

**Web-based Commercial vehicle
fitness e-certificate issuing system for
Western Province (WCVFEIS)**

T.R.Hemasiri

2024



Web based Commercial vehicle fitness e-certificate issuing system for Western Province (WCVFEIS)

**A dissertation submitted for the Degree of Master
of Information Technology**

T.R.Hemasiri

University of Colombo School of Computing

2024



Declaration

Name of the student:	Thilini Radhika Hemasiri
Registration number:	2020/MIT/038
Name of the Degree Programme:	Master of Information Technology
Project/Thesis title:	Web based Commercial vehicle fitness e-certificate issuing system for Western Province (WCVFEIS)

1. The project/thesis is my original work and has not been submitted previously for a degree at this or any other University/Institute. To the best of my knowledge, it does not contain any material published or written by another person, except as acknowledged in the text.
2. I understand what plagiarism is, the various types of plagiarism, how to avoid it, what my resources are, who can help me if I am unsure about a research or plagiarism issue, as well as what the consequences are at University of Colombo School of Computing (UCSC) for plagiarism.
3. I understand that ignorance is not an excuse for plagiarism and that I am responsible for clarifying, asking questions and utilizing all available resources in order to educate myself and prevent myself from plagiarizing.
4. I am also aware of the dangers of using online plagiarism checkers and sites that offer essays for sale. I understand that if I use these resources, I am solely responsible for the consequences of my actions.
5. I assure that any work I submit with my name on it will reflect my own ideas and effort. I will properly cite all material that is not my own.
6. I understand that there is no acceptable excuse for committing plagiarism and that doing so is a violation of the Student Code of Conduct.

Signature of the Student	Date (DD/MM/YYYY)
	24.09.2024

Certified by Supervisor(s)

This is to certify that this project/thesis is based on the work of the above-mentioned student under my/our supervision. The thesis has been prepared according to the format stipulated and is of an acceptable standard.

	Supervisor 1	Supervisor 2	Supervisor 3
Name	Dr. K A K T Karunanayaka		
Signature			
Date	30/09/2024		

Abstract

The Web-based Commercial Vehicle Fitness e-certificate Issuing System for Western Province (WCVFEIS) addresses the limitation of the manual process of vehicle fitness certificate issuing. The renewal process of revenue commercial vehicle licenses, unlike other vehicles, requires vehicle fitness certificates in addition to standard renewal documents. If there is a fitness e-certificate, commercial vehicles can also be eligible for the online revenue license service provided by DMT. Renewal of registration of fitness garages annually, which is a time-consuming process with lots of paper work, is also addressed by this system. Modern society largely tends to computer technologies like the internet and web applications. If it is very useful to have a way of communication through the internet enabling online booking and online inquiry information about the services. Through this system, it is possible to improve the performance of the fitness garage and DMTWP, reduce costly paper work, increase user performance, and generate reports easily. A commercial vehicle owner doesn't have to waste time in the garage because they can make an online appointment for an inspection vehicle. And also, they can follow fitness e-certificate issuing status through this system. And also, fitness garages can request renewal of garage registration online. This system interacts with five users. They are Commissioner DMTWP, Subject Officer DMTWP, Vehicle Fitness Garage Owner, Certifying Officer, and Commercial Vehicle Owner. They have different roles in this system. This system was developed as a web-based system by using PHP, HTML, CSS, JavaScript, and MySQL technologies. As the web server, I used the XAMPP server. One of the most prominent features of this system is user-friendliness. Online booking, inquiring current status, and email notification facilities are user-friendly because they improve performance and give effective service to the user.

Acknowledgements

First and foremost, I express my special appreciation and thanks to my supervisor, Dr. (Mr.) K A K T Karunanayaka, who encouraged me from all corners. Also, I thank UCSC staff members, lecture panel, and special thanks to Dr. (Ms.) H N D Thilini for guidance and coordination.

And my deepest gratitude and appreciation goes to my dearest parents and the rest of my family who were beside me, always offering their help and guidance. I thank them for the inspiration given to open my mind to achieve this goal. This would have been an unachievable target without them.

Finally, I express my deepest appreciation to all those who made it possible for me to complete this project schedule.

Table of Contents

Declaration	i
Abstract	ii
Acknowledgements	iii
Table of Contents	iv
List of Figures	viii
List of Tables	xi
List of Acronyms	xii
Chapter 1 - Introduction	1
1.1 Project Overview	1
1.2 Motivation.....	1
1.3 Objectives	3
1.4 Background of the study	4
1.5 Scope of the Study	8
1.5.1 In scope.....	8
1.5.2 Out of Scope	10
1.6 Structure of the Dissertation	10
Chapter 2 – Background	1
2.1 Introduction.....	1
2.2 Requirement Analysis	1
2.2.1 User Groups and user characteristics	1
2.2.2 Functional Requirement	4
2.2.3 Non-functional requirements.....	8
2.2.4 Software requirement	8
2.2.6 Assumptions made with this system.....	9
2.3 Review of Similar Systems	10
2.3.1 Comparison between similar products	13
2.4 Related Technologies	14
2.4.1 Front End Development	14
2.4.2 Back End Development.....	15
2.4.3 Database Management	15
2.4.4 Web-based application.....	15
2.4.5 Client-server architecture	16
2.4.6 Development process model	16

2.6 Summary	17
Chapter 3 – Design	18
3.1 Introduction.....	18
3.2 Related design strategies.....	18
3.2.1 Web based approach	18
3.2.2 Iterative Waterfall Process Model	18
3.3 System Architecture	18
3.4 UML diagrams	20
3.4.1 Use Case Diagrams.....	20
3.4.1.1 Use Case Diagram for User Management Module	21
3.4.1.2 Use Case Diagram for Vehicle Fitness Garage and Fitness Certifying Officer Management Module	22
3.4.1.3 Use Case Diagram for Online Booking Management Module	23
3.4.1.4 Use Case Diagram for Vehicle Fitness Certificate and Inspection report Management Module	24
3.4.1.5 Use Case Diagram for Payment Management Module.....	25
3.4.1.6 Use Case Diagram for Report Management Module	26
3.4.1.7 Use Case Diagram for Feedback Management Module.....	27
3.4.1.8 Use Case Diagram for News /FAQ Management Module	28
3.4.2 ER diagram	29
3.4.3 Activity diagrams.....	31
3.4.3.1 Activity diagram for vehicle fitness e-certificate issuing.....	31
3.4.3.2 Activity diagram for Fitness garage and certifying officer renewal of registration.....	32
3.4.4 Sequence diagrams	32
3.4.4.1 Sequence diagram for vehicle fitness e-certificate issuing	33
3.4.4.2 Sequence diagram for Fitness garage and certifying officer renewal of registration	34
3.4.5 Class diagram	35
3.5 Database Design.....	37
3.6 User Interface Design	38
3.6.1 WCVFEIS Home Page Interface	38
3.6.2 DMTWP login Interface	39
3.6.3 Vehicle Fitness Garage login Interface	39
3.6.4 Commercial Vehicle Owner Login Interface	40
3.6.5 Commercial Vehicle Owner Sign Up Interface	41

3.6.6 Commercial Vehicle Owner Dashboard	42
3.6.7 Check the validity of Vehicle Revenue License Interface	42
3.6.8 Apply for Vehicle fitness e-Certificate Interface	43
3.6.9 Booking Vehicle Fitness garage Interface	44
3.6.10 Vehicle Fitness e-certificate issuing status Interface	44
3.7 Summary	44
Chapter 4 – Implementation	46
4.1 Introduction.....	45
4.2 Implementation Environment	45
4.2.1 Hardware requirements.....	45
4.2.2 Software requirement.....	45
4.2.2.1 XAMPP	45
4.2.3 Development Tools	46
4.2.3.1 Visual Studio Code.....	46
4.2.3.2 Draw.io	46
4.2.3.3 Adobe Photoshop CS5	46
4.2.4 Supported Browsers	46
4.2.5 Technology Selection.....	47
4.2.5.1 HTML	47
4.2.5.2 CSS	47
4.2.5.3 JavaScript.....	47
4.2.5.4 PHP	47
4.2.5.5 MySQL	48
4.3. Reused Components.....	48
4.3.1 Bootstrap 5	48
4.3.2 PHPMailer.....	49
4.3.3 TCPDF and mPDF	49
4.4 Codes Segments	49
4.5 Summary	51
Chapter 5 – Testing and Evaluation	52
5.1 Introduction.....	52
5.2 Related Testing Types	52
5.2.1 Unit Testing.....	52
5.2.2 Integration Testing	52
5.2.3 system Testing.....	52

5.2.4 Functionality Testing.....	53
5.2.5 Compatibility Testing.....	53
5.2.6 Security Testing.....	53
5.2.7 Performance Testing	53
5.2.8 User Acceptance Testing.....	53
5.3 Test Cases.....	53
5.3.1 Test Case for User Login	54
5.3.2 Test Case for User Registration	57
5.3.3 Test Case for Check the validity of vehicle revenue license.....	59
5.3.4 Test Case for Apply for Vehicle Fitness e-Certification.....	60
5.3.5 Test Case for Check e-certificate Issuing Status.....	63
5.3.6 Test Case for Download vehicle fitness e-Certificate.....	64
5.3.7 Test Case for Generate vehicle fitness e-Certificate	65
5.4 User Evaluation.....	66
5.4.1 Template of the user evaluation form	67
5.4.2 Graphs of User Evaluation Summary	70
5.5 Results of the Testing.....	75
5.6 Results of the Evaluation	75
5.7 Summary	76
Chapter 6 – Conclusion.....	77
6.1 Introduction.....	77
6.2 Critical review of achieved objectives	77
6.3 Learning experiences	78
6.4 Difficulties & Challenges	78
6.5 Future Work	78
6.6 Summary	78
List of References	79
Appendix A – User Manual	82
Appendix B – MIS Reports	109

List of Figures

Figure 1 - Manually issued Examination Report & Fitness Certificate.....	5
Figure 2- Flow chart of manual process	Error! Bookmark not defined.
Figure 3- Flow chart of WCVFE	Error! Bookmark not defined.
Figure 4 - Online Vehicle Revenue Licence Services – Sri Lanka	10
Figure 5 - Government of India MINISTRY OF ROAD TRANSPORT & HIGHWAYS.....	11
Figure 6 - Ministry of Transport – Ontario, Canada	12
Figure 7 - Government of Western Australia (WA) – Department of Transport.....	12
Figure 8 - Vehicle Licence Expiry Date Enquiry service	13
Figure 9 - Iterative Waterfall Model	17
Figure 10- Top level architecture of WCVFEIS	19
Figure 11- Use Case Diagram for User Management Module	21
Figure 12 - Use Case Diagram for Vehicle Fitness Garage and Fitness Certifying Officer Management Module	22
Figure 13 - Use Case Diagram for Online Booking Management Module	23
Figure 14 - Use Case Diagram for Vehicle Fitness Certificate and Inspection report Management Module	24
Figure 15 - Use Case Diagram for Payment Management Module.....	25
Figure 16 - Use Case Diagram for Report Management Module.....	26
Figure 17 - Use Case Diagram for Feedback Management Module	27
Figure 18 - Use Case Diagram for News /FAQ Management Module.....	28
Figure 19 - ER diagram of WCVFEIS.....	30
Figure 20 - Activity diagram for vehicle fitness e-certificate issuing.....	31
Figure 21 - Activity diagram for fitness garage and certifying officer registration.....	32
Figure 22 - Sequence diagrams for vehicle fitness e-certificate issuing.....	33
Figure 23 - Sequence diagrams for fitness garage and certifying officer registration.....	34
Figure 24 - Class diagram of WCVFEIS	Error! Bookmark not defined.
Figure 25 - Database structure of WCVFEIS	37
Figure 26 - WCVFIS Home Page Interface	38
Figure 27 - DMTWP login Interface.....	39
Figure 28 - Vehicle Fitness Garage login Interface.....	39
Figure 29 - Commercial Vehicle Owner Login Interface	40

Figure 30 - Commercial Vehicle Owner Sign Up Interface.....	41
Figure 31 - Commercial Vehicle Owner Dashboard.....	42
Figure 32 - Check the validity of Vehicle Revenue License Interface.....	42
Figure 33 - Apply for Vehicle fitness e-Certificate Interface.....	43
Figure 34 - Booking Vehicle Fitness garage Interface.....	44
Figure 35 - Vehicle Fitness e-certificate issuing status Interface.....	44
Figure 36 - Database Connection Code segment.....	49
Figure 37 - Sign up code validation segment.....	50
Figure 38 - email notification code segment.....	51
Figure 39 - Template of the user evaluation form.....	69
Figure 40 - Evaluation Feedback Summary - Question 1.....	70
Figure 41 - Evaluation Feedback Summary - Question 2.....	70
Figure 42 - Evaluation Feedback Summary - Question 3.....	70
Figure 43 - Evaluation Feedback Summary - Question 4.....	71
Figure 44 - Evaluation Feedback Summary - Question 5.....	71
Figure 45 - Evaluation Feedback Summary - Question 7.....	72
Figure 46 - Evaluation Feedback Summary - Question 8.....	72
Figure 47 - Evaluation Feedback Summary - Question 9.....	72
Figure 48 - Evaluation Feedback Summary - Question 10.....	73
Figure 49 - Evaluation Feedback Summary - Question 11.....	73
Figure 50 - Evaluation Feedback Summary - Question 13.....	73
Figure 51 - Evaluation Feedback Summary - Question 14.....	74
Figure 52 - Evaluation Feedback Summary - Question 15.....	74
Figure 53 - Evaluation Feedback Summary - Question 16.....	74
Figure B.54- Report generating module interface for garage user	109
Figure B.55 - Booking report Generating interface	110
Figure B.56 - Garage Dashboard	110
Figure B.57 - Payment report generating interface.....	111
FigureB. 58 - Issued fitness e-certificate report generating interface.....	111
Figure B.59 – Fitness e-certificate view and download interface.....	112
Figure B 60 - Issued inspection report details generating interface.....	112
Figure B. 61 - Inspection Report view and download interface	113
Figure B.62 -Report generating module interface for DMTWP user	113
Figure B. 63 - Garage details report generating interface.....	114

Figure B.64 – Booking details report.....	114
Figure B. 65 - Payment details report	115
Figure B.66 - Issued Vehicle Fitness e-Certificate details report.....	115
Figure B.67 - Vehicle Fitness e-Certificate	116
Figure B.68 - Issued Vehicle inspection details Report	116
Figure B.69 - Vehicle Inspection Report.....	117

List of Tables

Table 1- Input Process Output of the system	9
Table 2 - Vehicle Fitness e-Certificate and Inspection Report Management user interaction ...	4
Table 3 -Online Booking Management User Interaction	5
Table 4 - Vehicle Fitness Garage and Vehicle Fitness Certifying Officer Management User Interaction	5
Table 5 - Payment Management User Interaction.....	6
Table 6 - Report management User Interaction	7
Table 7 - News /FAQ management User Interaction	7
Table 8 - Feedback management User Interaction.....	7
Table 9- Comparison between similar products.....	14
Table 10- Use Case Description for User Management Module	21
Table 11 - Use Case Description for Vehicle Fitness Garage and Fitness Certifying Officer Management Module	22
Table 12 - Use Case Description for Online Booking Management Module	23
Table 13 - Use Case Description for Vehicle Fitness Certificate and Inspection report Management Module	24
Table 14 - Use Case Description for Payment Management Module.....	25
Table 15 - Use Case Description for Report Management Module.....	26
Table 16 - Use Case Description for Feedback Management Module	27
Table 17 - Use Case Description for News /FAQ Management Module.....	28
Table 18- Hardware requirements.....	45
Table 19 - Software requirement.....	45
Table 20 - Development Tools	46
Table 21- Test Case for User Login	56
Table 22 - Test Case for User Registration	58
Table 23 - Test Case for Check the validity of vehicle revenue license	59
Table 24 - Test Case for Apply for Vehicle Fitness e-Certification	62
Table 25 - Test Case for Check e-certificate Issuing Status.....	63
Table 26 - Test Case for Download vehicle fitness e-Certificate.....	64
Table 27 - Test Case for Generate vehicle fitness e-Certificate	65
Table 28 - Results of the Testing.....	75
Table 29 - Results of the Evaluation	76

List of Acronyms

CSS	Cascading Style Sheets
CMS	Content management system
DMTWP	Department of Motor Traffic Western Province
DBMS	Database Management System
DS	Divisional Secretariat
ER	Entity Relationship
GB	Gigabyte
HTML	Hypertext Markup Language
SQL	Structured Query Language
SDLC	Software Development Lifecycle
PHP	PHP Hypertext Preprocessor
UI	User Interface
UML	Unified Modeling Language

Chapter 1 - Introduction

This chapter provides an overview of the project, including its background and motivation, objectives, scope, and a brief description of the rest of the report.

1.1 Project Overview

Nowadays, the world trend is to develop user-friendly web-based software applications. Always, people expect easy and effective ways to handle their day-to-day activities. In processes like the renewal of revenue vehicle licenses, people are willing to do it in an easy and less time-consuming way. But commercial vehicles (motor lorries, private couches, omnibuses, motor tricycle vans, ambulances, and hearse) are one type of vehicle that is not eligible for this online Vehicle Revenue License Service offered by DMT. Because commercial vehicles need fitness certificates other than the documents for the renewal of a revenue license. And the same way, considering the vehicle fitness garage perspective, it also had the time-consuming inefficiency process of dealing with issuing vehicle fitness certification. From the Department of Motor Traffic Western Province (DMTWP) perspective, registering and monitoring fitness garages is a time-consuming and inefficient process. The Web-based Commercial Vehicle Fitness e-certificate Issuing System for Western Province (WCVFEIS) overcomes the above limitation and gives effective workflow to the DMTWP, Vehicle Fitness Garage, and Commercial Vehicle Owners. The system has been developed in an iterative waterfall model and deployed as an online web-based application. This system has developed in a client-server architecture. This web-based system is developed by using PHP, HTML, CSS, JavaScript, jQuery, and MySQL. The system is tested with unit testing, functionality testing, performance testing, system testing, and user acceptance testing to ensure better performance of the product.

1.2 Motivation

The Department of Motor Traffic Western Province (DMTWP) facilitates Online Vehicle Revenue License Services for only motor cars, motorcycles, dual-purpose vehicles, land vehicles, three-wheelers, and motor cars A-Z. But all other vehicles should manually visit Divisional Secretariat (DS) or DMTWP to obtain a renewed revenue license (“ERL,” n.d.). Commercial Vehicles (Motor Lorry, Private Couches, Omnibuses, Motor Tricycle Vans,

Ambulances, and Hearse) are one type of vehicle that is not eligible for this online Vehicle Revenue Service. Because commercial vehicles need fitness certificates other than the documents for the renewal of the revenue license. If the fitness certificate is issued as an e-certificate, the commercial vehicle can also be eligible for Online Vehicle Revenue License Services.

Other important institutions in this process are the Vehicle fitness garages and Sri Lanka Transport Board deports (“SLTB,” n.d.) which are issued vehicle fitness certifications. DMTWP Applications are called for the registration of recognized motor garages situated within the Western Province to issue fitness certificates for motor vehicles used for public purposes. And also Certifying officers registering under a particular garage is also done by DMTWP. This registration is valid for only one year and should be renewed after one year.

