:

1. To design a Vehicle Service Centre Management System using Priority Scheduling Technique.
2. To develop a web based systems to manage the task in more organize.
3. To test the functionality of the system that includes Priority Scheduling Technique.

1.4. SCOPE

The main scopes of the system:

1.4.1. ADMIN

Admin will be able to log into the system. Admin has authority to add new staff to the system. Besides, admin can manage service that want to provide in the system. They also can view all the reports that involved in this system.

1.4.2. CLERK

The clerk can log into the system after registered by admin. They can manage their profile and change password. The clerk will manage customer that came to vehicles service center and confirm the repair schedule. The clerk also will manage all the payment and print the receipts for the customer.

1.4.3. MECHANIC

The mechanics that are registered by admin can log into the system to manage the given task by repairing the vehicles that will be assigned by using Priority Scheduling Technique. When the repaired task was done, they will update the repair status. After the login process, they need to punch the card through this system which indicates that they are already at the service centre and ready for the task. They also can manage their profile and change the password.

1.4.4. CUSTOMER

The customer can register and log into the system. After that, they can book a date to service their vehicle and select the damage type that they want to repair. The customer will get notification when the repaired is done. They also can view their vehicle's report.

1.5. LIMITATION OF WORK

There are several limitation and constraint that occurred throughout the development of the system. These problem and limitations in conducting this study are:

1. The customer can book a repair service through the system with the limit of only ten persons per hour.
2. This system does not focus on stock management and does not keep track the quantity or type of car repair parts.

1.6. EXPECTED RESULT

The expected result following the development of the proposed system is as follows:

1. This system will be able to make the repair schedules more organized and improve productivity of the business.
2. This system will be able to manage staff including mechanic and distribute the tasks evenly to all the mechanics.
3. This system will be able to provide a status notification to customer when the repaired done.

1.7. THESIS STRUCTURE

This thesis consists of five chapters. Chapter one is introduced that contains project background, problem statement, objectives, scope and thesis structure. Chapter two is a literature review and discuss the technique and theory that had been carried out by another researcher and existing computer application that related to the on-going project. Chapter three is a methodology that discusses method or technique that are used in the project also design framework, specifying in detail design of development projects. Chapter four is the implementation of the project and the report of testing that had been done to the development system. Chapter five is the conclusion of the overall project followed by references.

CHAPTER 2

LITERATURE REVIEW

2.1. INTRODUCTION

This chapter provide the literature review for the system that will be developed. The literature review is a process of reading, analysing, evaluating and summarizing scholarly material about a specific. It can be a guideline to develop a new system so that the new system can provide better or more functional than existing system.

2.2. RESEARCH COMPARISON

There are several journals related to the topic of the system that will be develop. Many of them use different ways to make the appointment. There are some advantages and disadvantages that we can analyse and then try to think for the added value that we can apply in the system that we will develop.

Bill	Title	Author	Description	Method	Advantages	Disadvantages
1	Priority Dispatch Scheduling in an Automobile Repair and Maintenance Workshop	Akinyemi Olasunkanmi O, Koyejo Oyebola T (2011)	To minimize the completion time of jobs, mean flow time, lateness of jobs and processing cost. The repair task will be processed on time by the right man-right time-right place-right cost using priority scheduling technique.	Priority Scheduling	Ease to manage the schedule for mechanics.	The jobs are classified according to the distance covered only.
2.	Scheduling of Mechanics in Automobile Repair Shops Using ANN	N. Shivasankaran and P. Senthilkumar (2014)	This paper investigates by an artificial neural network for selecting mechanic in a car repair shop and quoting the reliable due date to the customer by considering the various complaints raised by the customer, complaints traced out by the expert mechanics during the initial inspection, mechanics available for service, Vehicle in queue for service and workload of individual mechanics.	Artificial Neural Network (ANN)	<ul style="list-style-type: none"> - Response time is very fast for trained neural net. Predictions are extrapolated from the past experience and are reliable 	Carefully prepared training sets are needed for accurate prediction Extensive knowledge base and expert advice has to be formulated in the form of a knowledge base

3	Online Medical Appointment for Pusat Kesihatan Unisza Using Mobile Application	Muhammad Kamal Arif Bin Razali (2017)	To develop an online medical appointment using mobile application that can make their appointment with the doctor via online with the addition function that is student reminders that can help reduce missed appointments. A priority scheduling is implemented in Online Medical Appointment for Pusat Kesihatan UniSZA system during the process of queue the disease type that will be chosen by student. The most chronic diseases will be set into the highest priority.	Mobile Application and Priority Scheduling	Ease to book a date for appointment process via online from any mobile. Able to reschedule the appointment and the user will get the notification if the appointment is rescheduled.	Limited for only certain user
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Table 2.1: Research Comparison

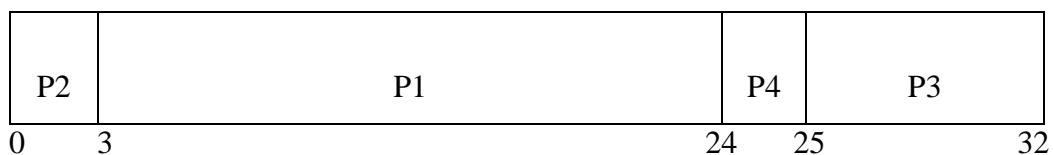
2.3. PRIORITY SCHEDULING

Priority scheduling is a method of scheduling processes based on priority. In this method, the scheduler chooses the tasks to work as per the priority which is different from other types of scheduling, for example, a simple round robin. Priority scheduling involves priority assignment to every process, and processes with higher priorities are carried out first, whereas tasks with equal priorities are carried out on a first-come-first-served (FCFS) or round robin basis.

- Priority is assigned for each process.
- Process with highest priority is executed first and so on.
- Process with same priority are executed in FCFS manner.
- Priority can be decided based on memory requirements, time requirements or any other resource requirement.

PROCESS	BURST TIME	PRIORITY
P1	21	2
P2	3	1
P3	6	4
P4	2	3

The Gantt chart for following processes based on priority Scheduling will be:



The average waiting time will be $(0 + 3 + 24 + 26) / 4 = 13.25$ ms.

The difference between a priority scheduling and the normal scheduling is the priority scheduling based on values comes out in order by priority instead of being a “first-in-first-out” data structure. A priority scheduling is implemented in Vehicle Service Management System during the process of the queue the service type that will be chosen by the customer. The appointment that has the lowest estimated time will be set into the highest priority. Besides, the task also will be assigned to the mechanic that has the least job at that time. The main problem with priority scheduling is starvation which is low priority order may never execute [10]. A solution to this problem is aging, as time progress the priority of the order in the ready queue is increased [11]

2.4. SUMMARY

This chapter discusses an overview about the concept of the system. Literature review is important to help the developer to know the problem from the previous system that can improves or the flow of the new system. Besides, it helps the developer in understanding the system and the chosen techniques more.