DMTWP issued two books to the registered fitness garage. One book contains Certificates of Fitness, and the other book contains Reports of Examination. Each book contains 50 certificates, and one certificate includes three copies. When these certificates are finished, the Fitness Certifying Officer has to go to DMTWP and collect the new book set. While the government offices have faced difficulties with a lack of papers and the government does not have sufficient funds to buy the papers, it is wasteful that a single process uses at least 8 papers per person.

DMTWP does field visits to monitor these fitness garages several times annually. At the time, if the fitness garage does anything beyond the process, the fitness garage permit is suspended by the DMTWP. Maintaining tracking and monitoring through the system is more cost-effective than physical monitoring.

From a fitness garage perspective, the Fitness Certifying Officer should have to maintain the Reports of Examination and Fitness Certificate, process and store customer and vehicle information, calculate bills, and generate reports manually. And when collecting new books, the DMTWP Fitness Certifying Officer has to present photocopies of their customers and vehicle registry details of the past month and a request letter.

In this manual process, the Fitness Certifying Officer has to visit DMTWP several times monthly to collect and hand over documents. Another thing is that usually one vehicle inspection takes about half an hour, but the fact is that many vehicles come for the examination at the same time. And all vehicle owners want to grab their chance soon. Managing these conflict situations is too stressful for the Fitness Certifying Officer.

From the commercial vehicle owner's perspective, they don't have the facility for online vehicle renewal revenue license services. So, they have to go to DMTWP or DS and wait in the queue. If there are some issues with documents, they have to go to DMTWP or DS several times. Same way at the fitness garage, most of the time they have to wait in a queue to get their chance. And also, commercial vehicle owners have to find the nearest place where the fitness garage is; sometimes it can be closed when the vehicle reaches the place. If it has a booking system, commercial vehicle owners can get a notification if the fitness garage has to be closed for unavoidable reasons. And also, sometimes commercial vehicle owners don't remember the date of revenue.

If details are computerized, it is easy to send notifications. And in the same way, if there is a tracking system, vehicle owners can follow up on their collecting vehicle fitness certificate process. Many commercial vehicle owners have lost their businesses due to unaffordable travel costs and the economic crisis in the country. So, they always have complaints that the manual process is worst regarding time wastage. Those are the significant ideas of the purpose of developing the Commercial Vehicle Fitness e-certificate issuing system.

1.3 Objectives

This project aims to provide an Online Web-based vehicle fitness e-certificate issuing system for Western Province to prevent most of the problems and limitations that are identified in the manual system and provide accurate and effective service to users (Project-Management.com, 2022).

The following are the key objectives of the System:

- To study the process of the manual vehicle fitness certificate issuing system and identify its strengths and weaknesses and identify the functional and non-functional requirements of the system.
- To provide the following online facilities to commercial vehicle owners.
 - ✓ Getting a Fitness e-Certificate for Commercial Vehicles
 - ✓ Getting an e-Vehicle Report of Examination
 - ✓ Getting Fitness Garage details and location
 - ✓ Getting an online booking
 - ✓ Online payment facility

- ✓ To registered commercial vehicle owners, get notifications regarding the commercial vehicle e-fitness certificate issuing process.
- To provide the following online facilities for fitness garage owners and fitness certification officers
 - ✓ Fitness Garage renewal of registration facility
 - ✓ To provide a facility for Fitness Garage to keep customers records and issued Fitness Certificate reports and manage them efficiently.
- To provide the following online facilities for DMTWP
 - ✓ To get monthly fitness garage operational report quickly and monitor them easily
 - ✓ Checking the vehicle fitness certificate online
 - ✓ Checking vehicle report of examination online

1.4 Background of the study

Examined the process of commercial vehicle Revenue license renewal process can be identified following facts. Commercial vehicle owners have to collect the following documents and visit Divisional Secretariat or DMTWP to obtain renewed Revenue license (“Revenue License – Just another WordPress site,” n.d.).

- ✓ Revenue License of the Previous Year
- ✓ Valid Vehicle Insurance Policy Certificates.
- ✓ Fitness Certificates for Commercial Vehicles.
- ✓ Valid Emission certificate

DMTWP facilitates an online vehicle renewal revenue license service but still commercial vehicles are not eligible for this service. Therefore, they have to follow time-consuming inefficient manual processes. If the Vehicle Fitness Certificate issuing as an e-certificate, the commercial vehicle also can be eligible for Online Vehicle renewal Revenue License Services. For issuing vehicle fitness e-certificates, the fitness garage operations should be computerized. From the Vehicle Fitness Garage perspective there are several processes related to Vehicle Fitness Certificates issuing.

- ✓ Fitness garages and fitness certifying officers have to be renewal of registration every year in DMTWP with lots of paperwork and time-consuming manual processes (“Garage Registrations & Fitness Certificates – Just another WordPress site,” n.d.).

- ✓ Fitness Certifying Officer has to collect new books set from DMTWP regularly and has to present photocopies of their customers and vehicle registry details of the past month and request letter.
- ✓ Fitness Garage engaged with manually maintaining the customer registry and maintaining reports of the examination book and fitness certificate book.
- ✓ Fitness Certifying Officer has to visit DMTWP several times monthly to collect and hand over documents.

From the DMTWP perspective, there are several processes related to Vehicle Fitness garage renewal of registration and monitoring.

- ✓ Collect applications from Vehicle Fitness Garage and Vehicle Fitness Certifying Officer.
- ✓ Collecting request letters for issuing the Fitness Certification book and Reports of Examination book.
- ✓ Issuing Fitness Certification book and Inspection certificate book
- ✓ Collect photocopies of vehicle fitness garage’s customers and vehicle registry details for the past month.
- ✓ Field visits to monitor operations of these fitness garages several times annually.

Manually issued Examination Report and Fitness Certificate illustrated in figure 1.

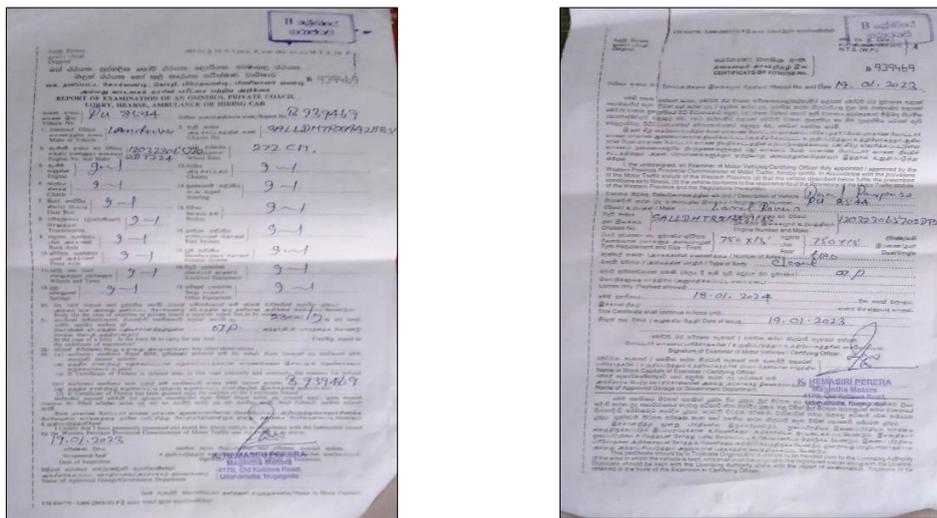


Figure 1 - Manually issued Examination Report & Fitness Certificate

Flow chart of Manual process of Vehicle fitness Certification Issuing and Vehicle Fitness Garage renewal of registration including Vehicle Certifying officer illustrated in figure 2.

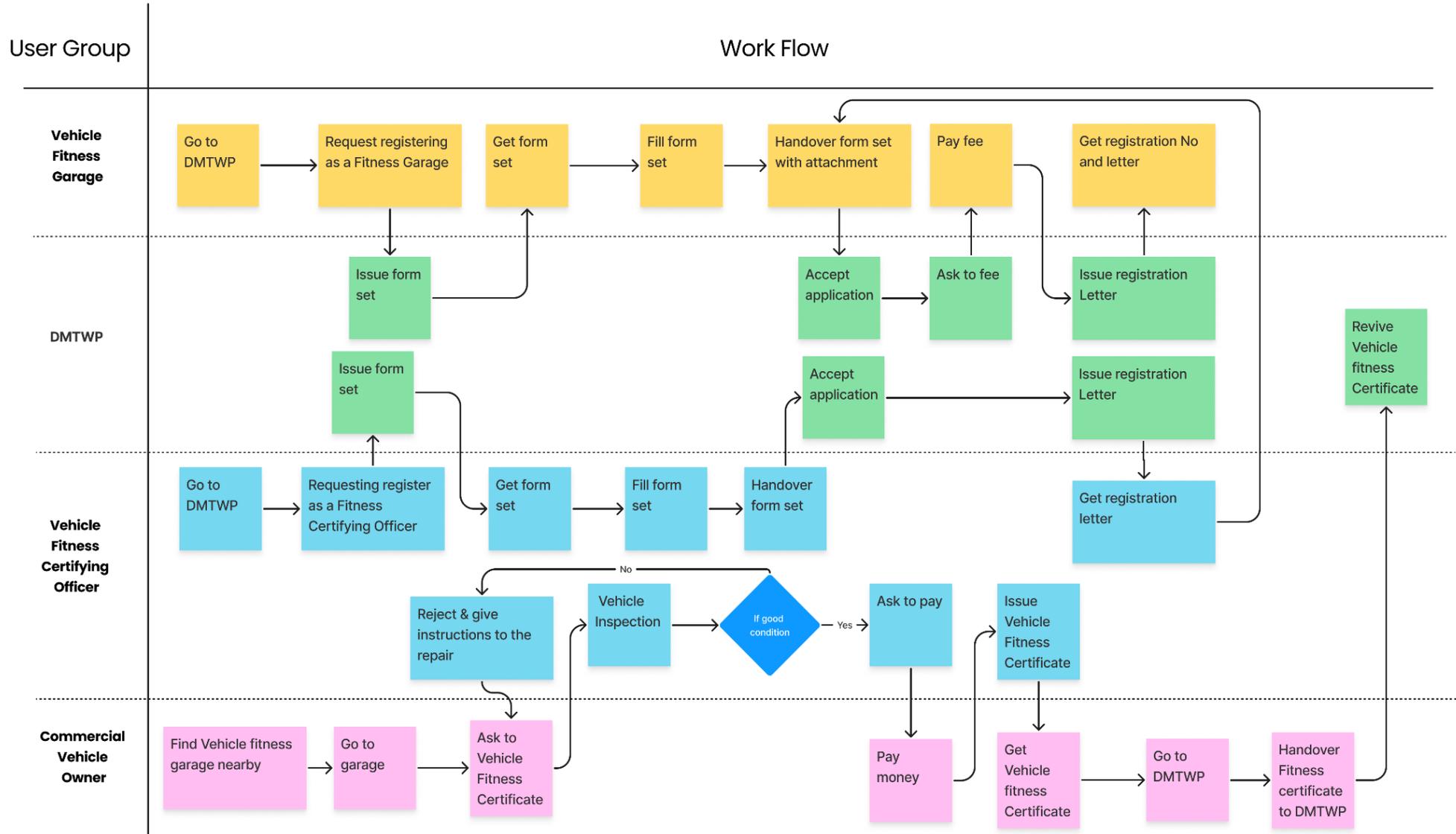


Figure 2- Flow chart of manual process

After studying this entirely manual process I have identified different kinds of pain points of users such as;

For Commercial Vehicle Owner

- No facility to get Fitness e-Certificate for Commercial Vehicles.
- No way to find the nearest registered fitness garage details even not published on the DMTWP website. Therefore, have to find the nearest place by asking someone.
- No facility for booking the vehicle fitness garage. Most of the time Commercial Vehicle owners have to visit the garage and wait in the queue
- Haven't online payment facility.
- Most of the time Commercial Vehicle owners have to waste time at several institutions several times for handwritten errors in their Fitness Certificate or Inspection Report.

For Vehicle Fitness Garage and Certifying Officer

- Renewal registration process is done manually and no online payment service is not applicable for those services.
- Fitness Certifying Officer has to maintain the list of issued Reports of Examination (Inspection report) and Fitness Certificate, process and store customer and vehicle information, generate reports manually.
- Fitness Certifying Officer has to collect new books set from DMTWP regularly and has to present photocopies of their customers and vehicle registry details of the past month and request letter.
- Fitness Certifying Officer has to do lots of paperwork for the one fitness certificate.
- Most of the time Fitness Certifying Officer get the income according to the number of issuing fitness certificate per day. But Fitness Certifying Officer had to wait the whole day in the fitness garage even though a few Commercial Vehicles came for inspection.

For DMTWP

- Use inefficient monitoring method for fitness garage such as collecting photocopies of fitness garage's customers and vehicle registry details of the past month.
- Use many papers works in the Fitness Garage and Fitness Certifying Officer renewal of registration process.
- Couldn't give effective service for Commercial Vehicles owners because Commercial Vehicles still not applicable for online Vehicle Revenue license Service.

1.5 Scope of the Study

To overcome identified difficulties, an Online Web-based vehicle fitness e-certificate issuing system is proposed for Western Province. This online system can give better service to users with efficiency. The users of the systems are DMTWP Commissioner, DMTWP subject officer, Vehicle Fitness Garage Owner, Vehicle Fitness Certifying Officer and Commercial Vehicle Owner (Dawson, 2009).

1.5.1 In scope

The scope of the system has covered the following main modules. Those are;

- **Vehicle Fitness e-Certificate and Inspection Report Management**
This module manages e-fitness certificate and Vehicle Reports of Examination (Inspections report). Manage notifications regarding issuing process.
- **Online Booking Management**
This module manages online booking and manage notifications regarding booking.
- **Vehicle Fitness Garage and Vehicle Fitness Certifying Officer Management**
This module manages garage renewal of registration request and garage operational status.
- **Payment Management**
This module handles Vehicle Fitness Garage registration fee payment details and vehicle fitness e-certificate issuing fee payment details. Manage notifications regarding payments.
- **Report management** - This module manages to create customized reports by choosing the information to be included and presenting it in the desired format. Basically, this module supports generating reports of issued vehicle fitness e-certificate details, issued inspection report, booking details reports customized by time period or category vice etc.
- **News/FAQ management** - This module handles the latest news published by DMTWP regarding rules and regulation changes, service fees change etc. Add, update and delete Frequently ask questions about the services.

- **Feedback management** - This module manages Commercial Vehicle owners' feedback regarding web-based vehicle fitness e-certificate issuing service.
- **User Management** - This module manages login for each user. This module is handled by the admin. Five user account types created as DMTWP Commissioner, DMTWP Subject Officer, Vehicle Fitness Garage, Vehicle Fitness Certifying Officer and Commercial Vehicle Owner.

This system has several inputs that users enter into the system and the system does some processing gives and outputs. Those are,

Inputs	Processes	Outputs
<ul style="list-style-type: none"> • User details 	<ul style="list-style-type: none"> • Create users account 	<ul style="list-style-type: none"> • User Account • Successful registering confirmation email notification
<ul style="list-style-type: none"> • Fitness Garage details and Certifying Officer details 	<ul style="list-style-type: none"> • Fitness Garage renewal Registration 	<ul style="list-style-type: none"> • Garage Registration Certificate
<ul style="list-style-type: none"> • Customer details (Commercial Vehicle owner) • Commercial Vehicle details • Appointment details 	<ul style="list-style-type: none"> • Online booking for vehicle inspection 	<ul style="list-style-type: none"> • Online booking confirmation email notification • Payment request email notification
<ul style="list-style-type: none"> • Commercial Vehicle condition details 	<ul style="list-style-type: none"> • Generate vehicle fitness e-certificate • Generate Vehicle Reports of Examination 	<ul style="list-style-type: none"> • Vehicle fitness e- certificate • Vehicle Reports of Examination • Successfully generate confirmation email notification
<ul style="list-style-type: none"> • Payment details 	<ul style="list-style-type: none"> • Online payment process 	<ul style="list-style-type: none"> • Payment confirmation email notification • e-bill
<ul style="list-style-type: none"> • All data 	<ul style="list-style-type: none"> • Generate report 	<ul style="list-style-type: none"> • Customize report

Table 1- Input Process Output of the system

Considering the previous manual system, the proposed system's innovation features were identified. Such as;

- Commercial Vehicle owner get vehicle fitness e-certificate.
- Commercial Garage Owner get online Garage Registration Certificate/ letter.
- DMTWP has enabled to monitor of the fitness garage operational information quickly.
- Registered Commercial Vehicles owner, get notifications regarding the vehicle fitness e-certificate issuing process.

1.5.2 Out of Scope

- Not handle Fitness garage and Certifying Officer registration at first time

1.6 Structure of the Dissertation

This thesis includes six main chapters and each chapter has discussed the flow of development of the system. structure of the thesis is as follows.

Chapter 02 – Background

This chapter has discussed the requirement analysis of the system including functional and non-functional requirements and related technologies of the system. And also, a review of similar systems has been discussed.

Chapter 03 – Design

This chapter has discussed the architectural design and the detailed design enhanced with UML model diagrams. And also, user interface design has been discussed.

Chapter 04 – Implementation

This chapter has discussed the implementation of the system including development tools and development environment etc.

Chapter 05 – Testing and Evaluation

This chapter has discussed the evaluation of the system including manual and automation testing, and usability evaluation.

Chapter 06 – Conclusion

This chapter has discussed the overall success of the project including achieving project objectives. And also, future enhancement of the system has been discussed.

Chapter 2 – Background

2.1 Introduction

This chapter has discussed the requirement analysis of the web base commercial vehicle fitness e-certification issuing system including functional and non-functional requirements and related technologies of the system. And also, a review of similar systems has been discussed.

2.2 Requirement Analysis

During the analysis stage consider the end-user's requirements. Analyzed existing documentation and observed the real working environment of the DMTWP and Vehicle Fitness Garage. Conducted small interviews and questionnaires from the small group of commercial vehicle owners, fitness garage owners and fitness certifying officers and officers of DMTWP are used for requirement gathering.

The scope of the system has been identified following user characteristics, functional requirements and non-functional requirements, software requirements and hardware requirements.

2.2.1 User Groups and user characteristics

- **Administrator** - Act as super user of the system. He can monitor the whole system. He can generate all kinds of reports available in the system for strategic decision-making. He can take backups and restore the system. He can handle the database. He must have Computer and internet literacy.
- **DMTWP (Commissioner and Subject Officer)** – He can monitor and update Garage operational status and renewal registration request. He can monitor issued fitness certificate and inspection report. He can add, update, view, delete news and FAQ. He can generate report. He must have Computer and internet literacy.
- **Vehicle Fitness Garage Owner**- He can log in to the system. He can renew registration his Fitness Garage in the system. He can check online bookings and monitor the rest of

the issuing fitness e-certificate process. He can generate reports. He must have computer and internet literacy.

- **Vehicle Certifying Officer** - He can log in to the system. He can check online bookings and respond to them. He is the only authorized person who can issue Vehicle Reports of Examination and Fitness Certificates through the system. He must be a qualified person in the motor mechanical field. He must have computer and internet literacy.
- **Commercial Vehicle owner (Customer)** - He can register to the system and log in to the system. He can find his revenue licence validity of vehicle on this system. He can make an online appointment for the vehicle inspection at Vehicle Fitness Garage. He can view the status of the fitness e-certification issuing process. He must have computer and internet literacy. He can add feedback to the system.

Flow chart of web-based Commercial Vehicle Fitness e-certificate Issuing System;

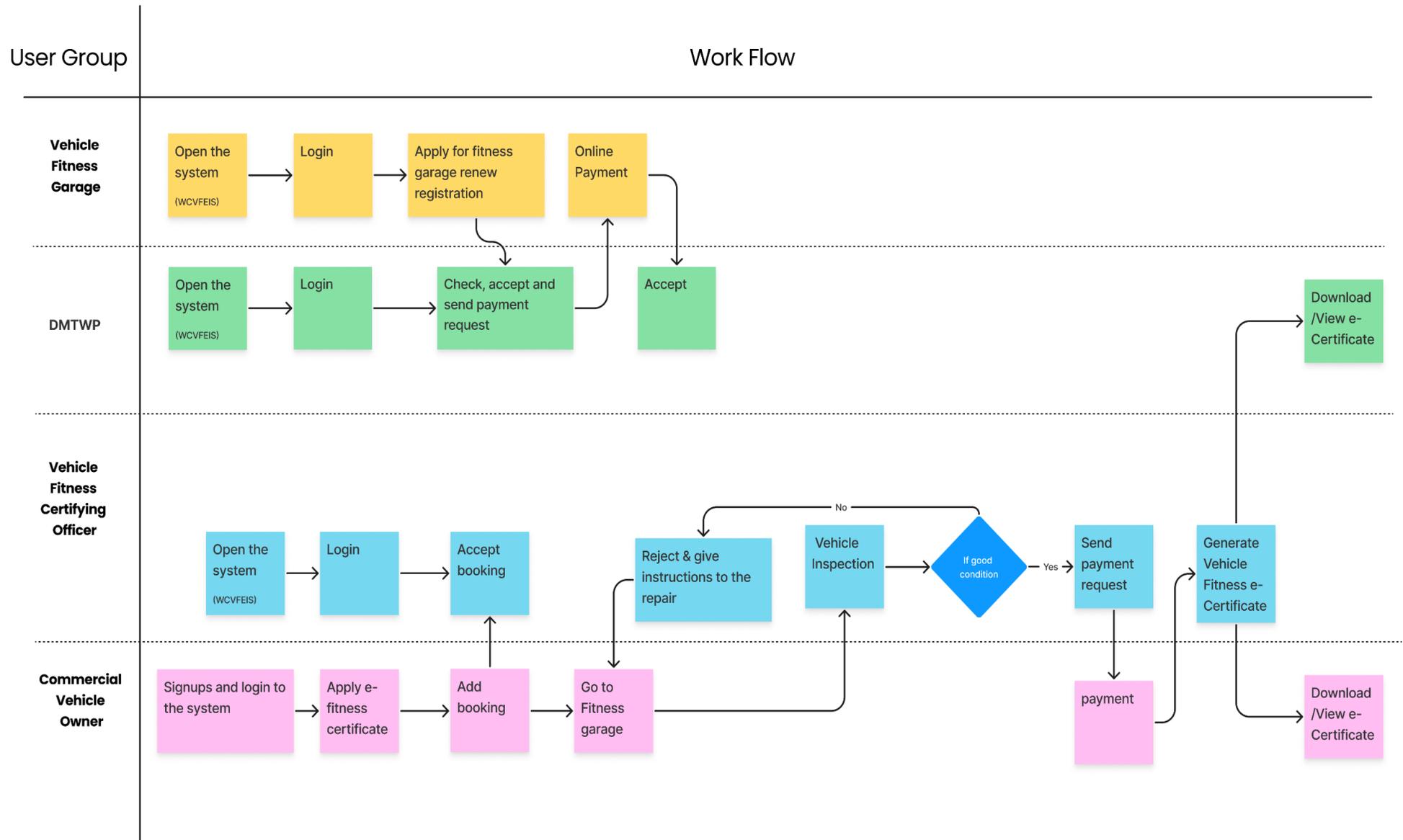


Figure 3 - Flow chart of WCVFE

2.2.2 Functional Requirement

- **Vehicle Fitness e-Certificate and Inspection Report Management**

This module manages Fitness Certificate and Reports of Examination (Inspection report) generating. Following table illustrated how users interaction with this module.

User Role	Function
DMTWP Commissioner	✓ View and download Fitness Certificate and Reports of Examination
DMTWP subject officer	✓ View and download Fitness Certificate and Reports of Examination
Vehicle Fitness Garage Owner	✓ View and download Fitness Certificate and Reports of Examination
Vehicle Fitness Certifying Officer	✓ Generate Fitness Certificate and Reports of Examination
Commercial Vehicle Owner	<ul style="list-style-type: none"> ✓ View and download Fitness Certificate and Reports of Examination ✓ Received email notification regarding issuing status. ✓ Can follow up process on Check e-certificate issuing status.

Table 2 - Vehicle Fitness e-Certificate and Inspection Report Management user interaction

- **Online Booking Management**

This module manages online booking. Following table illustrated how users' interaction with this module.

User Role	Functions
DMTWP Commissioner	✓ View booking details
DMTWP subject officer	✓ View booking details
Vehicle Fitness Garage Owner	✓ View booking details
Vehicle Fitness Certifying Officer	<ul style="list-style-type: none"> ✓ View booking details ✓ Update booking status ✓ Cancel booking

Commercial Vehicle Owner	<ul style="list-style-type: none"> ✓ Check the validity of vehicle revenue licence. ✓ within three months before the expiration of the vehicle revenue licence, the "apply for e-certificate" button active automatically. ✓ Select garage according to preferred district and city. ✓ Select date and time and make reservation ✓ Received email notification regarding booking Status. ✓ Can follow up process on Check e-certificate issuing status. ✓ Cancel booking
--------------------------	---

Table 3 -Online Booking Management User Interaction

- **Vehicle Fitness Garage and Vehicle Fitness Certifying Officer Management**

This module manages garage renewal request and garage operational status. Following table illustrated how users interaction with this module.

User Role	Function
DMTWP Commissioner	<ul style="list-style-type: none"> ✓ Update operational status ✓ Confirm renewal registration request status and automatically generate garage Registration Certificate ✓ View Garage details ✓ View renewal registration request
DMTWP subject officer	<ul style="list-style-type: none"> ✓ View Garage details ✓ View renewal registration request ✓ Accept renewal registration request
Vehicle Fitness Garage Owner	<ul style="list-style-type: none"> ✓ Add renewal registration request ✓ View renewal registration request ✓ View garage Registration Certificate
Vehicle Fitness Certifying Officer	<ul style="list-style-type: none"> ✓ View renewal registration request ✓ View garage Registration Certificate

Table 4 - Vehicle Fitness Garage and Vehicle Fitness Certifying Officer Management User Interaction

- **Payment Management**

This module handles Vehicle Fitness Garage renewal of registration fee payment details and vehicle fitness e-certificate issuing fee payment details. Following table illustrated how users interaction with this module.

User Role	Function
DMTWP Commissioner	✓ View payment details of renewal of registration
DMTWP subject officer	✓ View payment details of renewal of registration
Vehicle Fitness Garage Owner	✓ Pay renewal of registration fee ✓ View payment details of fitness e-certificate issuing
Vehicle Fitness Certifying Officer	✓ View payment details of fitness e-certificate issuing ✓ Update payment status for on-site payment for fitness e-certificate issuing fee
Commercial Vehicle Owner	✓ Pay fitness e-certificate issuing fee ✓ Received email notification regarding payment status. ✓ View payment status.

Table 5 - Payment Management User Interaction

- **Report management**

This module manages to create customized reports by choosing the information to be included and presenting it in the PDF or Excel format. Following table illustrated how users interaction with this module

User Role	Function
DMTWP Commissioner	✓ Generate booking, Issued Fitness Certificate and Issued Inspection reports regarding all garages
DMTWP subject officer	✓ Generate booking, Issued Fitness Certificate and Issued Inspection reports regarding all garages

Vehicle Fitness Garage Owner	✓ Generate booking, Payment, Issued Fitness Certificate and Issued Inspection reports regarding their garage
Vehicle Fitness Certifying Officer	✓ Generate booking, Payment, Issued Fitness Certificate and Issued Inspection reports regarding their garage

Table 6 - Report management User Interaction

- **News /FAQ management**

This module handles the latest news published by DMTWP regarding rules and regulation changes, service fees changeset etc. Following table illustrated how users interaction with this module.

User Role	Function
DMTWP Commissioner	✓ Add, Update, View, Delete news and FAQ
DMTWP subject officer	✓ Add, Update, View, Delete news and FAQ
Vehicle Fitness Garage Owner	✓ View News and FAQ
Vehicle Fitness Certifying Officer	✓ View News and FAQ
Commercial Vehicle Owner	✓ View News and FAQ

Table 7 - News /FAQ management User Interaction

- **Feedback management**

This module manages Commercial Vehicle owners' feedback regarding web-based vehicle fitness e-certificate issuing service. Following table illustrated how users interaction with this module.

User Role	Function
DMTWP Commissioner	✓ View feedback ✓ Delete feedback
DMTWP subject officer	✓ View feedback ✓ Delete feedback
Vehicle Fitness Garage Owner	✓ View feedback
Vehicle Fitness Certifying Officer	✓ View feedback
Commercial Vehicle Owner	✓ Add feedback ✓ View feedback

Table 8 - Feedback management User Interaction

- **User Management**

This module is handled by the admin of the system. Five user roles created as DMTWP Commissioner, DMTWP subject officer, Vehicle Fitness Garage Owner, Vehicle Fitness Certifying Officer and Commercial Vehicle Owner. In this system have Sperate 3 login as DMTWP, Fitness Garage and Commercial Vehicle Owner. In this system can Add, View, Update, Delete Commercial Vehicle Owner user account. In this system can add, view of Vehicle Fitness Garage Owner, Vehicle Fitness Certifying Officer user account.

2.2.3 Non-functional requirements

- **Usability**

User groups contain different types of people; therefore, system consist user-friendly, simple user interface to give a better user experience.

- **Availability**

Users can access this web-based system any time, any place with any browser.

- **Performance**

Users can use this system concurrently. system operates without unnecessary delays and less response time (Nechvolod, 2022).

- **Security**

Using user id and password security for user login. Password encryption mechanism has been used. Maintain user level for accessing data. Creating a backup plan and backup copies stored in a different medium in different locations (“Software Quality Attributes | Top 9 Software Quality Attributes,” 2021).

2.2.4 Software requirement

- Web server (used as local server) - XAMPP server 3.3
 - ✓ Apache Server 2.4.48
 - ✓ MySQL
 - ✓ PHP 8.0.7
 - ✓ phpMyAdmin 5.1.1
- Code editor - Visual Studio Code
- Web browser - Mozilla Firefox/IE/Chrome

- Draw diagrams - draw.io
- Image Editing - Adobe Photoshop CS5

2.2.6 Assumptions made with this system

- Commissioner DMTWP, Subject officer DMTWP Vehicle Fitness Certifying Officer, Vehicle Fitness Garage Owner and Commercial Vehicle owner have basic web application operating skills.
- DMTWP, Vehicle Fitness Certifying Officer, Vehicle Fitness Garage Owner and Commercial Vehicle owner have computer devices or mobile devices with an internet connection.
- DMTWP already has a database of the last year Commercial Vehicle renewal details including vehicle, vehicle owner and revenue licence details (Tables - Vehicle, vehi_owner, vehi_revenue_licence).
- DMTWP already has a database of the last year registered garage, garage owner and certifying officer database (Tables – garage, garage_owner, certifying_officer).
- DMTWP already have an online vehicle renewal licence system except for Commercial Vehicles.
- Vehicle Fitness Garage and Vehicle Fitness Certifying Officer registered only once a year.
- Vehicle Fitness Garage can have one or more vehicle Fitness Certifying Officers and they must register under a particular garage.
- Vehicle Fitness Certifying Officer Cannot change their registered garage within the registered year.
- Vehicle Fitness Garage owner may be a Vehicle Fitness Certifying Officer in his Vehicle Fitness Garage.
- System has predefined 30-minute time slots for scheduling fitness garage bookings.
- Commercial Vehicles owner may have one or more Commercial Vehicles.
- Through this system payments made for DMTWP should be online payments and payments made for the fitness garage can be both cash or card payments.
- DMTWP staff registration done by Staff Management System.

2.3 Review of Similar Systems

- **Online Vehicle Revenue License Services – Sri Lanka**

This Service is for only Motor cars, Motorcycles, Dual purpose vehicles, Land vehicles, Three-wheelers and Motor cars A-Z. But all other vehicles should visit Divisional Secretariat (DS) or DMTWP to obtain a revenue license manually.

This system allows users to make an account and add vehicle details. The system shows the owner's details and if the license is valid or invalid. If invalid gives the opportunity to renew by selecting the vehicle emission institute and vehicle insurance institute from which he gets the certificate.

After Online payment, they receive a temporary license. Users can get print or save it. Then the original vehicle licensee was received by post (“ERL,” n.d.).

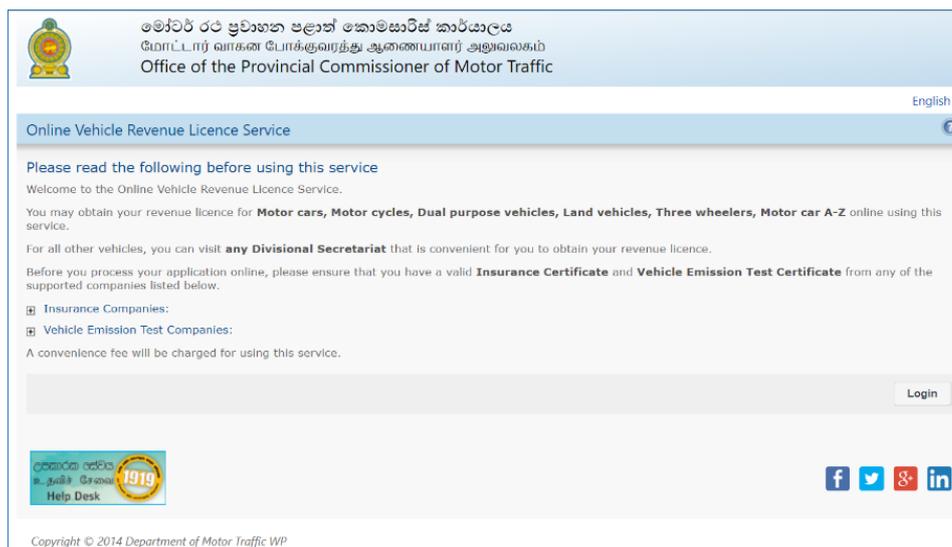


Figure 4 - Online Vehicle Revenue Licence Services – Sri Lanka

- **Government of India MINISTRY OF ROAD TRANSPORT & HIGHWAYS**

India Government gives facilitate online permit appointment service and fitness certificate (“Home | Parivahan Sewa | Ministry of Road Transport & Highways, Government of India,” n.d.). The applicant has to enter the Vehicle Registration number into the Renewal of Registration service (“stepBystep.pdf,” n.d.).

And move the application to the next stage. After selecting the Renewal of Registration service applicant has to fill Chassis number and mobile number. The applicant can log in to the system and fill out the form and click on the payment button to proceed with the online payment. After

the Application letter is generated, the applicant can take the Print as required. go to the relevant office to collect the permit. Same process as the fitness certificate.

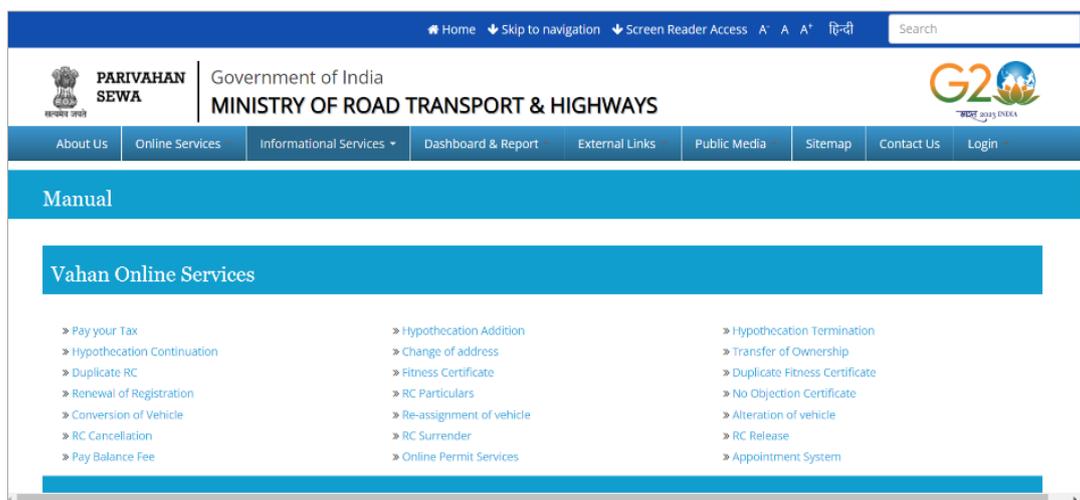


Figure 5 - Government of India MINISTRY OF ROAD TRANSPORT & HIGHWAYS

- **Ministry of Transport – Ontario, Canada**

The government of Ontario gives facilities to heavy commercial vehicles (over 3,000 kg), buses, school buses and farm vehicles renew online. A person receives a registration renewal notice in the mail that indicates if his vehicle needs an emissions test. Emissions tests for heavy diesel commercial motor vehicles must be performed by a certified technician at a vehicle inspection center that has entered into an agreement with the Ontario government. license plate sticker should arrive in the mail within 14 days. Register vehicle owner received renewal reminder certification (“Register and insure a vehicle in Ontario | ontario.ca,” n.d.).

In Ontario, commercial motor vehicles and their drivers must meet strict safety standards and follow all commercial vehicle-related regulations. Police and transportation enforcement officers regularly inspect vehicles, and the penalties for unsafe vehicles or drivers are severe.

If the vehicle passes the inspection owner will be given a safety standards certificate and a vehicle inspection report as proof. If the vehicle doesn't pass an inspection, the owner will be required to repair it and have it re-inspected before a safety standards certificate is issued.

But for inspection services do not provide an online facility. An inspection report is not mandatory for renewing a license. Renew license and inspection report are two separate processes.