As the conclusion, Priority Scheduling is the most suitable method to use in developing Vehicle Service Management System. Priority scheduling is a method of scheduling processes based on priority. By using this method, Vehicle Service Management System will be able to make the repair schedules more organized and improve productivity of the business, will be able to manage staff including mechanic and distribute the tasks evenly to all the mechanics. This system also will be able to provide a status notification to customer when the repaired done.

CHAPTER 3

METHODOLOGY

3.1. INTRODUCTION

In this section, the methodology that has been used to develop Vehicle Service Centre Management System using Priority Scheduling is described. The use of the methodology is to solve the entire problem arising and to ensure that the project will work smoothly and can be completed within the given time. There are many types of methodology that can be applied and used in the system development. The approach must be chosen correctly for the project. It is important to guide the researcher to manage the given task. Hence, the Waterfall Model is used for this project. Furthermore, every details about each phase that involve in the development of this project and the system requirement will be explained later in this chapter.

3.2. RESEARCH PARADIGM AND JUSTIFICATION

Waterfall model is a model which was developed for software development. The basic idea it is called as such because the model develops systematically from one phase to another phase in downwards style like a waterfall. The phases consist of definition study or analysis, basic design, technical design, construction and implementation, testing, integration, and maintenance.

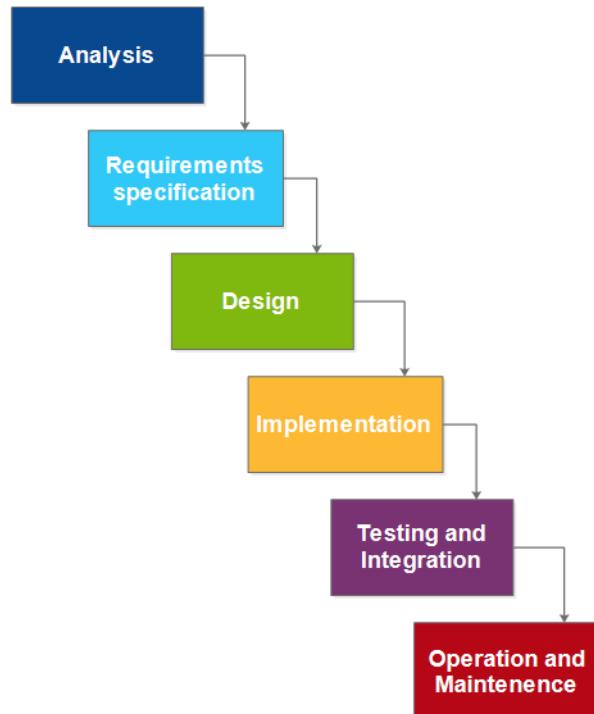


Figure 3.1:Waterfall Model

Waterfall model has been chosen based on the following consideration:

1. Project Monitoring

- Each phase of the development is monitored from time to time to ensure all the system module match earlier system requirement.

2. Allow changes

- Any changes in developing the system can be implemented at every phase to improve the functionality of the system.

3. Save cost

- The development of the system can save the cost because the information collected at each phase is very particular until the final test of the system.

3.3. SYSTEM DEVELOPMENT METHODOLOGY/SOFTWARE

This project used Structured Analysis and Design Methodology (SADM) by applying waterfall model. This methodology is adaptable to time given for complete the task. It starts with the planning, requirement analysis, design, implementation and testing as well as operation and maintenance phase. Every phase must fulfil the requirement specification. After the system complete, it will undergo maintenance as final test.

3.3.1. PLANNING PHASE

The objective of this phase is to plan on how to develop a system named as Vehicle Service Management System using Priority Scheduling. This system will be developed for mechanics and customers as a facility for customers to book a date for appointment before coming to vehicle service center and distribute the tasks to all the mechanics.

3.3.2. REQUIREMENT ANALYSIS PHASE

The objective of this phase is to gather the entire requirement needed to develop the system and analyse the existing system. In this phase, the information gathered regarding on online booking and the way to implement the scheduling technique are collected based on the analysis from previous research to improve the understanding about the system that will be developed. To gain more understanding about the existing vehicle service management system, an observation of the real system and interview from the owner and the workers of vehicle service center has been done. The center is located at Kg Durian Burung. It is done to see and learn on how the real system is performed.

3.3.3. DESIGN PHASE

Design phase contains several diagrams to show the process of the system will function. This project will be divided into three types of design that are Process Design, Database Design, and Interface Design. In Process Design, the criteria involved are Context Diagram, Data Flow Diagram (DFD) Level 0, Data Flow Diagram (DFD) Level 1, Data Flow Diagram (DFD) Level 2, Data Decomposition and Algorithm that will be applied in this project. In Database Design, the criteria involved are Entity Relationship Diagram (ERD) and Data Dictionary. For Interface Design, the criteria that involved are Homepage design, Menu design, Input form design and Output design. These diagram and items listed above is a guide for user to understand the flow of the system. The database for the overall system also will be developed at this phase.

3.3.4. IMPLEMENTATION PHASE

This phase will transform the design into a real implementation. The project is will be developed by using Java programming. JSP language will be used to link the web-based on the database by using MySQL as the platform for the database and XAMPP as the localhost server. Scheduling technique will be implemented to manage the time scheduler. If the date is less than the current date, no booking can be made. Some validation will be added to make sure the request information that we need from the user to make the booking date is true so that the appointment can be done successfully.

3.3.5. TESTING PHASE

After writing the code, the system module is tested by using single unit testing to test the single module of the system. Then, the integration testing is conducted to test the integrated modules. After that, system testing is conducted to test error of the whole system. Any errors or bugs will be fixed and the system will repeat the testing phase until there none of errors and bugs is founds. The finishing of the testing phase will be released the first version of the system

3.3.6. DEPLOYMENT PHASE

After the system is bug-free, the system can be released and users can use the system. Once the system is in the steady state, it is reviewed that the system has met all the goals, requirement and the objective of the project plan satisfactory results.

3.4. SYSTEM REQUIREMENTS

3.4.1. SOFTWARE REQUIREMENTS

LIST OF SOFTWARE NEEDED:

NO.	SOFTWARE	PURPOSE
1.	Netbean IDE 8.0.1	Editor to write code program
2.	XAMPP Server	Act as a local server to run and test the application
3.	MySQL	Platform for the database of the application
4.	UC Browser / Google Chrome	A browser to run the localhost and searching for information
5.	Edraw Max	A tool to create figures and diagram such as Context Diagram, DFD and ERD
6.	MySQL Workbench	A tool to create ERD and SQL command for database
7.	- Microsoft Word 2010 - Microsoft PowerPoint 2010	Platform for documentation of system
8.	Balsamiq Mockups 3	Platform to design the interface
10.	Snipping Tool	Used to captured and screen shot the images

Table 3.1: List of Software Requirements

3.4.2. HARDWARE REQUIREMENTS

LIST OF HARDWARE NEEDED:

NO.	HARDWARE	PURPOSE
1.	Laptop	<ul style="list-style-type: none">- To develop, testing and implement the system- Documentation
2.	Printer	<ul style="list-style-type: none">- Print the document
3.	Pendrive and Hard Disk	<ul style="list-style-type: none">- Storage

Table 3.2: List of Hardware Requirements

3.5. PROCESS DESIGN

3.5.1. CONTEXT DIAGRAM

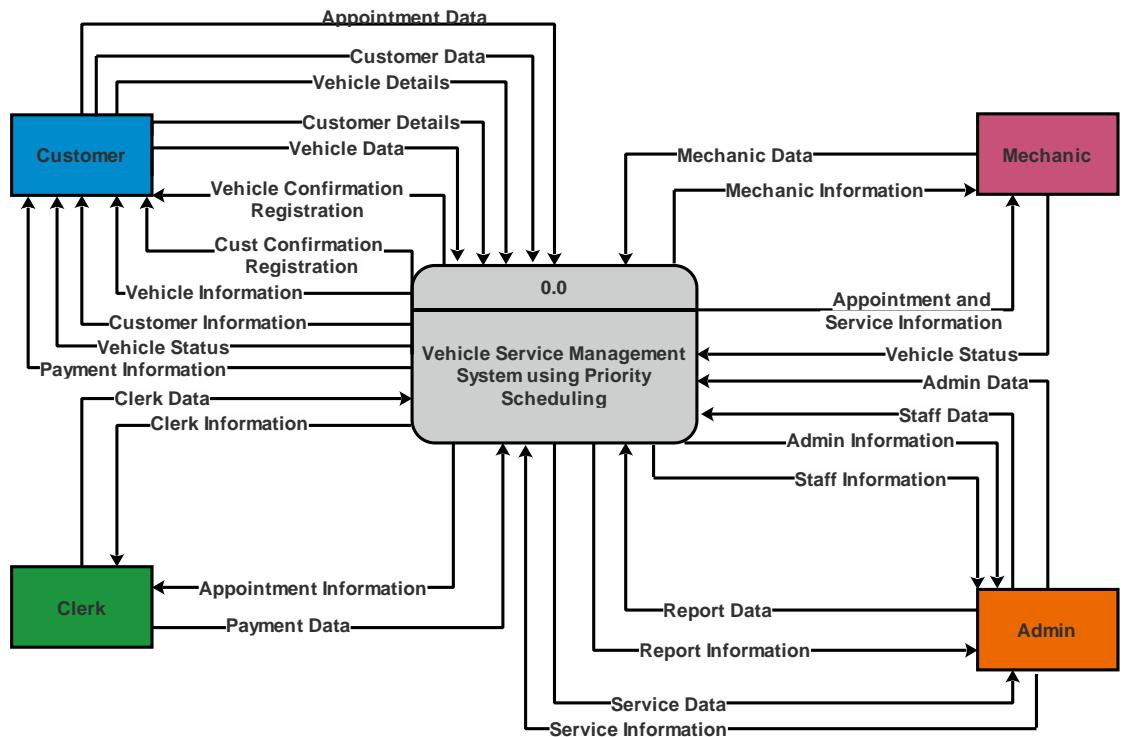


Figure 3.2: Context Diagram

Figure 3.2 above shows the Context Diagram for Vehicle Service Centre Management System data flow. There are four main users involved in this system which are Admin, Clerk, Mechanic, and Customer. All users are required to log in to the system in order to use this system. There are 29 data flows involved in the interaction between primal process and the users.