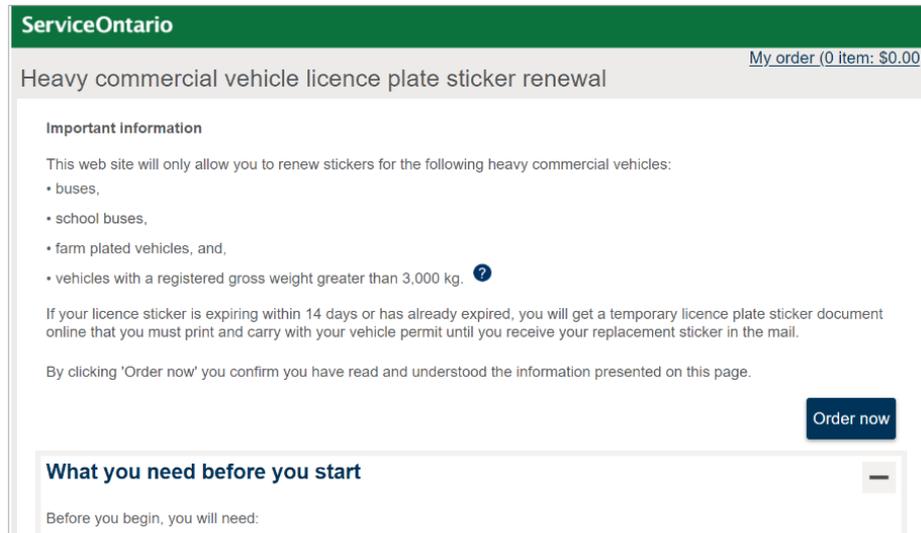


Figure 6 - Ministry of Transport – Ontario, Canada

- **Government of Western Australia (WA) – Department of Transport**

The government of Western Australia’s vehicle license has expired for a period of three months or more. The vehicle owner must have the vehicle inspected and they must make an application to license the vehicle. The vehicle owner can get an application from this website. Can pay invoices online through this system. Then applications for a vehicle license must be submitted in person at a Driver and Vehicle Services Centre or regional agent with documents of a valid Certificate of Inspection and a completed Application to License a Vehicle (“DOT Home,” n.d.).

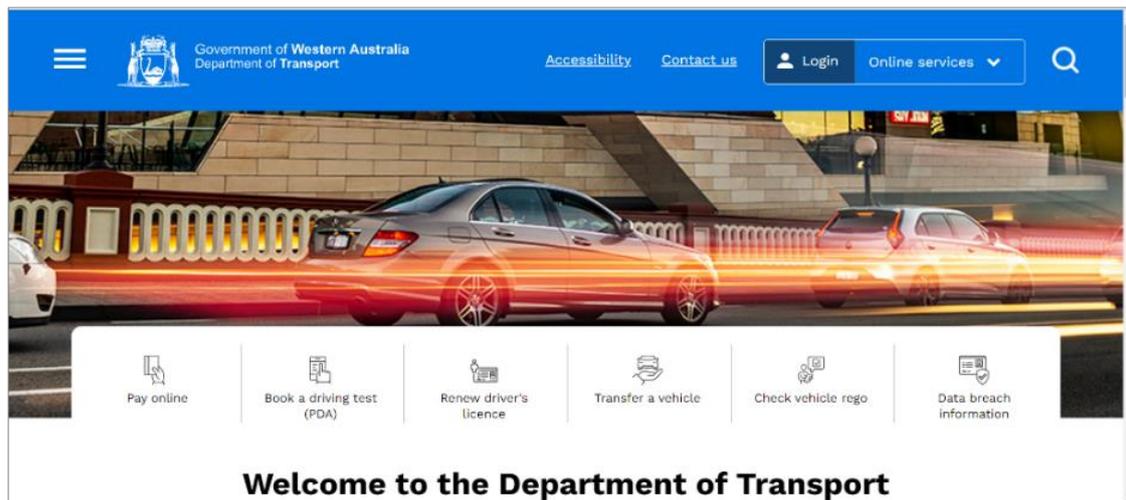


Figure 7 - Government of Western Australia (WA) – Department of Transport

Online payments are not available for Authorized Inspection Stations (AIS). Vehicle owners need to book and pay the inspection fee directly with the chosen provider. AIS telephone

numbers and hours of operation vary and the providers are on this page. Vehicle owners have to contact chosen AIS directly to make any changes to their vehicle inspection booking. This website provides a Vehicle license Expiry Date Enquiry service.

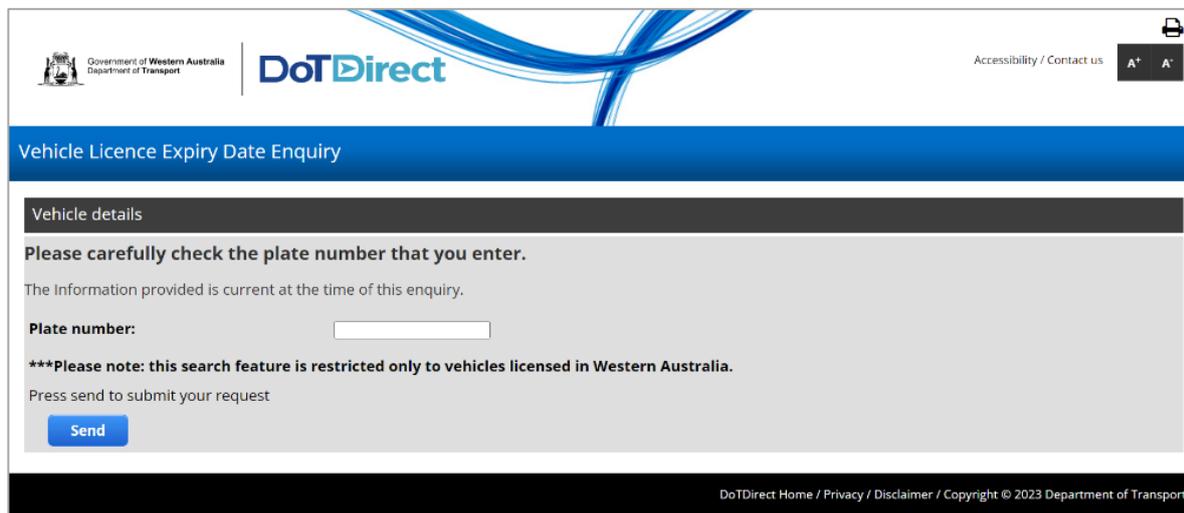


Figure 8 - Vehicle Licence Expiry Date Enquiry service

2.3.1 Comparison between similar products

Features	Online Vehicle Revenue License Services, Sri Lanka	Government of India, Ministry of Road Transport & Highways	Ministry of Transport, Ontario Canada	Government of Western Australia (WA), Department of Transport	Proposed system WVFEIS
1. user can log in to the system	Except for commercial vehicle owner	Yes	No	No	Yes
2. User can make an appointment for a Fitness garage	No	Yes	No	Yes	Yes
3. Online Vehicle Fitness Garage Registering	No	No	No	No	Yes
4. Online Vehicle Fitness Certifying Officer Registering	No	No	No	No	Yes

5. Issuing vehicle Fitness e-certificate	No	No	No	No	Yes
6. Online Payment facility	Yes, Except for commercial vehicle owner	Yes	No	No	Yes
7. Vehicle owner gets notifications	No	Yes	Yes	No	Yes
8. Vehicle owner gets reminders	No	No	Yes	No	Yes
9. Government can online monitor the daily activity of Fitness Garage	No	No	No	No	Yes
10. Report generating	Yes	No	No	No	Yes
11. Feedback facility	No	No	No	No	Yes
12. News and FAQ facility	Yes	Yes	Yes	yes	yes

Table 9- Comparison between similar products

Most of the above system users can't log in to the system and haven't facility to register Vehicle Fitness Garage online. Online booking features have a lot of online web-based systems and it supports customers to save time. But the above systems are not much concerned about it. Most of the above systems cannot support generating reports. And the same way, not much concern about customer feedback about the service, notifications and reminders etc.

2.4 Related Technologies

2.4.1 Front End Development

The system was developed as a web base client-server architecture. Therefore, it should ensure visual interactivity and use friendliness with the User Experience of the system. And according to the system functionality, the system should be compatible with mobile devices with responsiveness. Therefore, HTML CSS and JavaScript technology are used for the front-end development of the system.

HTML is Hypertext Markup Language used for structuring the content of the interface in the system. CSS is Cascading Style Sheet used for the interface layout of the system. HTML and

CSS were used because HTML and CSS are often used in conjunction with other technologies, such as JavaScript and PHP, and those are inexpensive to learn. And also, these are key parts of the responsive web design process (“10 Reasons To Learn HTML and CSS In 2023,” n.d.).

JS(JavaScript) was used to add interactivity and features to improve the user experience in the proposed system (“What Is JavaScript & Why Is It Important?,” n.d.). Because it can interact with HTML source code in dynamic content and improves control over security (“JavaScript Tutorial,” n.d.).

Bootstrap is used for the front-end development of the system. Because it is a free and open-source CSS framework that is a responsive, front-end framework used for web development. It contains HTML, CSS and JavaScript-based design templates for typography, forms, buttons, navigation, and other interface components (contributors, n.d.). It is supported to maintain the consistency of the design.

2.4.2 Back End Development

PHP (PHP Hypertext Preprocessor) is used for server-side backend coding because PHP offers a wide range of functions, codes and commands that are easily rewritten or used without any added cost, easy integration and accessibility (Costa, 2023). This system is implemented as web-based client-server architecture. Therefore, PHP can be embedded into regular HTML code. And also, PHP is an open-source language and it supports MySQL databases (“PHP Introduction,” n.d.).

2.4.3 Database Management

This system handles structured data therefore MySQL database is suitable for the requirement. And it is an open-source relational database management system and has benefits such as scalability, high performance and availability (“MySQL Tutorial,” n.d.).

2.4.4 Web-based application

The responsive web application enables access via mobile devices also. Web-based applications allow users to access from anywhere and handle multiple users at the same time. Therefore, these features are suited for the proposed system functionalities. Proposed system users would be the DMTWP, Vehicle Fitness Garage Owner, Vehicle Certifying Officer and

Commercial Vehicle owner. Commercial Vehicle owners represent the General Public and they would be used service from anywhere with any device. And also, simultaneously multiple users used the proposed system. Therefore, the system is deployed as an online web-based application (“What Is a Web-based Application? Examples and Benefits - Designveloper,” n.d.).

2.4.5 Client-server architecture

The system architecture would lower the minimum system requirements for the client-server architecture. Because applications run on a web server instead of the client’s computer. Therefore, no need for higher system requirements for clients. And modifications to the system can be done without conflicting with other tires. After implementation system will be hosted in the web server location with a centralized database. DMTWP, Vehicle Fitness Garage Owner, Vehicle Certifying Officer and Commercial Vehicle owner can call front-end web interfaces from the web server using an internet browser. Because of these features, client-server architecture is used for the system . (“Client-server architecture | Definition, Characteristics, & Advantages | Britannica,” 2023)

2.4.6 Development process model

The system is developed in Iterative Waterfall Model. The iterative waterfall model is a software development Life cycle (SDLC) that combines elements of both the waterfall model and iterative development (“Iterative Waterfall Model in SDLC | PrepInsta,” n.d.). In this approach, a clear separation of phases allows for better planning and management of the project, as each phase has specific goals and deliverables.

The WVFEIS project is stable requirements because it is based on existing manual processes. Therefore, requirements can clearly identify based on it. And this project has to submit deliverables in each stage therefore it can be easier for clearly defined deliverables and progress can be easily tracked.

The iterative nature of the model allows for changes and adjustments to be made as the project progresses. Therefore, it can be beneficial in addressing unexpected issues fixed through the SDLC. Therefore, WVFEIS was developed by an Iterative Waterfall Model (Khan, 2020).

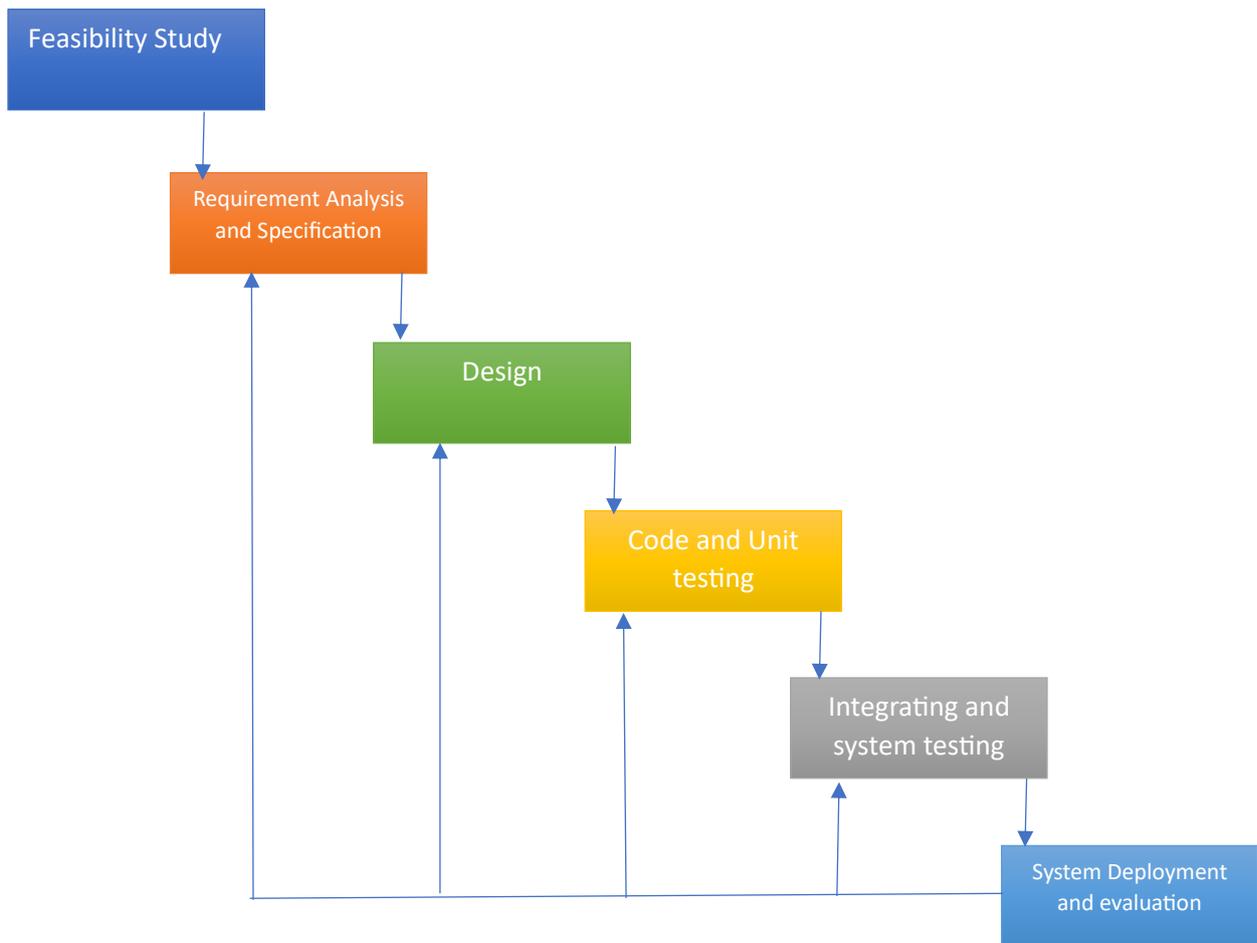


Figure 9 - Iterative Waterfall Model

2.6 Summary

This chapter provided full description about the background information of the project. including requirement analysis, review of similar systems and related technologies of the system. Next chapter will be describing the design stage of this project.

Chapter 3 – Design

3.1 Introduction

This chapter has described aspect of design of the proposed solution including top level architecture and detailed design diagrams. Furthermore, the user interface design is addressed in this chapter.

3.2 Related design strategies

3.2.1 Web based approach

The decision to implement a Web-based system was driven by several factors. Web-based system is proved to be cost-effective. Being platform-independent, the system offers flexibility and easy maintenance with centralized databases and synchronization. It enables efficient monitoring of organizational processes and report generation from any location. The client-server architecture allows for browser-based client interfaces, resulting in lower loading times (Japheth, n.d.).

3.2.2 Iterative Waterfall Process Model

Among the various process models available for guiding software development projects, the Iterative Waterfall model was selected as the most suitable approach over other models like Agile methodology, Prototyping and Rapid Application Development (RAD). The Iterative Waterfall model is chosen for its simplicity and minimal resource requirements in software development. It offers high visibility as it generates output after each stage, providing clients and project managers with a sense of progress. Easy project management is facilitated by visible outputs and the ability to set deadlines for each phase. This approach provides a structured template for analysis, design, coding, testing, and maintenance, ensuring a systematic development process. It is particularly suited for projects where quality takes precedence over schedule (“Software development for enterprise systems,” n.d.).

3.3 System Architecture

The completed system operates on a standard web environment, encompassing several key components:

- **Web Server:** The web server handles incoming requests from users' browsers and serves the appropriate web pages and data, facilitating the communication between the client and the server.

- **Web Application:** The web application comprises the business logic and functionalities of the system. It processes user inputs, interacts with the database, and generates dynamic web pages for users. This application consist external system (Commercial vehicle Owner) and internal system (DMTWP, Garage) .
- **User Interface (Client Browser):** The user interface serves as the front-end of the system, enabling users to interact with the application through their web browsers. It presents the visual elements and enables users to input data and receive responses.
- **Relational Database System:** This component manages the storage, organization, and retrieval of data in a structured manner, ensuring efficient data handling and integrity.

Together, these components form a web-based system, allowing users to access the application via their browsers, interact with the web application, and perform various tasks within the system, all are underlying relational database system and web server (“System architecture for web mapping | GEOG 585: Web Mapping,” n.d.).

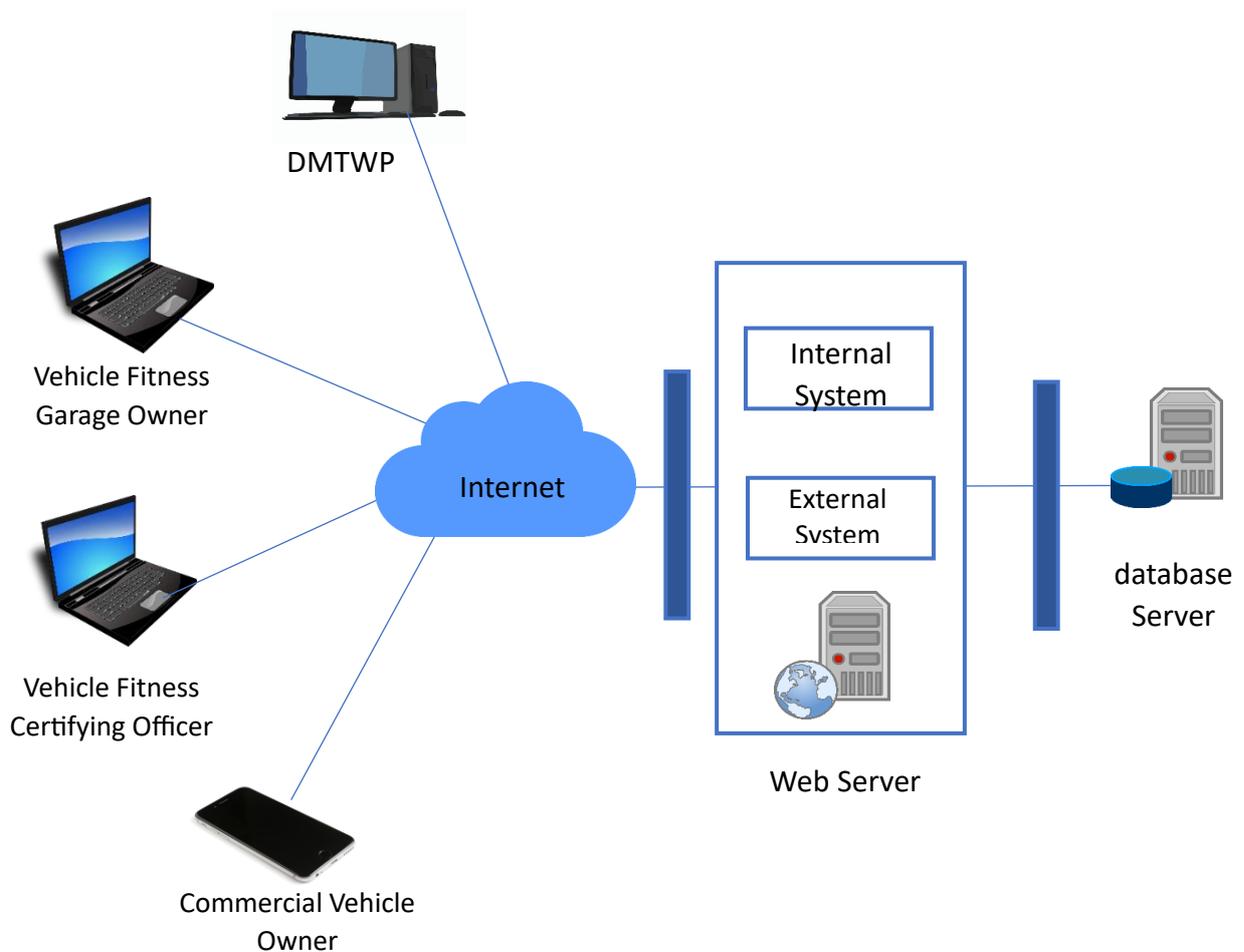


Figure 10- Top level architecture of WCVFEIS

3.4 UML diagrams

Following types of UML diagrams were used to evaluate the design and make the design process accurate and effective (“UML - Standard Diagrams,” n.d.) (draw.io, n.d.).