3.5.2. DATA FLOW DIAGRAM LEVEL 0

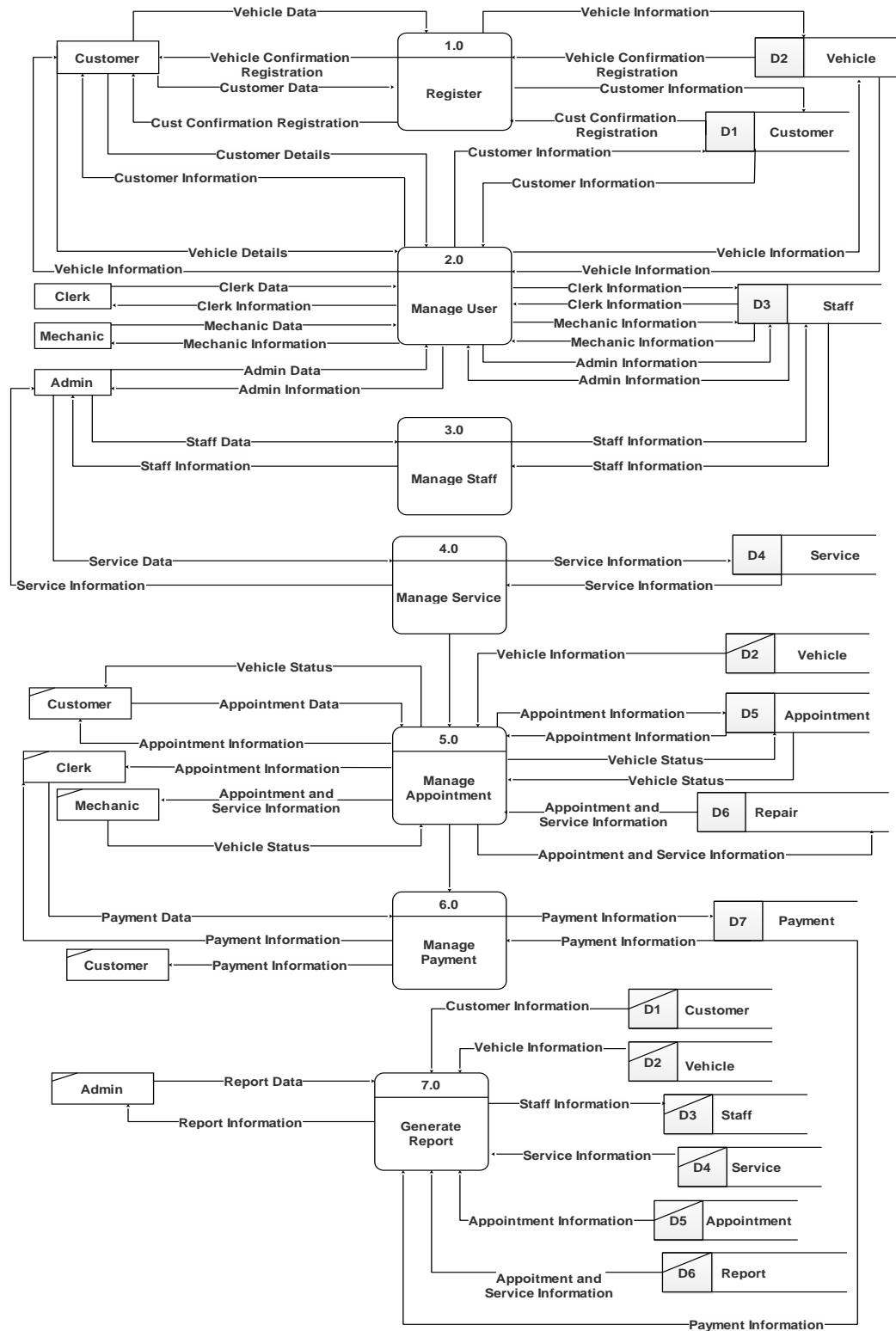


Figure 3.3: Data Flow Diagram (DFD) Level 0

Figure 3.3 shows the DFD Level 0 for Vehicle Service Centre Management System which represents the graphical flow of the data in the system. In DFD, all processes connect with an entity and data store which allows data flow from an external data sources or an internal data sources. This system has seven processes which are Register, Manage User, Manage Staff, Manage Service, Manage Appointment, Manage Payment and Generate Report. This system also has seven data store which is D1 for Customer that stored all customer information, D2 for Vehicle that stored all customer's vehicle information, D3 for Staff that stored all staff information, D4 for Service that stored all service information, D5 for Appointment that stored all appointment information, D6 for Repair that stored all appointment and service information and D7 for Payment hat stored payment that have been done from customer.

3.5.3. DATA FLOW DIAGRAM LEVEL 1

3.5.3.1. PROCESS 2.0: MANAGE USER

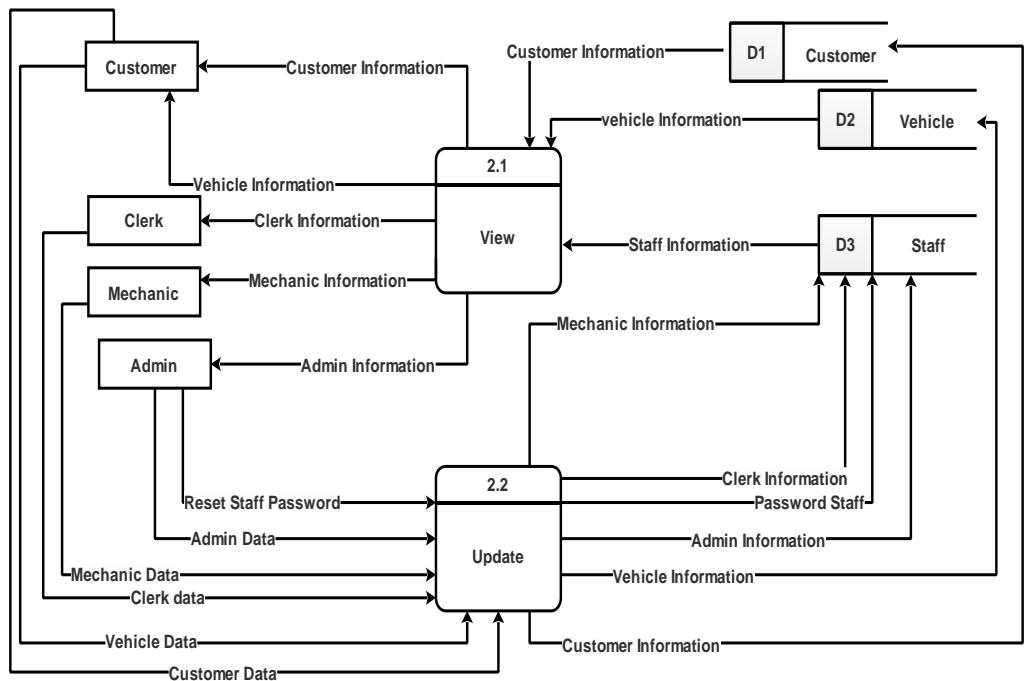


Figure 3.4 DFD Level 1: Manage User

Figure 3.4 above shows DFD Level 1 for process 2.0 Manage User for all four users. This process lets customer, admin, clerk and mechanic view and updates their profile. In other hand admin also can update the clerk and mechanic password in case they want to reset their password.

3.5.3.2. PROCESS 3.0: MANAGE STAFF

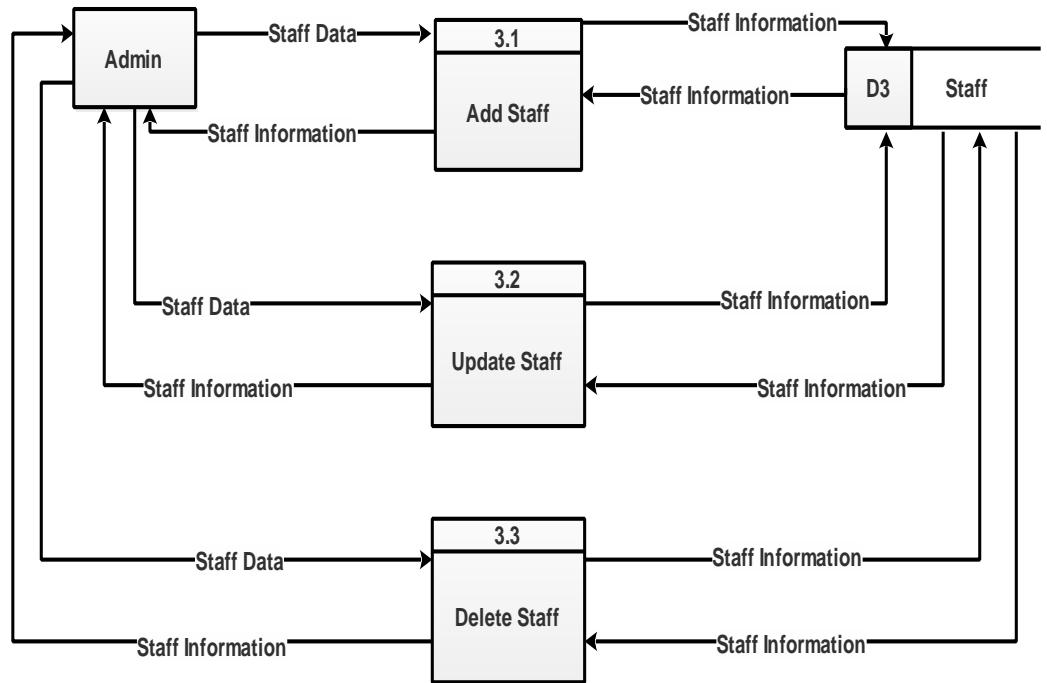


Figure 3.5 DFD Level 1: Manage Staff

Figure 3.5 above shows DFD Level 1 for process 3.0 Manage Staff for admin. This process lets the admin add, update and delete staff information. All the data will be saved in table Staff.

3.5.3.3. PROCESS 4.0: MANAGE SERVICE

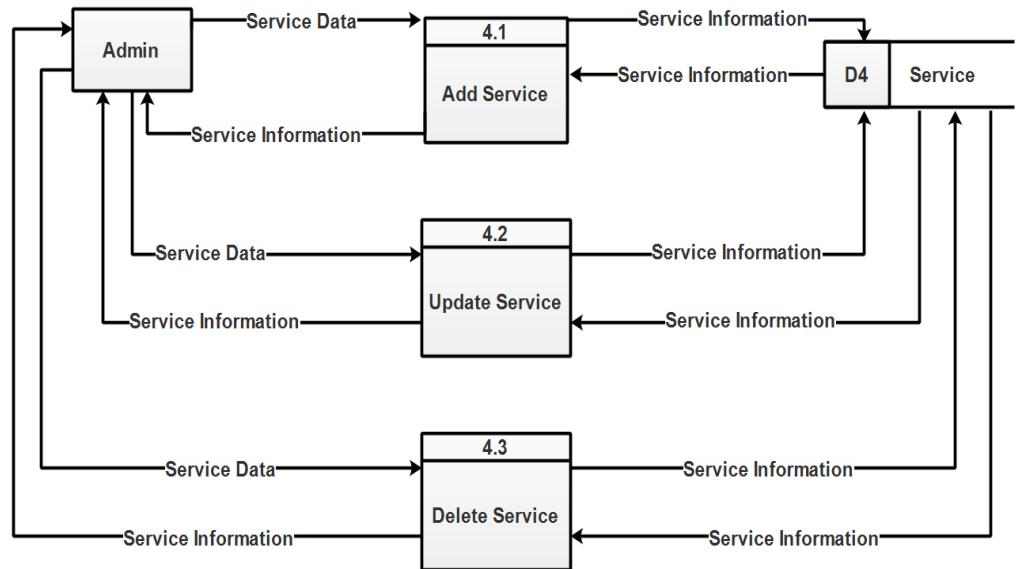


Figure 3.6 DFD Level 1: Manage Service

Figure 3.6 above shows DFD Level 1 for process 4.0 Manage Service for admin. This process lets the admin add, update and delete service information. All the data will be saved in table Service.

3.5.3.4. PROCESS 5.0: MANAGE APPOINTMENT

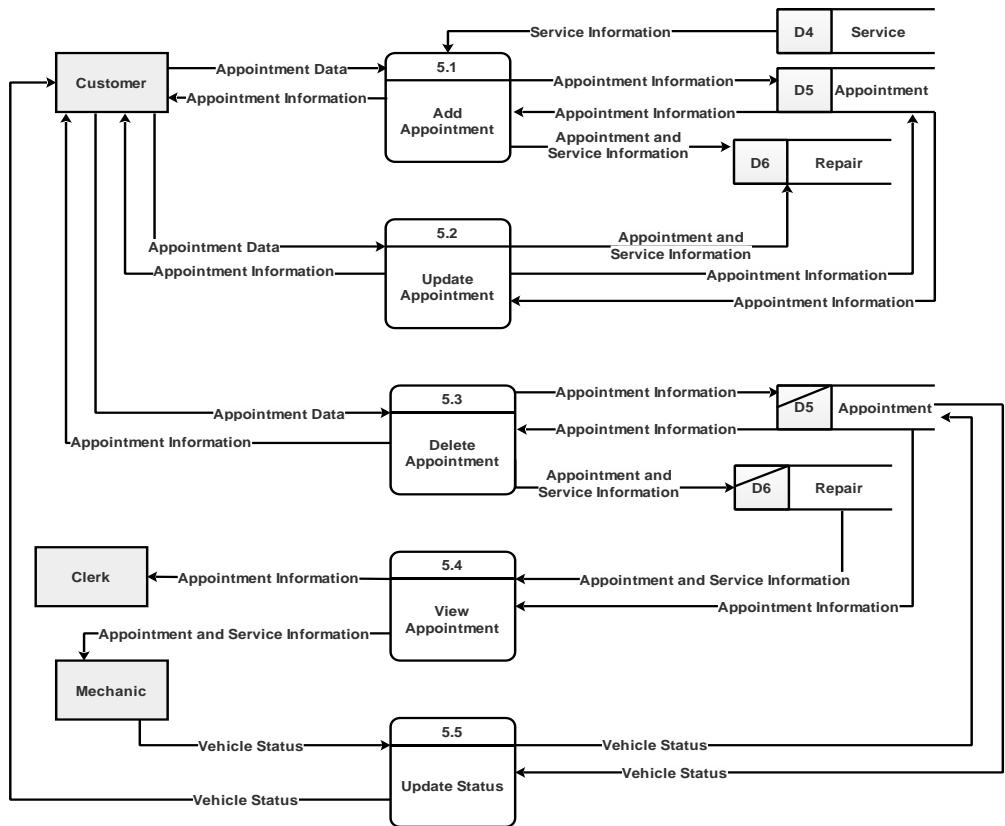


Figure 3.7 DFD Level 1: Manage Appointment

Figure 3.7 above shows DFD Level 1 for process 5.0 Manage Appointment that involves three users which are the customer, the clerk, and the mechanic. This process lets the customer add, update and cancel the appointment while clerk can view the appointment details to confirm that customer has made the appointment before come to the service center. The mechanic also can view the appointment and service details before doing their repair task. After the repair was done, the mechanic will update vehicle status and the customer will receive the notification and pick up their vehicle.