- Use Case diagram
- ER diagram
- Activity Diagram
- Sequence Diagram
- Class Diagram

3.4.1 Use Case Diagrams

Use case representation is a widely used method for capturing system requirements from the perspective of users or actors. It depicts the interactions and goals between the system and the actors involved. These actors can be users, user roles, or other interconnected systems. Use case diagrams help describe the functionalities of the system in a modular manner, showing how different modules or components interact with actors to achieve specific goals (“UML - Use Case Diagrams,” n.d.).

3.4.1.1 Use Case Diagram for User Management Module

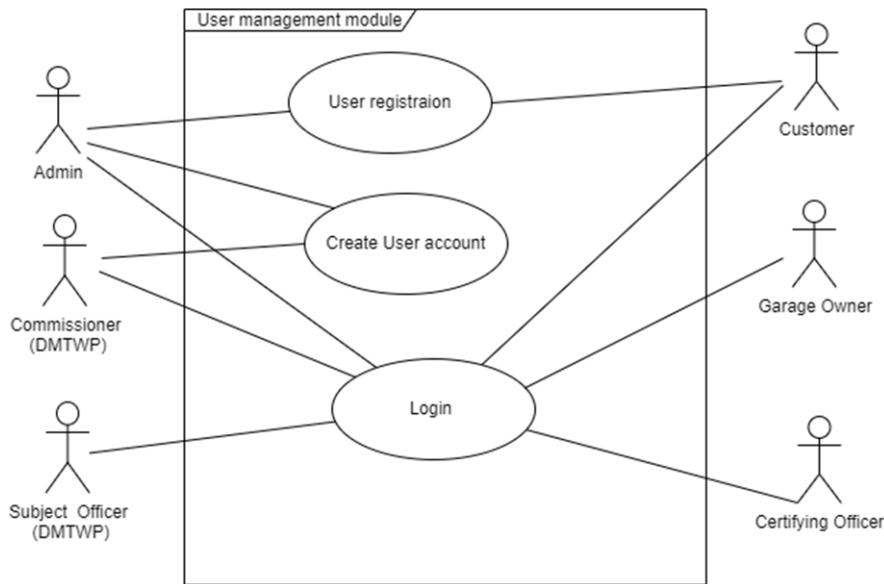


Figure 11- Use Case Diagram for User Management Module

Use Case	User Management Module
Actors	Garage Owner, Exertive Officer (DMTWP), Subject Clark (DMTWP), Customer (Commercial Vehicle Owner)
Description	
<ul style="list-style-type: none"> • Customer (Commercial Vehicle Owner) can sign up the system • Garage Owner can log to the system • Commissioner (DMTWP) and Subject Officer (DMTWP) can log to the system. • Commissioner (DMTWP) add user account for Garage Owner and Certifying Officer 	
Precondition	
<ul style="list-style-type: none"> • Customer (Commercial Vehicle Owner) is not having user account in the system. • Garage owner and certifying officer are not having user account in the system. • Commissioner (DMTWP) and Subject Officer (DMTWP) already have user account. (Assumption their registration handle on staff management system of DMTWP) • Previous year registered Commercial Vehicle Owners, Grage and Certifying Officer database tables are imported to the system 	
Postcondition	
<ul style="list-style-type: none"> • Customer (Commercial Vehicle Owner) can access customer dashboard. • Garage Owner and vehicle certifying officer can access internal dashboard. • Commissioner (DMTWP) and Subject Officer (DMTWP) can access internal dashboard. 	

Table 10- Use Case Description for User Management Module

3.4.1.2 Use Case Diagram for Vehicle Fitness Garage and Fitness Certifying Officer Management Module

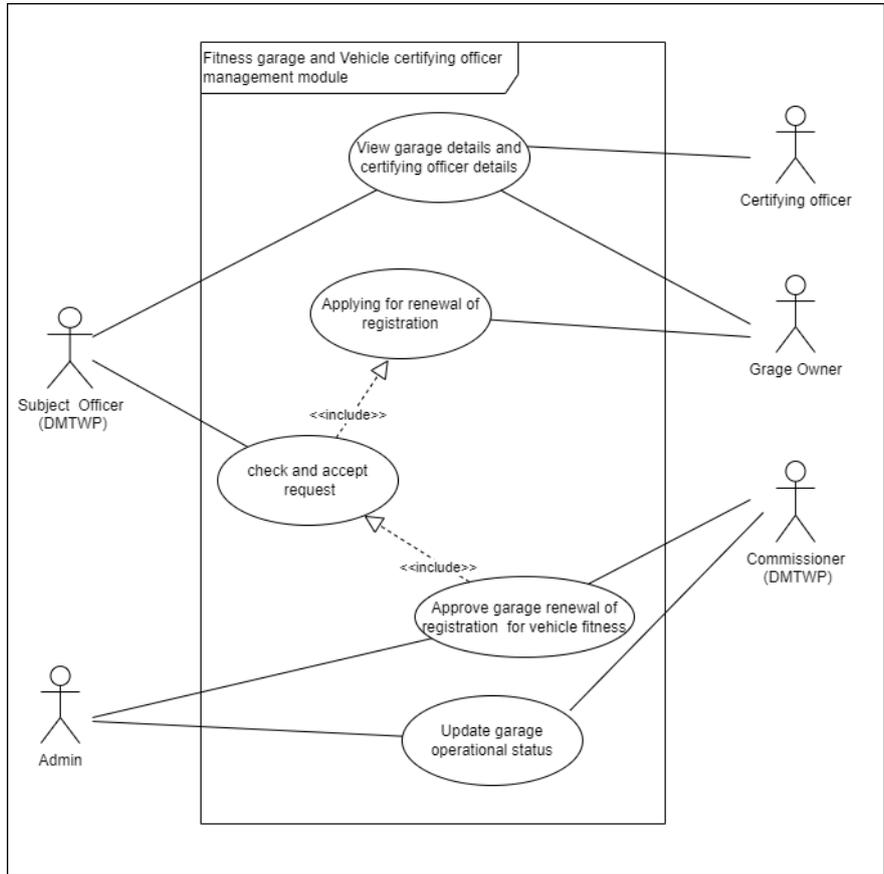


Figure 12 - Use Case Diagram for Vehicle Fitness Garage and Fitness Certifying Officer Management Module

Use Case	Vehicle Fitness Garage and Fitness Certifying Officer Management Module
Actors	Garage Owner, certifying officer, Commissioner (DMTWP), Subject Officer (DMTWP)
Description	<ul style="list-style-type: none"> Garage Owner apply for renewal of registration as a fitness garage Subject Officer check and accept the request Commissioner approved the request Commissioner update operational status as Active
Precondition	<ul style="list-style-type: none"> Commissioner already create user account for Garage owner Garage owner can login to the system Garage must have Grage registration certificate for last year
Postcondition	<ul style="list-style-type: none"> Can access to garage dashboard to continue operational as registered garage for Vehicle Fitness (Issuing Inspection Report and Fitness Certificate)

Table 11 - Use Case Description for Vehicle Fitness Garage and Fitness Certifying Officer Management Module

3.4.1.3 Use Case Diagram for Online Booking Management Module

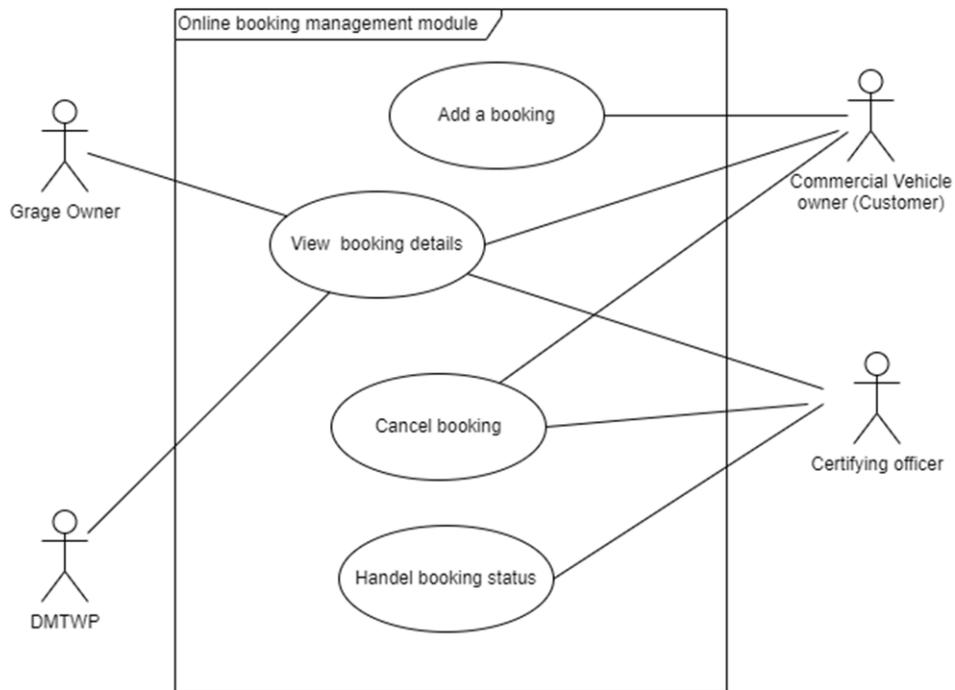


Figure 13 - Use Case Diagram for Online Booking Management Module

Use Case	Online Booking Management Module
Actors	Customer (Commercial Vehicle Owner), Garage Owner, Certifying Officer, DMTWP
Description	
<ul style="list-style-type: none"> • Commercial Vehicle Owner make booking to fitness garage for vehicle inspection • Certifying officer accept the booking • Certifying officer complete the booking status 	
Precondition	
<ul style="list-style-type: none"> • Commercial Vehicle Owner login to the system • Must be registered vehicle on DMTWP • He must have Revenue license for last year • Revenue license validity must be invalid or within 3 months before expiry date of previous revenue license. 	
Postcondition	
<ul style="list-style-type: none"> • Can view booking details and status 	

Table 12 - Use Case Description for Online Booking Management Module

3.4.1.4 Use Case Diagram for Vehicle Fitness Certificate and Inspection report Management Module

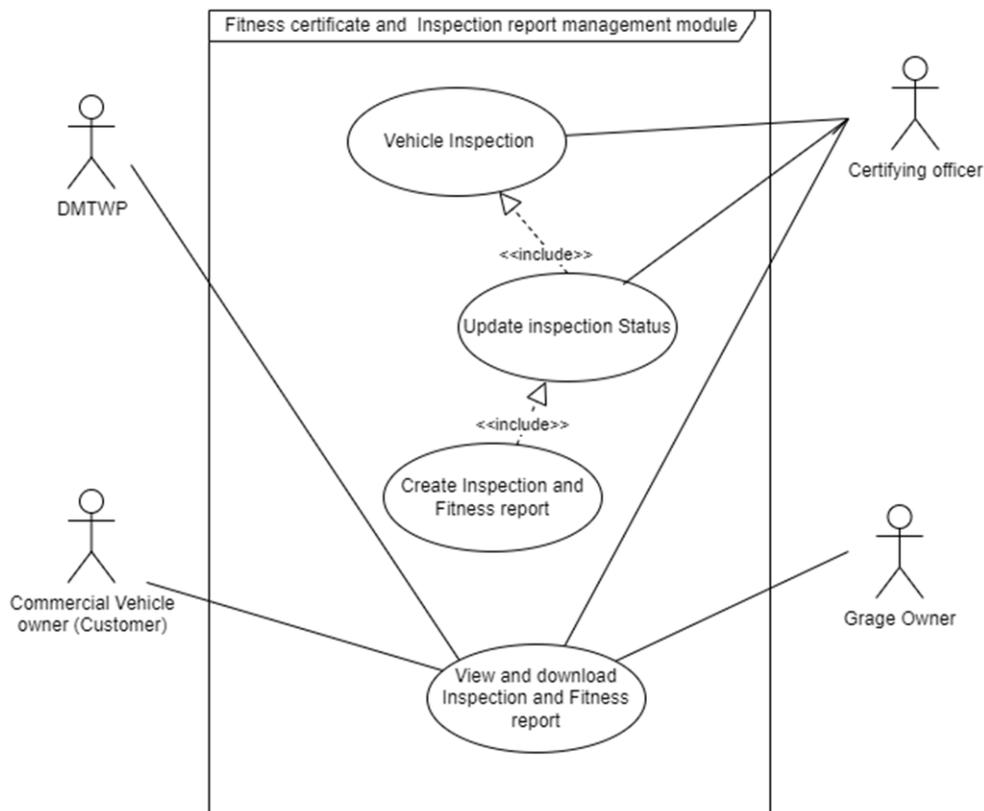


Figure 14 - Use Case Diagram for Vehicle Fitness Certificate and Inspection report Management Module

Use Case	Vehicle Fitness Certificate and Inspection report Management Module
Actors	Customer (Commercial Vehicle Owner), Garage Owner, certifying officer, DMTWP
Description	
<ul style="list-style-type: none"> • Fill Inspection report details • Fill vehicle fitness e-certificate and generate certificate 	
Precondition	
<ul style="list-style-type: none"> • Customer made a booking for inspection • Customer (Commercial Vehicle Owner) take vehicle to the fitness garage • Certifying officer inspection Vehicle • Inspection Should be Pass 	
Postcondition	
<ul style="list-style-type: none"> • can view and download the vehicle fitness e-certificate and Inspection Report for all user of the system 	

Table 13 - Use Case Description for Vehicle Fitness Certificate and Inspection report Management Module

3.4.1.5 Use Case Diagram for Payment Management Module

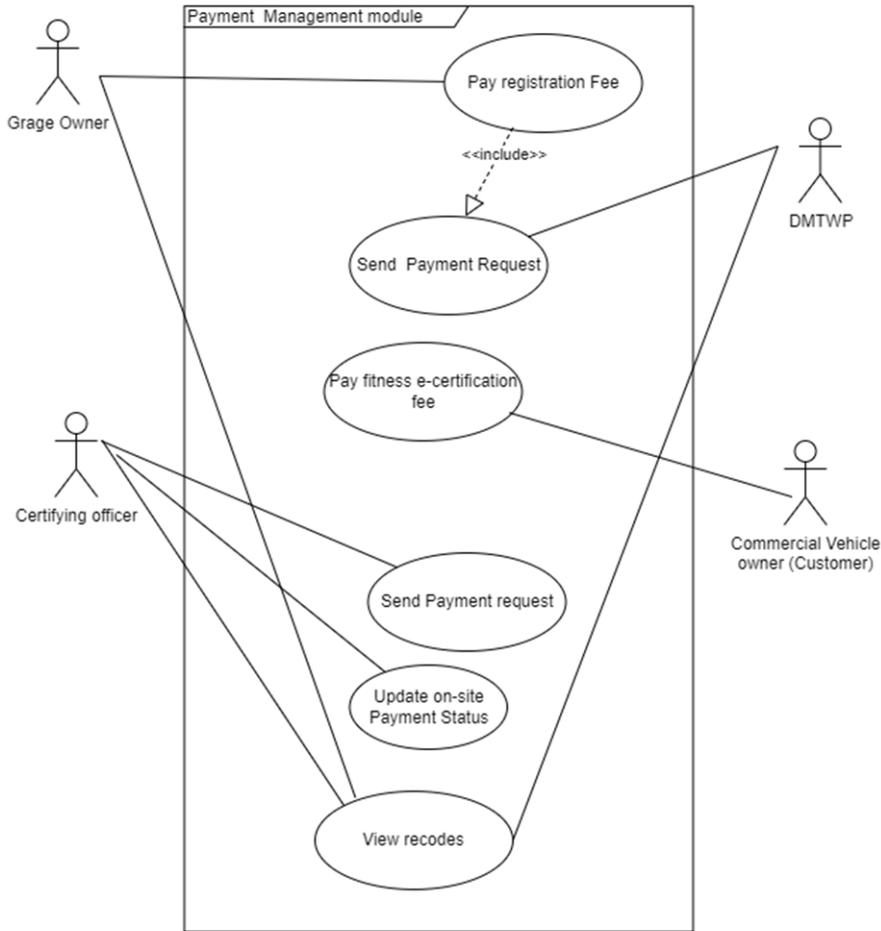


Figure 15 - Use Case Diagram for Payment Management Module

Use Case	Payment Management Module
Actors	Customer (Commercial Vehicle Owner), Garage Owner, certifying officer, DMTWP
Description	<ul style="list-style-type: none"> Garage Owner make payment for fitness garage registration Customer (Commercial Vehicle Owner) make payment for fitness e-certificate
Precondition	<ul style="list-style-type: none"> Received payment request from the system
Postcondition	<ul style="list-style-type: none"> Received payment conformation email notification Can access to the continue generate fitness certificate process Can access to the continue renew registration process