3.5.3.5. PROCESS 6.0: MANAGE PAYMENT

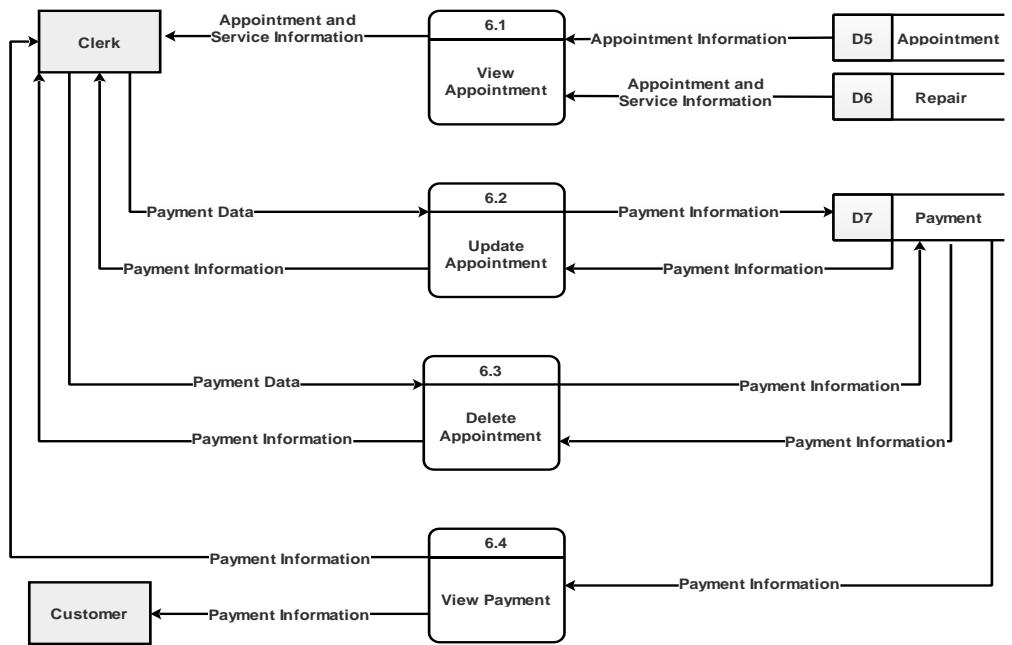


Figure 3.8 DFD Level 1: Manage Payment

Figure 3.8 above shows DFD Level 1 for process 6.0 Manage Payment that customer and clerk. This process lets the clerk view the appointment and manage payment for the customer. The clerk can add, view and update payment information while the customer can only view the payment information.

3.5.4. FRAMEWORK

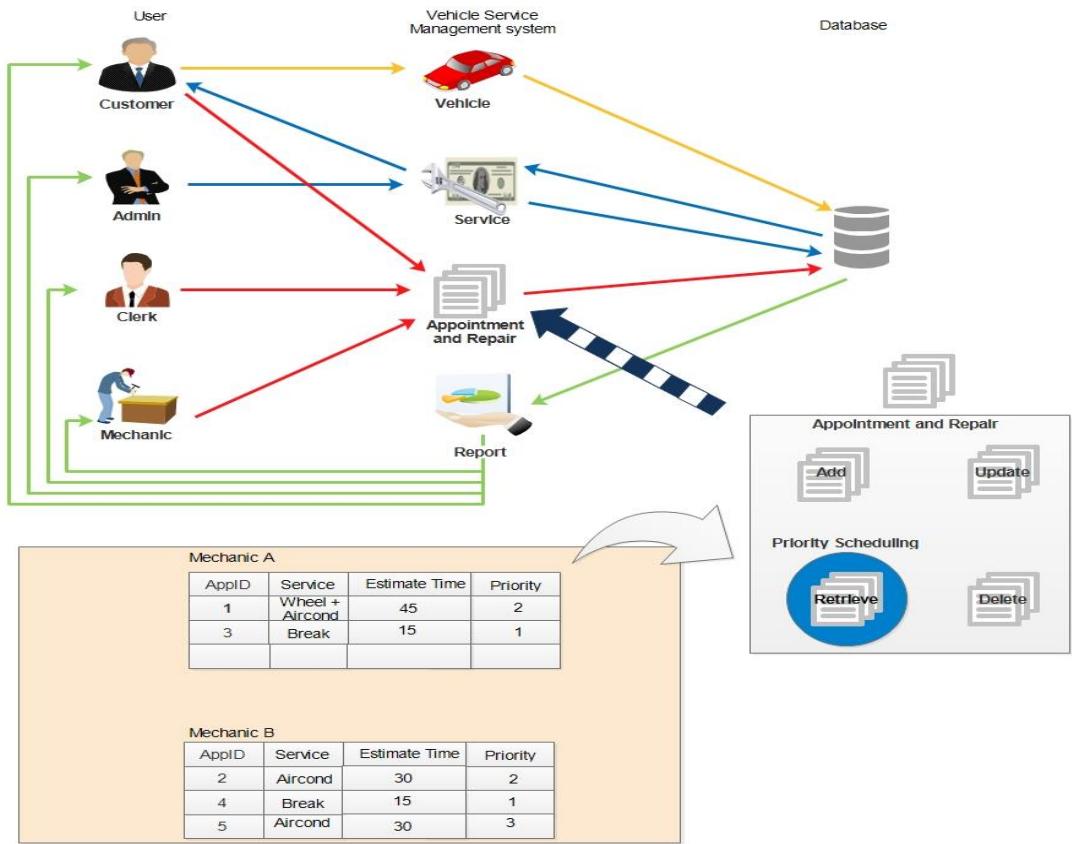


Figure 3.9: Framework

Figure 3.9 shows the framework for Vehicle Service Management System. In order to use this system, the admin, the clerk, the mechanic and the customer need to login to the system first. After succeeding authenticates the identification, the user can proceed with the next process provided.

Customer must register their own vehicle before making an appointment. The customer can choose the service that provided in the system that has been managed by admin. Next, the appointment will be handled by the clerk before the appointment will be assigned to the mechanic that has the least job at that time. The Priority Scheduling Algorithm will occur during the appointment process. This algorithm will help mechanic to list the appointment on the priority to make the system more efficient and systematic. The distribution of works among the workers can be done efficiently based on the even number of tasks already done that day.

3.5.5. ALGORITHM

This project will implement Priority Scheduling Approach. Priority scheduling is a method of scheduling processes based on priority. In this method, the scheduler chooses the tasks to work as per the priority which is different from other types of scheduling, for example, a simple round robin. Priority scheduling involves priority assignment to every process, and processes with higher priorities are carried out first, whereas tasks with equal priorities are carried out on a first-come-first-served (FCFS) or round robin basis.

The difference between a priority scheduling and the normal scheduling is the priority scheduling based on values comes out in order by priority instead of being a “first-in-first-out” data structure. A priority scheduling is implemented in Vehicle Service Management System during the process of the queue the service type that will be chosen by the customer. The appointment that has the lowest estimated time will be set into the highest priority. Besides, the task also will be assigned to the mechanic that has the least job at that time. The main problem with priority scheduling is starvation which is low priority order may never execute [10]. A solution to this problem is aging, as time progress the priority of the order in the ready queue is increased [11].

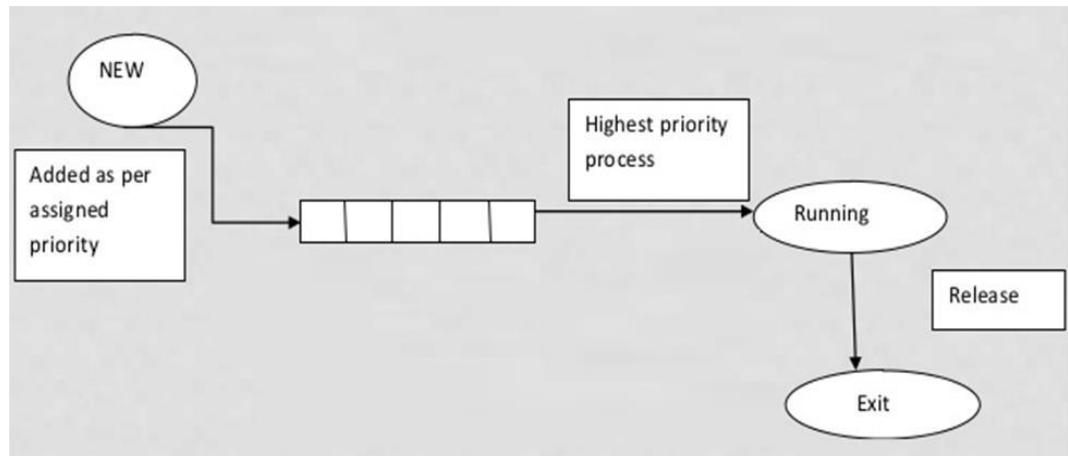


Figure 3.10: Basic Priority Scheduling

Figure 3.10 shows that basic of priority scheduling flow. First, every new appointment will be added to a ready queue. The appointment will be added on per assigned priority value. Then the highest priority appointment will be done. After the highest priority successfully processing it will be released or in other words, will be terminated from the ready queue.