Table 14 - Use Case Description for Payment Management Module

3.4.1.6 Use Case Diagram for Report Management Module

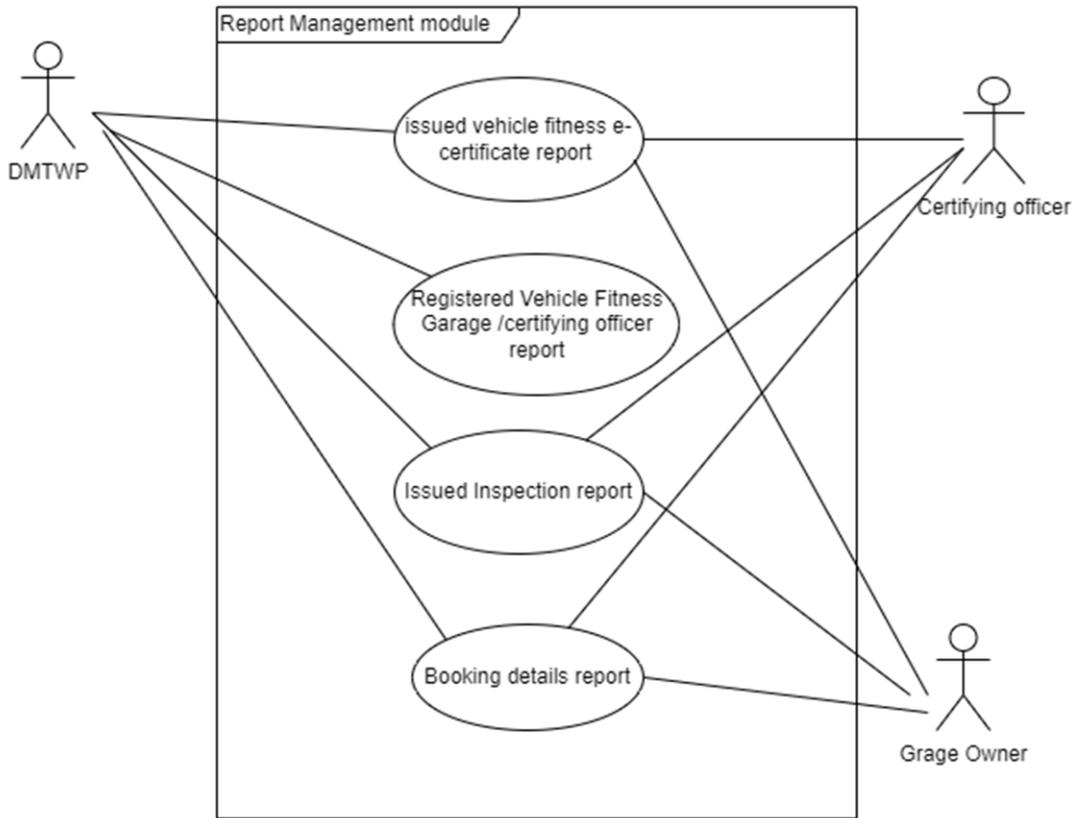


Figure 16 - Use Case Diagram for Report Management Module

Use Case	Report Management Module
Actors	Garage Owner, Certifying officer, DMTWP
Description	<ul style="list-style-type: none"> Issued vehicle fitness e-certificate report, issued inspection report details report, booking details report, Payment details report, Registered Vehicle Fitness Garage details report and registered certifying officer report customized by time and various categories.
Precondition	<ul style="list-style-type: none"> Garage Owner, certifying officer, DMTWP login in to the system
Postcondition	<ul style="list-style-type: none"> Can download MIS report in PDF and Excel format on report generate interface Individual Fitness Certificate and inspection report can View and download as PDF

Table 15 - Use Case Description for Report Management Module

3.4.1.7 Use Case Diagram for Feedback Management Module

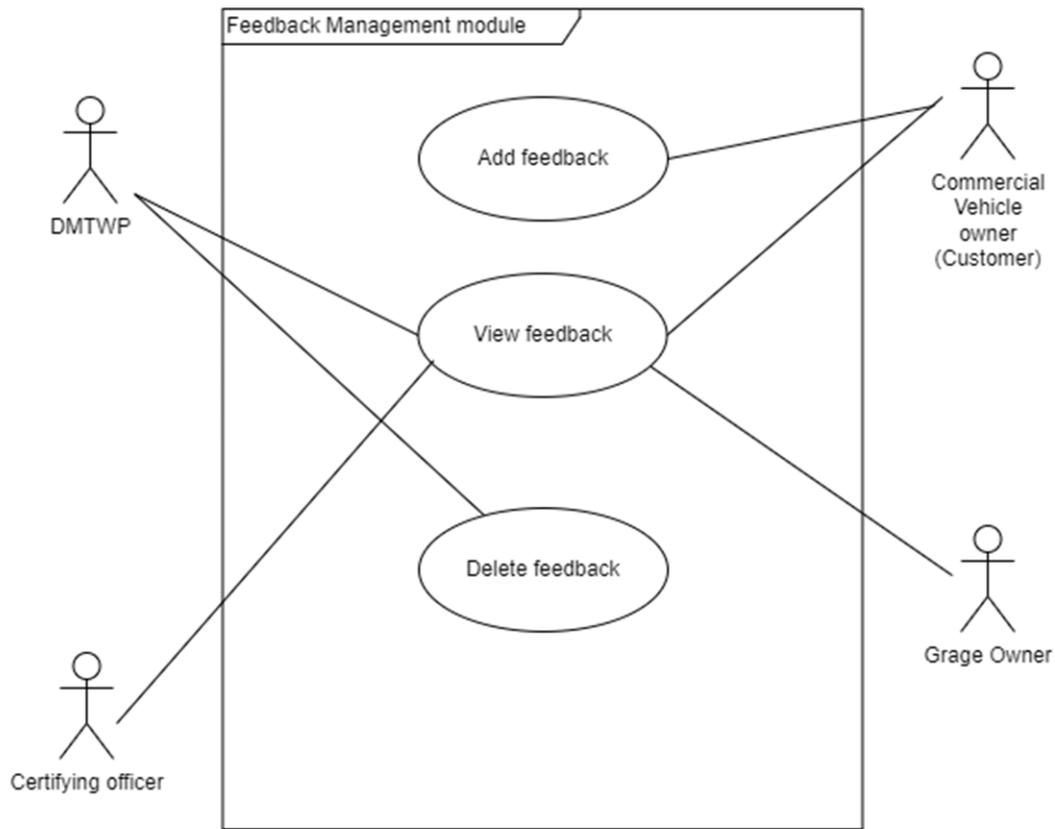


Figure 17 - Use Case Diagram for Feedback Management Module

Use Case	Feedback Management Module
Actors	Customer (Commercial Vehicle Owner), Garage Owner, certifying officer, DMTWP
Description	<ul style="list-style-type: none"> Customer (Commercial Vehicle Owner) add feedback regarding the service.
Precondition	<ul style="list-style-type: none"> DMTWP commissioner and DMTWP subject officer login to the system
Postcondition	<ul style="list-style-type: none"> Display feedback on home page

Table 16 - Use Case Description for Feedback Management Module

3.4.1.8 Use Case Diagram for News /FAQ Management Module

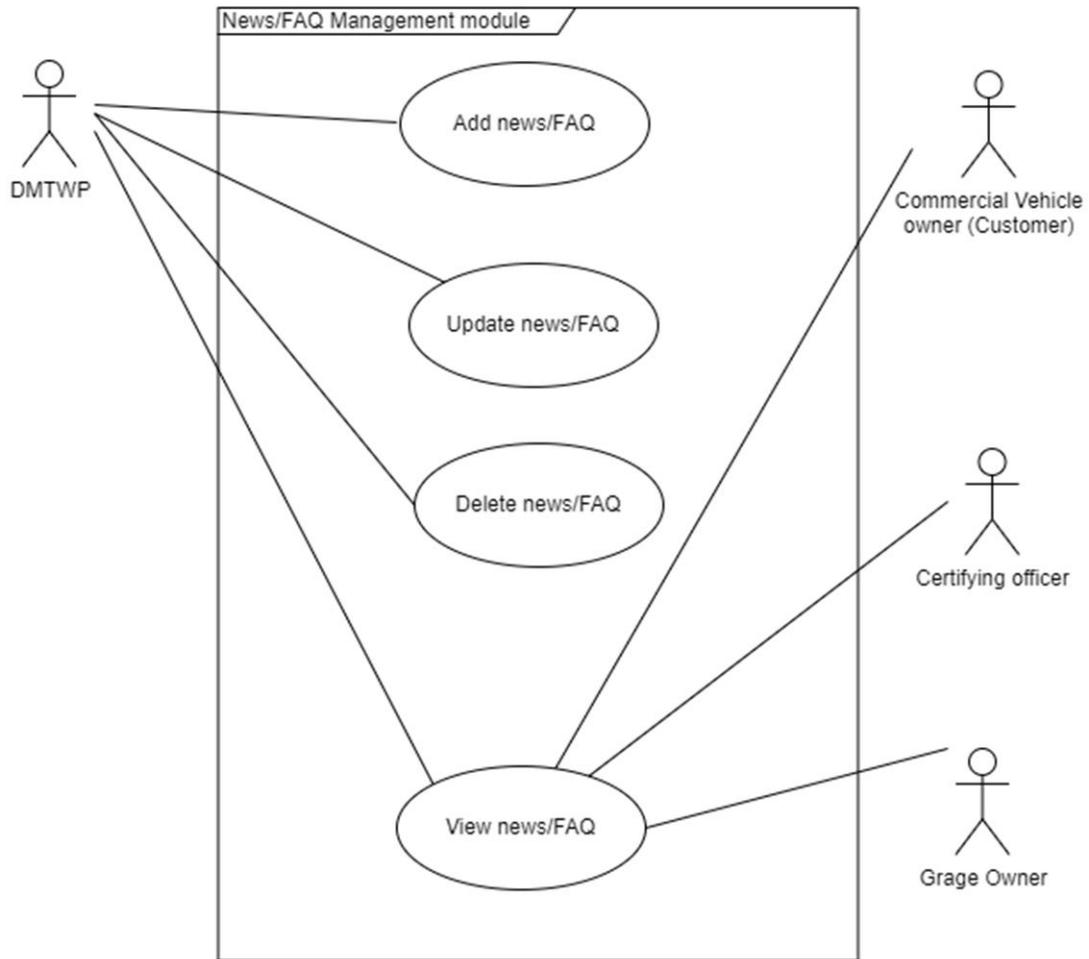


Figure 18 - Use Case Diagram for News /FAQ Management Module

Use Case	News /FAQ Management Module
Actors	Customer (Commercial Vehicle Owner), Garage Owner, certifying officer, DMTWP
Description	<ul style="list-style-type: none"> • latest news publishes DMTWP regarding rules and regulation changes, service fees changes. • Add, update and delete Frequently ask questions about the services.
Precondition	<ul style="list-style-type: none"> • DMTWP Commissioner and DMTWP Subject officer login to the system
Postcondition	<ul style="list-style-type: none"> • Display news/FAQ on the home page

Table 17 - Use Case Description for News /FAQ Management Module

3.4.2 ER diagram

An Entity-Relationship (ER) diagram is a visual representation of the relationships among entities in a database. It uses symbols to depict entities, attributes, and the associations between them. ER diagrams help in designing and understanding database structures, clarifying data relationships, and ensuring data integrity in database management systems (“ER Diagram Representation | Tutorialspoint,” n.d.).

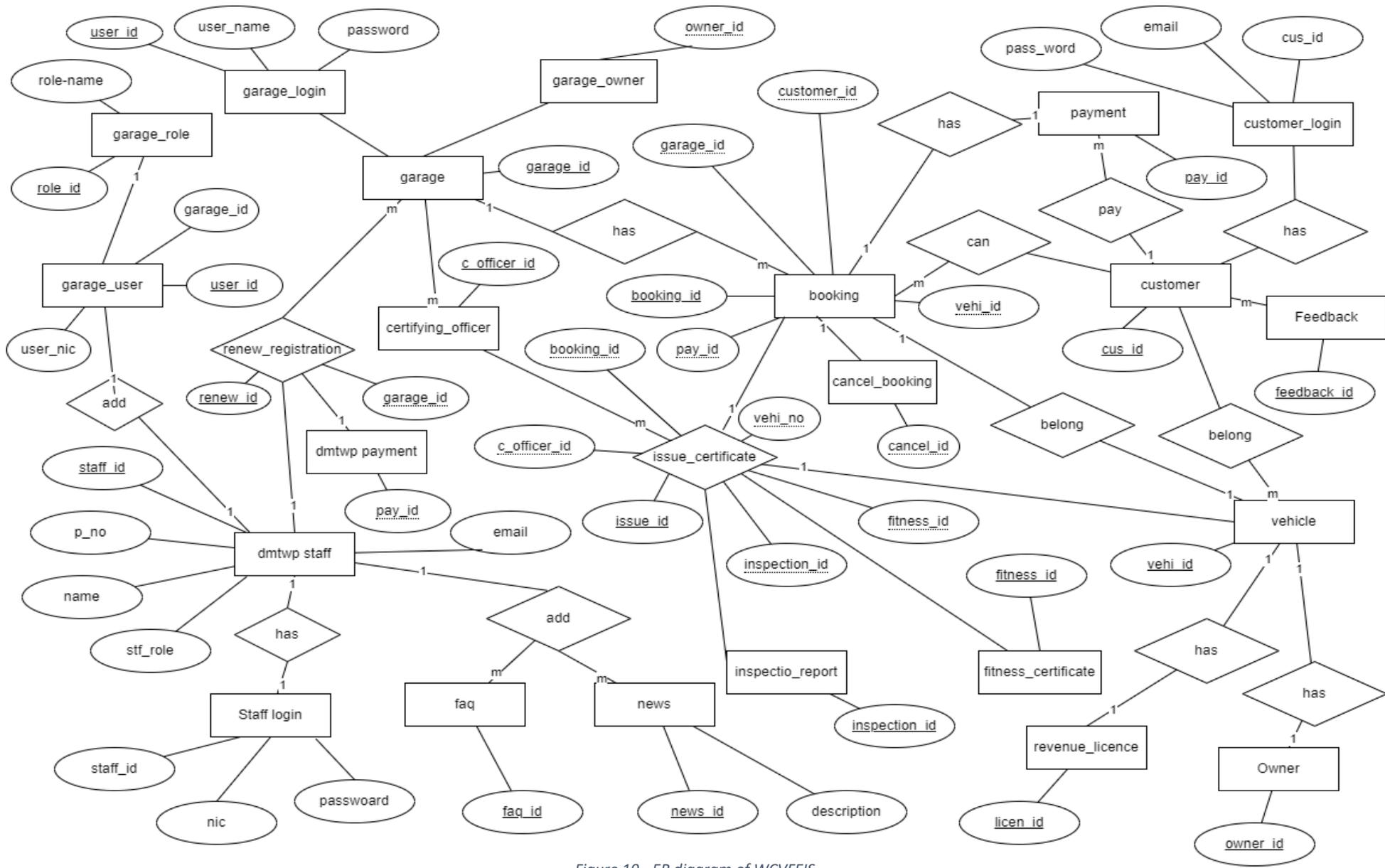


Figure 19 - ER diagram of WCVFEIS

3.4.3 Activity diagrams

An activity diagram is a graphical representation used to model the flow of activities within a system. It depicts the sequence of actions, decisions, and parallel processes, providing a clear visualization of how tasks are performed and interactions occur in a structured manner (“UML - Activity Diagrams,” n.d.).

3.4.3.1 Activity diagram for vehicle fitness e-certificate issuing

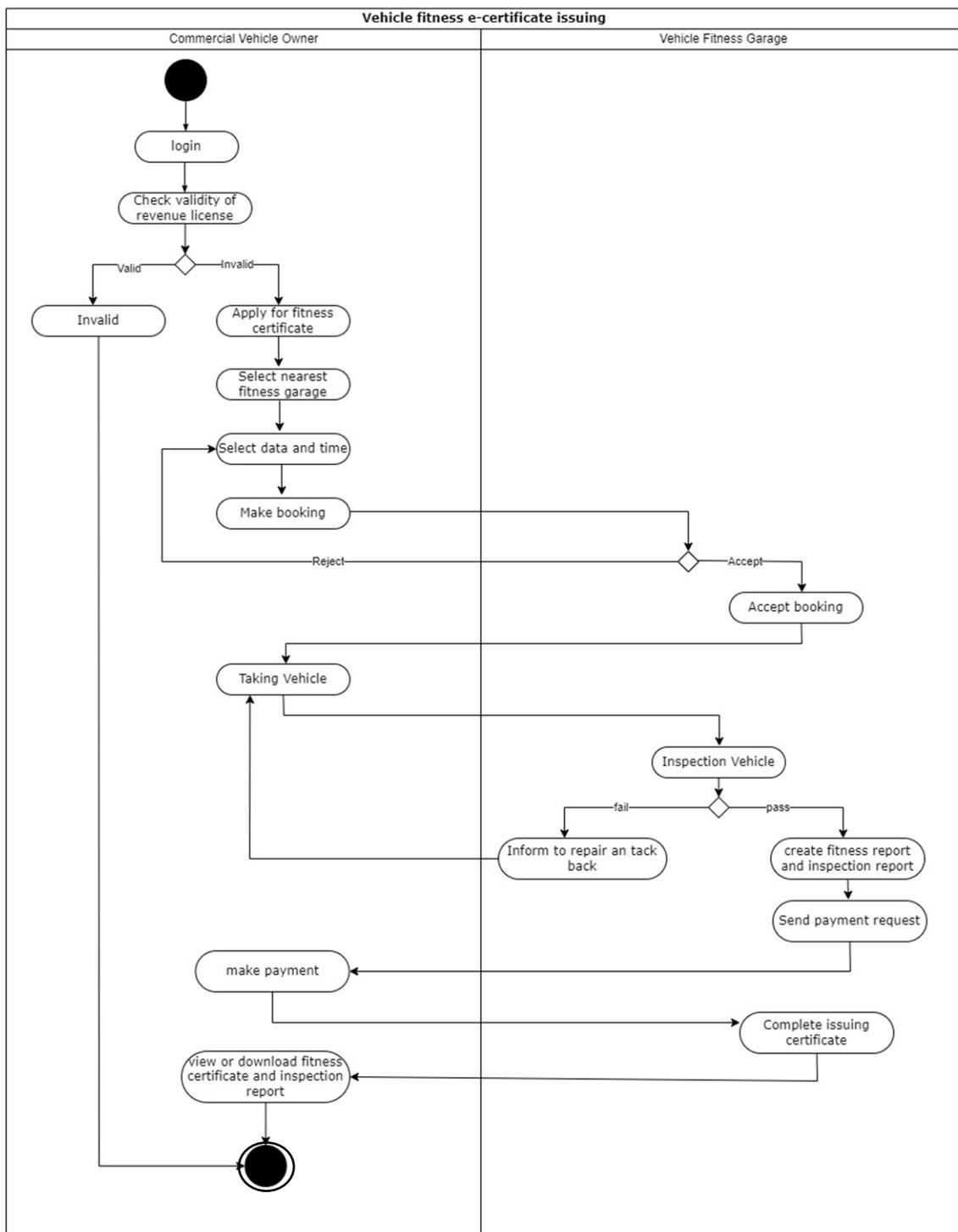


Figure 20 - Activity diagram for vehicle fitness e-certificate issuing

3.4.3.2 Activity diagram for Fitness garage and certifying officer renewal of registration

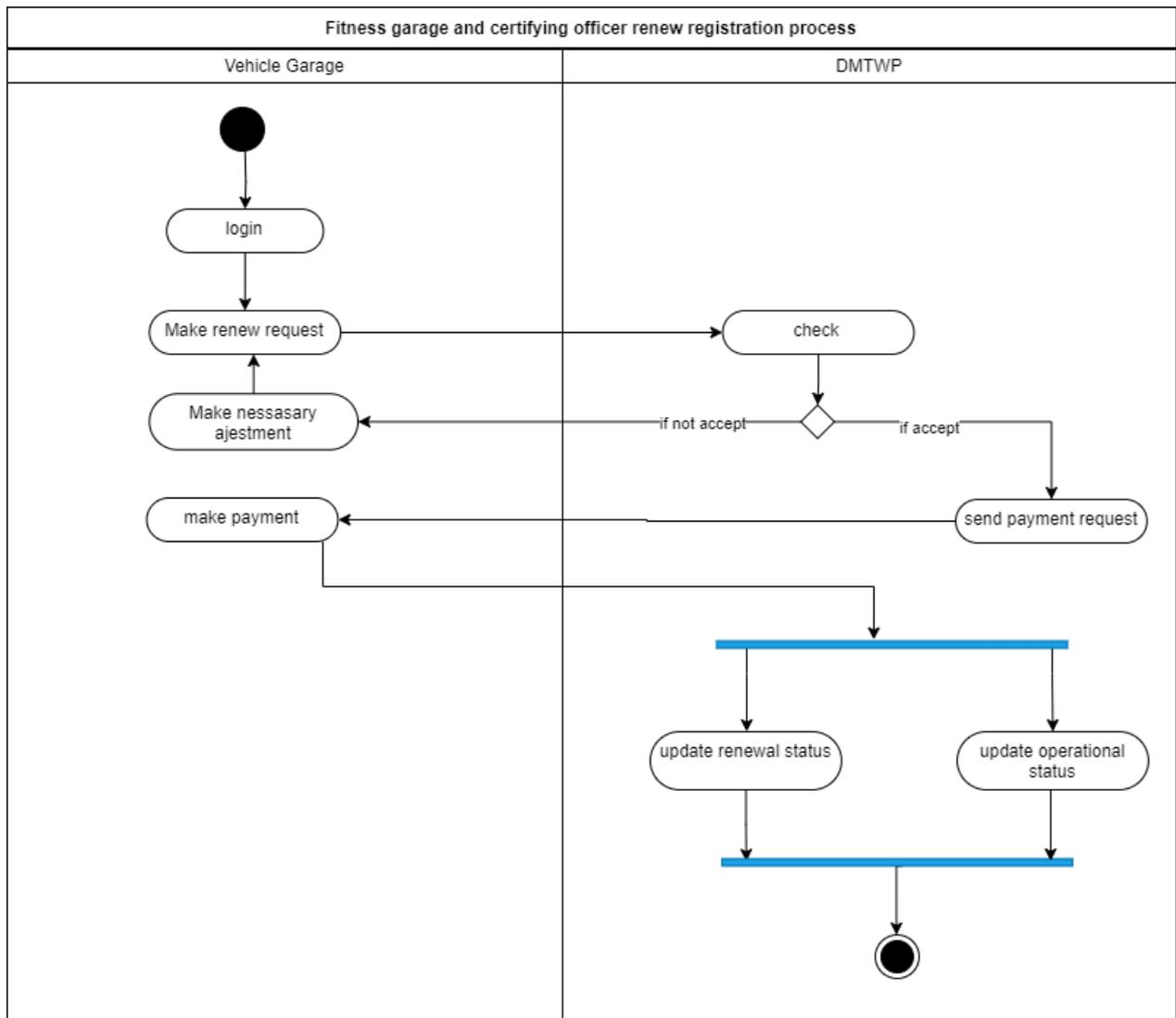


Figure 21 - Activity diagram for fitness garage and certifying officer registration

3.4.4 Sequence diagrams

Sequence diagrams illustrate interactions between objects or components in a system. They display the chronological order of messages exchanged among entities, helping to visualize the dynamic behavior of a two main process. Sequence diagrams emphasize the timing and collaboration of system elements for better understanding and design (“UML Sequence Diagram Tutorial,” n.d.).

3.4.4.1 Sequence diagram for vehicle fitness e-certificate issuing

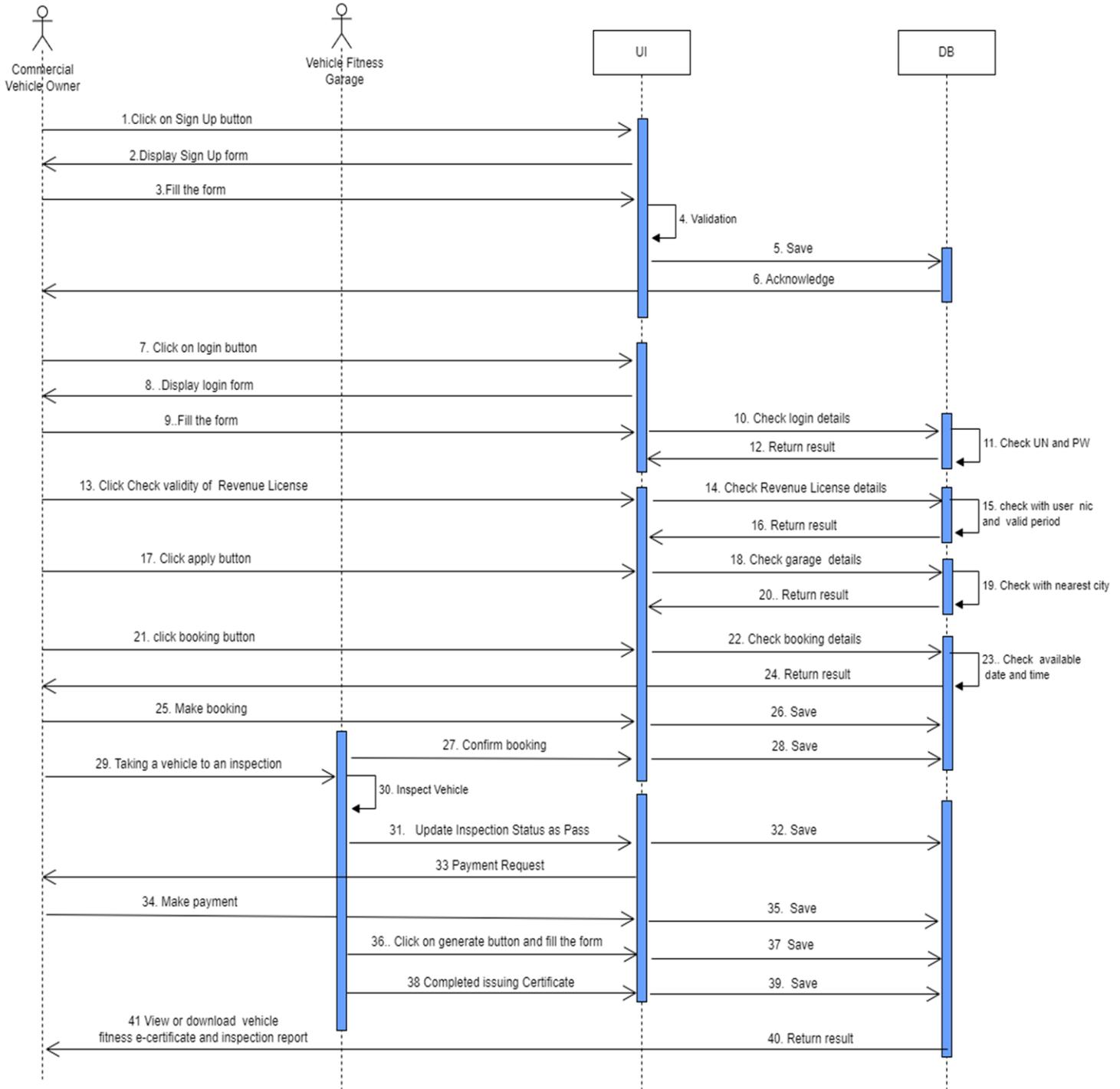


Figure 22 - Sequence diagrams for vehicle fitness e-certificate issuing

3.4.4.2 Sequence diagram for Fitness garage and certifying officer renewal of registration

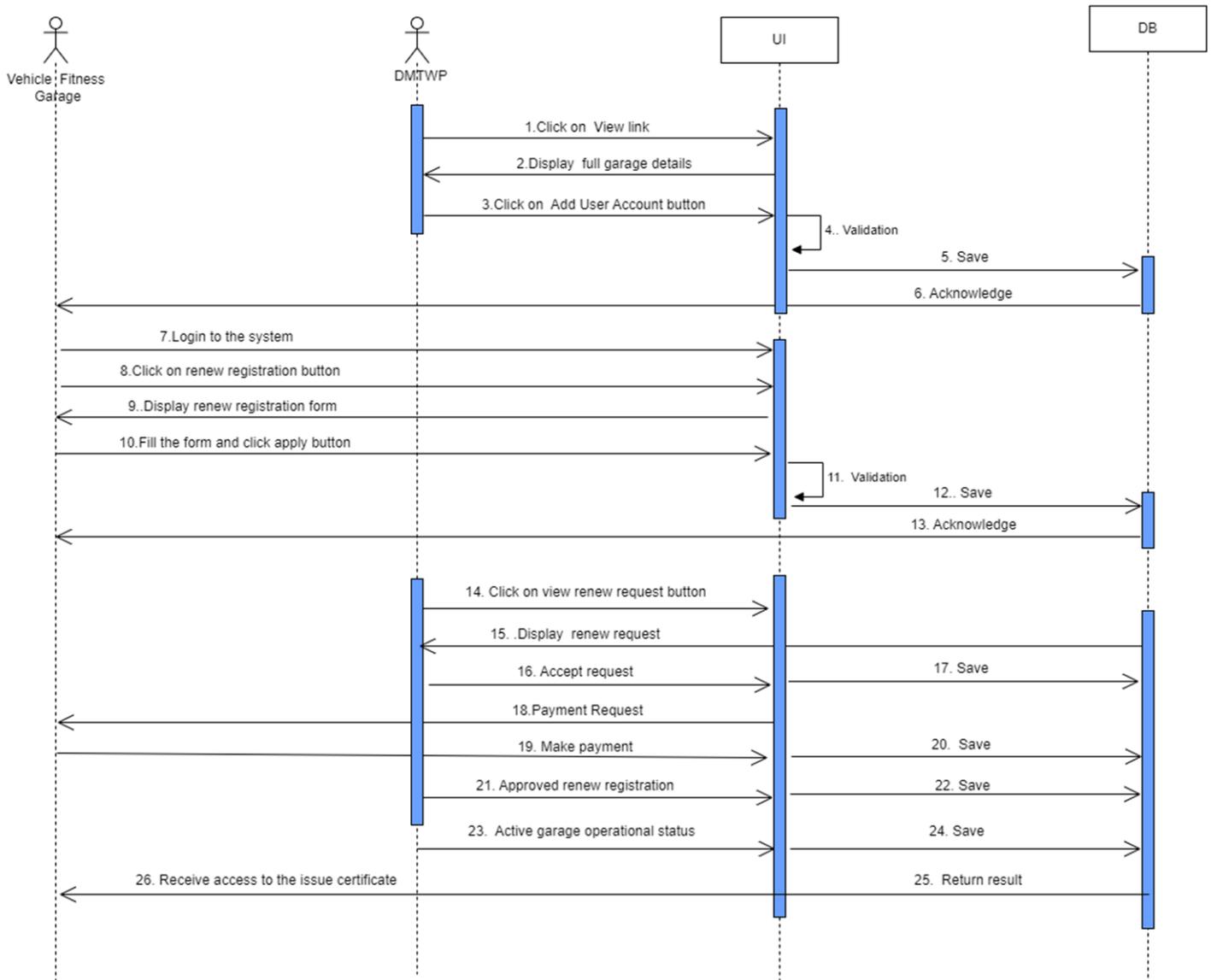


Figure 23 - Sequence diagrams for fitness garage and certifying officer registration

3.4.5 Class diagram

Class diagrams in software design illustrate the structure of a system by depicting classes, their attributes, methods, and relationships. They provide a static view of the system's object-oriented architecture, aiding in modeling and understanding class hierarchies, associations, and inheritance. Class diagrams are crucial for planning, communication, and documentation in software development (Martin, n.d.).

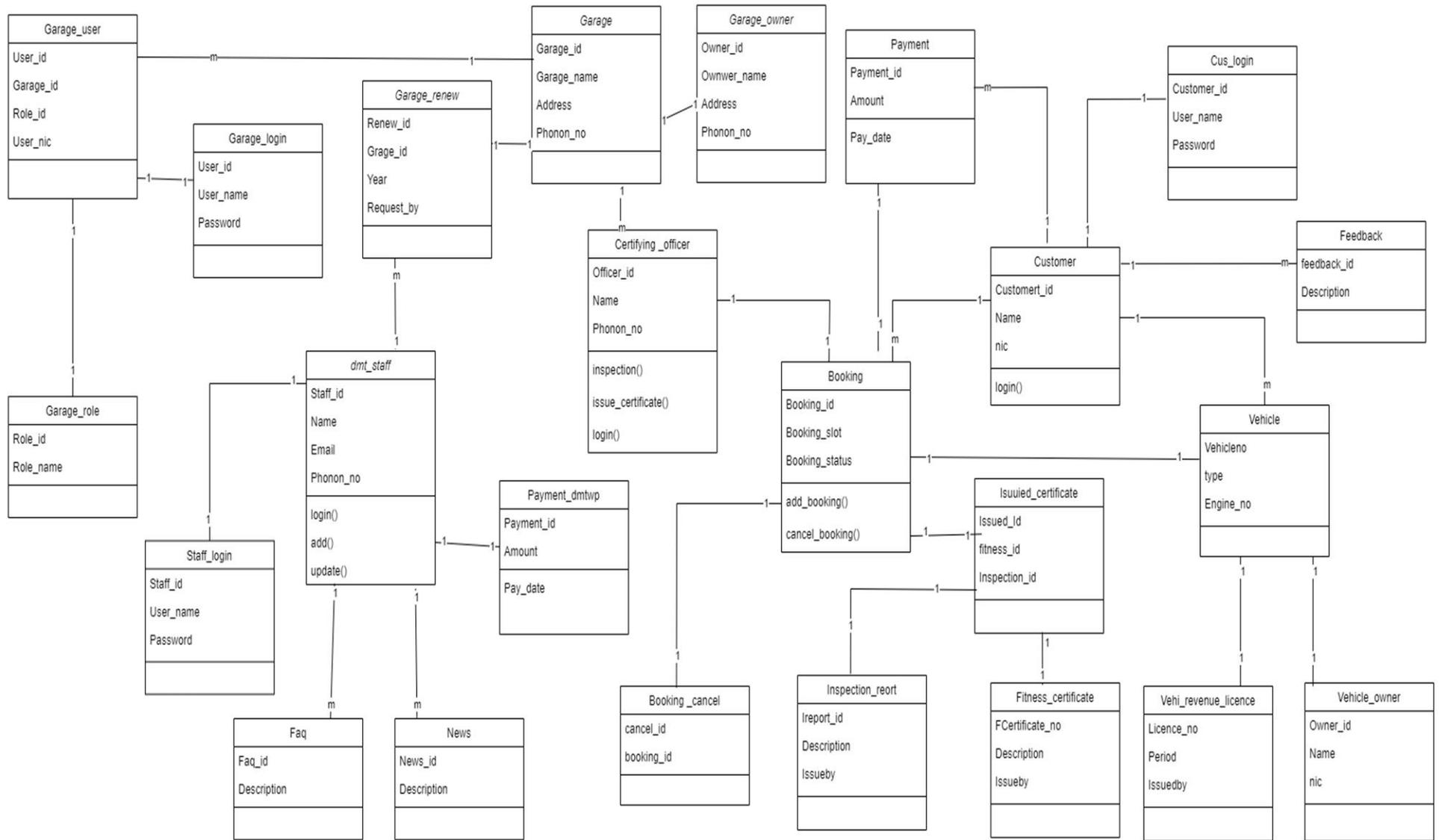


Figure 24 – Class diagram of WCVEIS

3.5 Database Design

The database of this system was designed as relational database implemented using Structured Query Language. A Database Management System (DBMS) comprises a collection of interconnected data along with a set of programs to access and manage this data. It is responsible for handling large volumes of data efficiently. The core component is the database, where the data is stored, organized, and accessed. Well-implemented DBMS simplifies data management, enhances data security, and ensures data integrity and consistency.

A consistent and systematic naming convention was applied to all tables and fields in the database. Short and ambiguous names were avoided to prevent confusion. Instead, meaningful names were used for each table, making it easier to comprehend the records contained within. This naming strategy ensures clarity and helps users understand the purpose and content of each table, facilitating effective data management and retrieval (“Database design basics - Microsoft Support,” n.d.).

Table	Action	Rows	Type	Collation	Size	Overhead
booking	Browse Structure Search Insert Empty Drop	3	InnoDB	utf8mb4_general_ci	16.0 KIB	-
cancel_booking	Browse Structure Search Insert Empty Drop	35	InnoDB	utf8mb4_general_ci	64.0 KIB	-
certifying_officer	Browse Structure Search Insert Empty Drop	4	InnoDB	utf8mb4_general_ci	16.0 KIB	-
customer	Browse Structure Search Insert Empty Drop	8	InnoDB	utf8mb4_general_ci	16.0 KIB	-
cus_login	Browse Structure Search Insert Empty Drop	10	InnoDB	utf8mb4_general_ci	16.0 KIB	-
dmt_staff	Browse Structure Search Insert Empty Drop	2	InnoDB	utf8mb4_general_ci	16.0 KIB	-
faq	Browse Structure Search Insert Empty Drop	6	InnoDB	utf8mb4_general_ci	16.0 KIB	-
feedback	Browse Structure Search Insert Empty Drop	2	InnoDB	utf8mb4_general_ci	16.0 KIB	-
fitness_certificate	Browse Structure Search Insert Empty Drop	3	InnoDB	utf8mb4_general_ci	16.0 KIB	-
garage	Browse Structure Search Insert Empty Drop	4	InnoDB	utf8mb4_general_ci	16.0 KIB	-
garage_login	Browse Structure Search Insert Empty Drop	9	InnoDB	utf8mb4_general_ci	16.0 KIB	-
garage_owner	Browse Structure Search Insert Empty Drop	4	InnoDB	utf8mb4_general_ci	16.0 KIB	-
garage_renew	Browse Structure Search Insert Empty Drop	2	InnoDB	utf8mb4_general_ci	16.0 KIB	-
garage_role	Browse Structure Search Insert Empty Drop	2	InnoDB	utf8mb4_general_ci	16.0 KIB	-
garage_user	Browse Structure Search Insert Empty Drop	8	InnoDB	utf8mb4_general_ci	16.0 KIB	-
inspection_report	Browse Structure Search Insert Empty Drop	3	InnoDB	utf8mb4_general_ci	16.0 KIB	-
issued_certificate	Browse Structure Search Insert Empty Drop	3	InnoDB	utf8mb4_general_ci	16.0 KIB	-
news	Browse Structure Search Insert Empty Drop	2	InnoDB	utf8mb4_general_ci	16.0 KIB	-
payment	Browse Structure Search Insert Empty Drop	4	InnoDB	utf8mb4_general_ci	16.0 KIB	-
payment_dmtwp	Browse Structure Search Insert Empty Drop	1	InnoDB	utf8mb4_general_ci	16.0 KIB	-
staff_login	Browse Structure Search Insert Empty Drop	5	InnoDB	utf8mb4_general_ci	16.0 KIB	-
vehicle	Browse Structure Search Insert Empty Drop	6	InnoDB	utf8mb4_general_ci	16.0 KIB	-
vehi_owner	Browse Structure Search Insert Empty Drop	4	InnoDB	utf8mb4_general_ci	16.0 KIB	-
vehi_revenue_licence	Browse Structure Search Insert Empty Drop	6	InnoDB	utf8mb4_general_ci	16.0 KIB	-
24 tables	Sum	136	InnoDB	utf8mb4_general_ci	432.0 KIB	0 B

Figure 24 - Database structure of WCVFEIS

3.6 User Interface Design

User interface design is a crucial aspect that directly impacts the system's accessibility and usability. A well-structured and user-friendly interface enhances the system's appeal to users with varying technical knowledge levels, reducing training costs and time.