3.6. DATABASE DESIGN

3.6.1. ENTITY RELATIONSHIP DIAGRAM

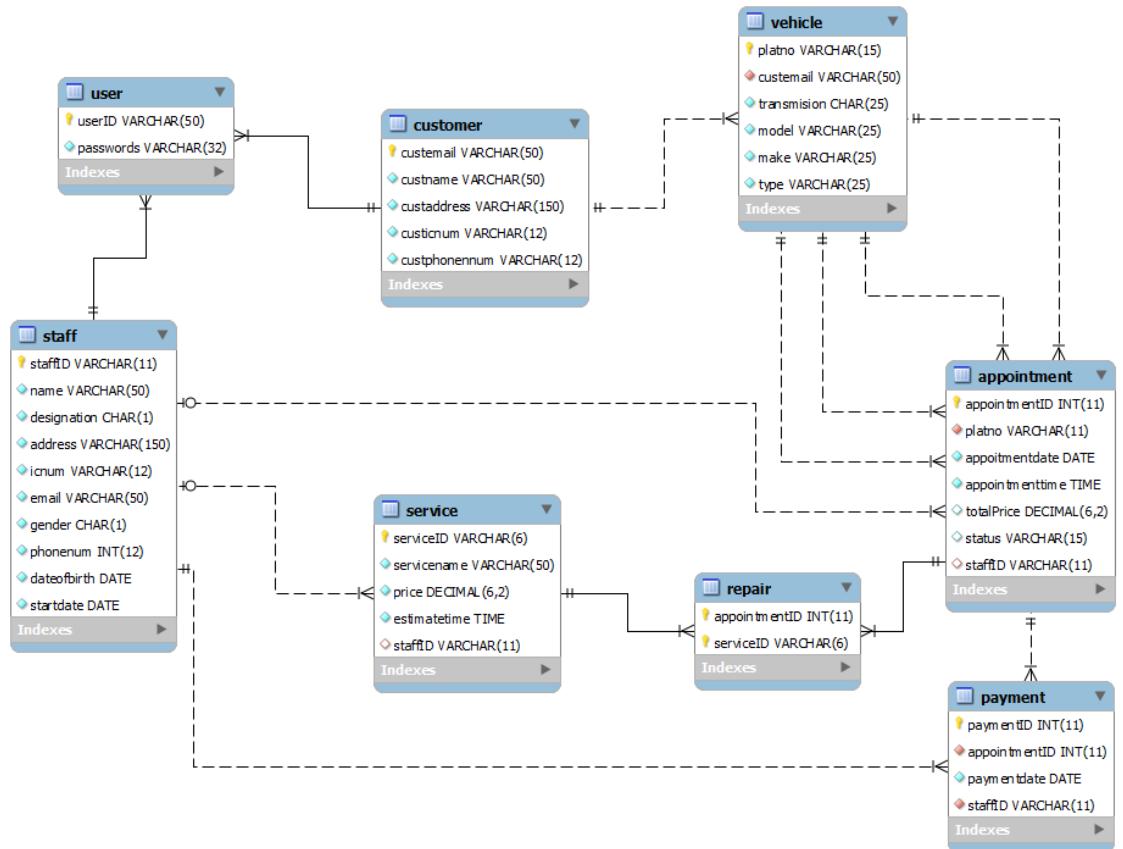


Figure 3.11 Entity Relationship Diagram (ERD)

Figure 3.11 above shows the ERD for Vehicle Service Management System. This system contains eight tables for a database which are User, Customer, Vehicle, Staff, Service, Appointment, Repair, and Payment. Each table has their own attributes. There are 2 attributes in table user, 5 attributes in table Customer, 6 attributes in table Vehicle, 10 attributes in table Staff, 5 attributes in table Service, 8 attributes in table Appointment, 2 attributes in table Repair and 4 attributes in table Payment. All data inserted will be saved in those tables in the database.

3.6.2. DATA DICTIONARY

Table	Action	Rows	Type	Collation	Size	Overhead
appointment		0	InnoDB	latin1_swedish_ci	48 KiB	
customer		0	InnoDB	latin1_swedish_ci	16 KiB	
payment		0	InnoDB	latin1_swedish_ci	48 KiB	
repair		0	InnoDB	latin1_swedish_ci	32 KiB	
service		0	InnoDB	latin1_swedish_ci	48 KiB	
staff		0	InnoDB	latin1_swedish_ci	16 KiB	
user		0	InnoDB	latin1_swedish_ci	16 KiB	
vehicle		0	InnoDB	latin1_swedish_ci	32 KiB	
8 tables	Sum				256 KiB	0 B

Figure 3.12: Table for Overall System

Figure 3.12 shows the overall table that will be used in this system. The database is named with dbcarservice. There are eight tables in dbcarservice database which is customer table, vehicle table, staff table, service table, appointment table, repair table, payment table and user table.

3.6.2.1. CUSTOMER

#	Name	Type	Collation	Attributes	Null	Default	Extra	Action
1	custemail	varchar(50)			No	None		Change Drop Primary Unique Index Spatial ▾ More
2	custname	varchar(50)			No	None		Change Drop Primary Unique Index Spatial ▾ More
3	custaddress	varchar(150)			No	None		Change Drop Primary Unique Index Spatial ▾ More
4	custicnum	varchar(12)			No	None		Change Drop Primary Unique Index Spatial ▾ More
5	custphonenum	varchar(12)			No	None		Change Drop Primary Unique Index Spatial ▾ More

Figure 3.13: Table for Customer

Figure 3.13 shows the table customer for dbcarservice database.

This table is used to store the customer information. This table has five fields which are custemail as primary key, custname, custaddress, custicnum and custphonenum.

3.6.2.2. VEHICLE

#	Name	Type	Collation	Attributes	Null	Default	Extra	Action
1	platno	varchar(15)			No	None		Change Drop Primary Unique Index Spatial Fulltext ▾ More
2	custemail	varchar(50)			No	None		Change Drop Primary Unique Index Spatial Fulltext ▾ More
3	transmision	char(25)			No	None		Change Drop Primary Unique Index Spatial Fulltext ▾ More
4	model	varchar(25)			No	None		Change Drop Primary Unique Index Spatial Fulltext ▾ More
5	make	varchar(25)			No	None		Change Drop Primary Unique Index Spatial Fulltext ▾ More
6	type	varchar(25)			No	None		Change Drop Primary Unique Index Spatial Fulltext ▾ More

Figure 3.14: Table for Vehicle

Figure 3.14 shows the table vehicle for dbcarservice database.

This table is used to store the customer's vehicle information. This table has six fields which are platno as primary key, custemail as foreign key from table customer, transmision, model, make and type.

3.6.2.3. STAFF

#	Name	Type	Collation	Attributes	Null	Default	Extra	Action
1	staffID	varchar(11)			No	None		Change Drop Primary Unique Index Spatial Fulltext More
2	name	varchar(50)			No	None		Change Drop Primary Unique Index Spatial Fulltext More
3	designation	char(1)			No	None		Change Drop Primary Unique Index Spatial Fulltext More
4	address	varchar(150)			No	None		Change Drop Primary Unique Index Spatial Fulltext More
5	icnum	varchar(12)			No	None		Change Drop Primary Unique Index Spatial Fulltext More
6	email	varchar(50)			No	None		Change Drop Primary Unique Index Spatial Fulltext More
7	gender	char(1)			No	None		Change Drop Primary Unique Index Spatial Fulltext More
8	phonenum	int(12)			No	None		Change Drop Primary Unique Index Spatial Fulltext More
9	dateofbirth	date			No	None		Change Drop Primary Unique Index Spatial Fulltext More
10	startdate	date			No	None		Change Drop Primary Unique Index Spatial Fulltext More

Figure 3.15: Table for Staff

Figure 3.15 shows the table staff for dbcarservice database. This table is used to store the staff information. This table has 10 fields which are staffID as primary key, name, designation, address, icnum, email, gender, phonenum, dateofbirth and startdate.

3.6.2.4. SERVICE

#	Name	Type	Collation	Attributes	Null	Default	Extra	Action
1	serviceID	varchar(6)			No	None		Change Drop Primary Unique Index Spatial More
2	servicename	varchar(50)			No	None		Change Drop Primary Unique Index Spatial More
3	price	decimal(6,2)			No	None		Change Drop Primary Unique Index Spatial More
4	estimatetime	time			No	None		Change Drop Primary Unique Index Spatial More
5	staffID	varchar(11)			Yes	NULL		Change Drop Primary Unique Index Spatial More

Figure 3.16: Table for Service

Figure 3.16 shows the table service for dbcarservice database. This table is used to store the service information. This table has five fields which are serviceID as primary key, staffID as foreign key from table staff, servicename, price and estimatetime.

3.6.2.5. APPOINTMENT

#	Name	Type	Collation	Attributes	Null	Default	Extra	Action
1	appointmentID	int(11)		No	None	AUTO_INCREMENT		Change Drop Primary Unique Index ▾ More
2	platno	varchar(11)		No	None			Change Drop Primary Unique Index ▾ More
3	appointmentdate	date		No	None			Change Drop Primary Unique Index ▾ More
4	appointmenttime	time		No	None			Change Drop Primary Unique Index ▾ More
5	totalPrice	decimal(6,2)		Yes	NULL			Change Drop Primary Unique Index ▾ More
6	status	varchar(15)		Yes	NULL			Change Drop Primary Unique Index ▾ More
7	staffID	varchar(11)		Yes	NULL			Change Drop Primary Unique Index ▾ More

Figure 3.17: Table for Appointment

Figure 3.17 shows the table appointment for dbcarservice database. This table is used to store the appointment information. This table has seven fields which are appointmentID as primary key and being set AUTO_INCREMENT, platno as foreign key from table vehicle, staffID as foreign key from table staff, appointmentdate, appointmenttime, totalPrice and status.

3.6.2.6. REPAIR

#	Name	Type	Collation	Attributes	Null	Default	Extra	Action
1	appointmentID	int(11)		No	None			Change Drop Primary Unique Index Spatial Fulltext ▾ More
2	serviceID	varchar(6)		No	None			Change Drop Primary Unique Index Spatial Fulltext ▾ More

Figure 3.18: Table for Repair

Figure 3.18 shows the table repair for dbcarservice database. This table is used to store the appointment and service information. This table has two fields which are appointmentID and serviceID as primary key, appointmentID as foreign key from table appointment, serviceID as foreign key from table service

3.6.2.7. PAYMENT

#	Name	Type	Collation	Attributes	Null	Default	Extra	Action
1	paymentID	int(11)			No	None	AUTO_INCREMENT	Change Drop Primary Unique Index ▾ More
2	appointmentID	int(11)			No	None		Change Drop Primary Unique Index ▾ More
3	paymentdate	date			No	None		Change Drop Primary Unique Index ▾ More
4	staffID	varchar(11)			No	None		Change Drop Primary Unique Index ▾ More

Figure 3.19: Table for Payment

Figure 3.19 shows the table payment for dbcarservice database. This table is used to store the payment information. This table has four fields which are paymentID as primary key and being set AUTO_INCREMENT, appointmentID as foreign key from table appointment, staffID as foreign key from table staff and paymentdate.

3.6.2.8. USER

#	Name	Type	Collation	Attributes	Null	Default	Extra	Action
1	userID	varchar(50)			No	None		Change Drop Primary Unique Index Spatial Fulltext ▾ More
2	passwords	varchar(32)			No	None		Change Drop Primary Unique Index Spatial Fulltext ▾ More

Figure 3.20: Table for User

Figure 3.20 shows the table user for dbcarservice database. This table is used to store the appointment and service information. This table has two fields which userID as primary key, userID as foreign key from table customer and staff and passwords.

3.7. SUMMARY

Based on this chapter, the methodology used for the project was elaborated. The system requirements that were used are also stated. Choosing methodology to be used for a system development is a crucial part in ensuring that the development starts off at a great pace. The suitable algorithm that will be used in this project also was elaborated.

The next step is the implementation of the system. The system will be developed by using Priority Scheduling algorithm to help mechanic to list the appointment on the priority to make the system more efficient and systematic. The distribution of works among the workers can be done efficiently based on the even number of tasks already done that day.

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APPENDIX A

ACTIVITY	WEEK														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Project title decision and meeting with supervisor															
2. Project Title Registration															
3. Discussion and writing for Chapter 1: Introduction															
4. Proposal Writing Chapter 2: Literature Review															
5. Presentation and Evaluation for proposal project															
6. Correction of the Proposal															
7. Proposed solution Chapter 3: Methodology															
8. Proof of Concept															
9. Seminar Preparation															
10. Seminar Presentation and Evaluation															
11. Finalizing Report of the Proposal															
12. Final Report Submission and Evaluation															

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