The system's interface should be intuitive, enabling users to effortlessly navigate and utilize its features in their operations. A carefully designed interface minimizes the risk of user errors and aligns with user expectations. It considers the physical and mental capabilities of the target audience, ensuring a seamless and enjoyable user experience (“What is User Interface (UI) Design?,” n.d.).

The WCVFEIS was intentionally designed to be simple and user-friendly. Unwanted menus and links were avoided to ensure a clean and clutter-free interface. The home page was structured in a way that users can easily classify themselves without confusion, guiding them to their desired destinations. Each page includes a menu for convenient navigation, allowing users to access various sections effortlessly. The content was curated to be visually appealing, avoiding excessive graphics and dark colors. The architecture follows the client-server model, optimizing loading times on the server for efficient performance. And this system implemented web-based responsive system that could be enhance user experience (“10 Fundamental UI Design Principles You Need to Know | Dribbble,” n.d.).

3.6.1 WCVFEIS Home Page Interface

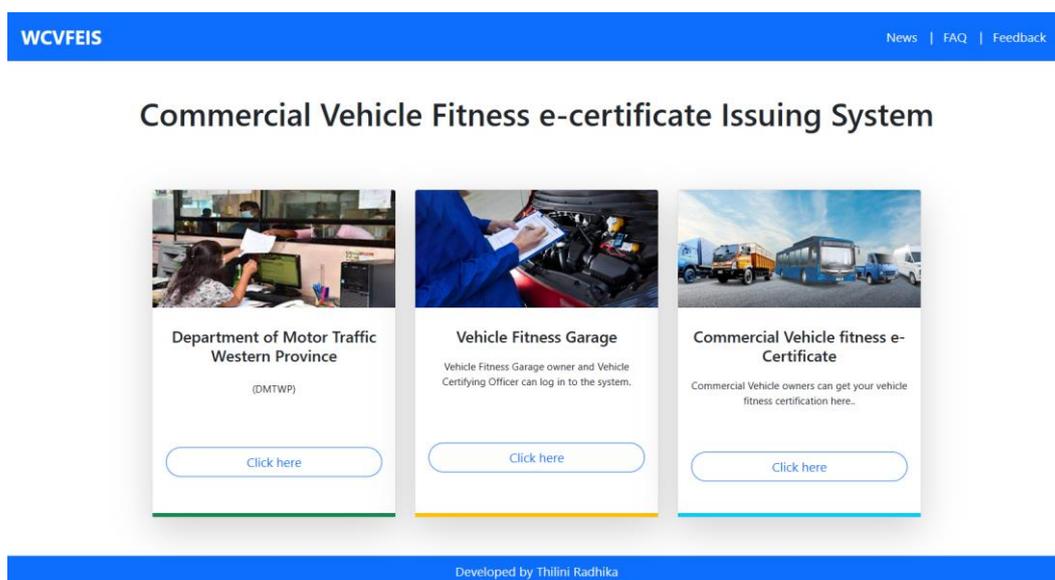


Figure 25 - WCVFIS Home Page Interface

3.6.2 DMTWP login Interface

WCVFEIS

Department of Morter Traffic - Western Province

login

Email

Password

Role
Subject Officer ▼

Developed by Thilini Radhika

Figure 26 - DMTWP login Interface

3.6.3 Vehicle Fitness Garage login Interface

WCVFEIS

Vehicle Fitness Garage

login

Email

Password

Role
Garage Owner ▼

Don't have an account? [Click here](#)

Developed by Thilini Radhika

Figure 27 - Vehicle Fitness Garage login Interface

3.6.4 Commercial Vehicle Owner Login Interface

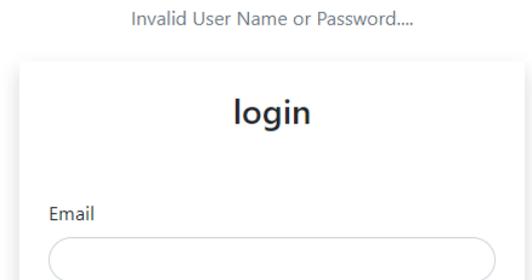
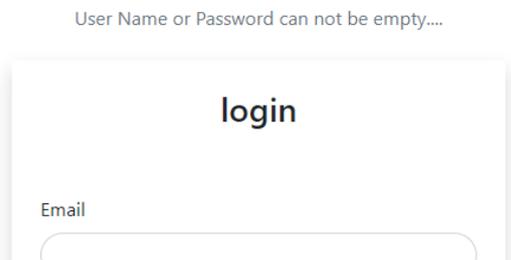
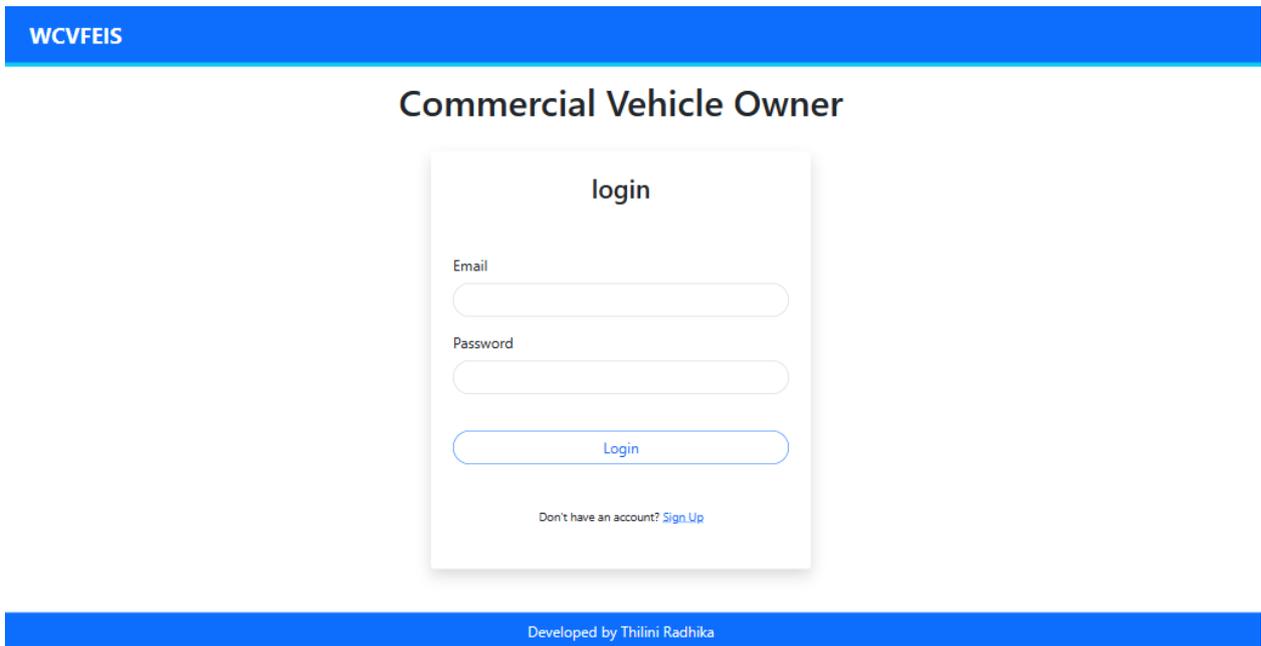


Figure 28 - Commercial Vehicle Owner Login Interface

3.6.5 Commercial Vehicle Owner Sign Up Interface

WCVFEIS

Commercial Vehicle Owner

Sign Up

First Name

Last Name

NIC

Phone No

Email

Password

[Do you have an account? Login](#)

Developed by Thilini Radhika

Commercial Vehicle Owner

Sorry... NIC already exists..

Sign Up

First Name

Last Name

Commercial Vehicle Owner

Sorry... email already exists..

Sign Up

First Name

Commercial Vehicle Owner

Mobile Number must contain 10 digits..

Sign Up

First Name

Figure 29 - Commercial Vehicle Owner Sign Up Interface

3.6.6 Commercial Vehicle Owner Dashboard

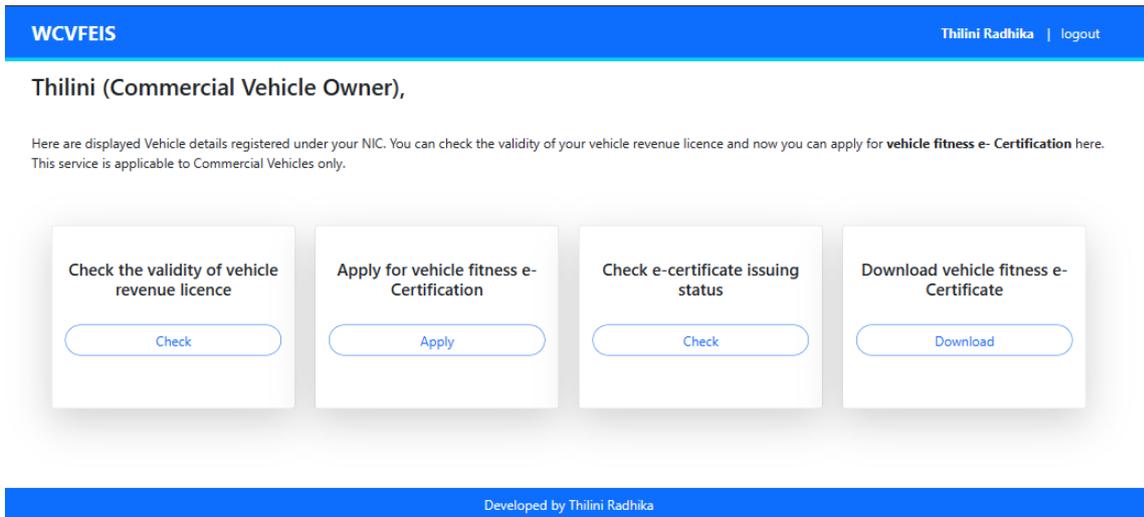
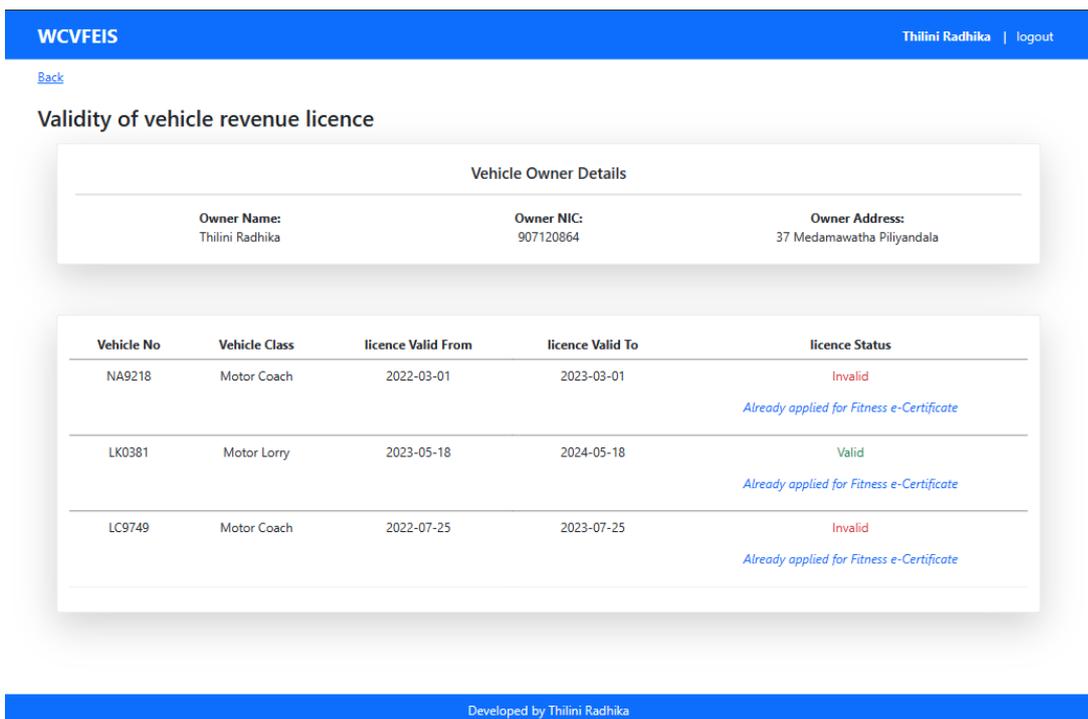


Figure 30 - Commercial Vehicle Owner Dashboard

3.6.7 Check the validity of Vehicle Revenue License Interface



Validity of vehicle revenue licence

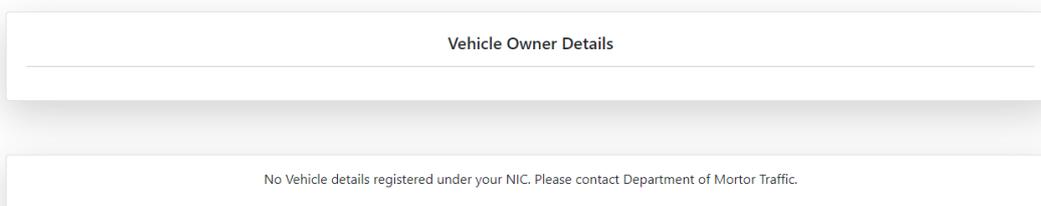


Figure 31 - Check the validity of Vehicle Revenue License Interface

3.6.8 Apply for Vehicle fitness e-Certificate Interface

The screenshot displays the WCVFEIS application interface. At the top, a blue header contains the text 'WCVFEIS' on the left and 'Thilini Radhika | logout' on the right. Below the header, a blue link labeled 'Back' is visible. The main heading is 'Apply for vehicle fitness e-Certification'. A white box titled 'Vehicle Details' contains three fields: 'Vehicle No: LK0381', 'Vehicle Class: Motor Lorry', and 'Engine No: N04CTH110667'. Below this is a light blue section titled 'Find the nearest fitness garage'. It features two dropdown menus for 'Select a District' and 'Select a City', followed by a 'Search' button. A table lists two garages: 'Magaintha Mortors' and 'Nawinna Service Station', each with a 'Booking Now' button. The table columns are 'Garage Name', 'Location', 'Contact No', 'District', and 'City'. A blue footer bar at the bottom of the first section reads 'Developed by Thilini Radhika'. A white box with the number '1' is positioned below the first section. The second section is a similar search interface with 'Province' and 'City' input fields and a 'Search' button. Below the search fields, the text 'No garages found matching the search criteria.' is displayed. A second blue footer bar at the bottom of the second section reads 'Developed by Thilini Radhika'.

WCVFEIS Thilini Radhika | logout

[Back](#)

Apply for vehicle fitness e-Certification

Vehicle Details

Vehicle No: LK0381	Vehicle Class: Motor Lorry	Engine No: N04CTH110667
-----------------------	-------------------------------	----------------------------

Find the nearest fitness garage

Garage Name	Location	Contact No	District	City	
Magaintha Mortors	417, Old Kottawa Road, Udahamulla, Nugegoda	112844578	Colombo	Nugegoda	<input type="button" value="Booking Now"/>
Nawinna Service Station	68, Watamawatta, Wijwrama, Nugegoda	11280304	Colombo	Nugegoda	<input type="button" value="Booking Now"/>

Developed by Thilini Radhika

1

Find the nearest fitness garage

No garages found matching the search criteria.

Developed by Thilini Radhika

Figure 32 - Apply for Vehicle fitness e-Certificate Interface

3.6.9 Booking Vehicle Fitness garage Interface

WCVFEIS Thilini Hemasiri | logout

[Back](#)

Garage Booking

Garage Details

Grage Nmae: Magintha Mortors	Address: 417, Old Kottawa Road, Udahamulla, Nugegoda	Contact No: 112844578	Email: magintha@gmail.com
--	---	---------------------------------	-------------------------------------

Select date and Time slot

Date: Time Slot:

Developed by Thilini Radhika

Figure 33 - Booking Vehicle Fitness garage Interface

3.6.10 Vehicle Fitness e-certificate issuing status Interface

WCVFEIS Thilini Hemasiri | logout

[Back](#)

Vehicle Fitness e-certificate issuing status

Vehicle Number	Booking Date	Booking Time	Garage Name	Booking Status	Inspection Certificate Status	Fitness Certificate Status
NA9218	2023-09-05	8:00 AM - 10:00 AM	Magintha Mortors	Pending	pending	pending

Developed by Thilini Radhika

Figure 34 - Vehicle Fitness e-certificate issuing status Interface

3.7 Summary

This chapter provided full description about the design stage of the project including related design strategies, system architecture, UML diagrams, database design and user interface design of the system. Next chapter will be describing the implementation stage of this project.

Chapter 4 – Implementation

4.1 Introduction

This chapter includes about the Software requirement, Hardware requirement, development tools and technologies of the WCVFEIS in detail.

4.2 Implementation Environment

In this section describe hardware requirement, software environment and Development Tools and Supported Browsers.

4.2.1 Hardware requirements

CPU	Intel core i3 or higher
Operating System (OS)	Windows 7 or higher
Memory	4GB or higher
Hard Disk	400GB or higher
Internet Connection	4G or higher

Table 18- Hardware requirements

4.2.2 Software requirement

Web server	XAMPP server 3.3
	✓ Apache Server 2.4.48
	✓ MySQL
	✓ PHP 8.0.7
	✓ phpMyAdmin 5.1.1

Table 19 - Software requirement

4.2.2.1 XAMPP

XAMPP used as local web server for hosting the system in development. It is a free and open-source cross-platform web server solution package. It consists of the Apache HTTP Server, MySQL database and interpreters for scripts written in the PHP and Perl programming languages. The reason for selecting the XAMPP server is that it is free and open source for implementing this system. Since it is also reliable and well-performing.

4.2.3 Development Tools

Code editor	Visual Studio Code
Diagrams Software	Draw.io
Image Editor	Adobe Photoshop CS5

Table 20 - Development Tools

4.2.3.1 Visual Studio Code

Visual Studio Code (VS Code) is a lightweight, cross-platform code editor developed by Microsoft. Its rich feature set and extensive ecosystem of extensions. VS Code is known for its speed and efficiency, launching quickly and providing a responsive coding experience. It's compatible with Windows, macOS, and Linux, ensuring accessibility for across various operating systems. One of its most compelling attributes is its extensibility. Customization options abound, from themes to keyboard shortcuts, enabling to create a personalized coding environment (“Documentation for Visual Studio Code,” n.d.).

4.2.3.2 Draw.io

Draw.io is a user-friendly, web-based diagramming tool that used to create a wide range of visual diagrams and charts. It offers a diverse library of shapes, symbols, and connectors. Draw.io is platform accessible via a web browser, without the need for installations or downloads. This makes it highly versatile and accessible, enabling users to create, edit, and share diagrams from virtually anywhere. Diagrams can be exported in various formats, including PDF, PNG, or editable files like XML, ensuring compatibility with different applications.

4.2.3.3 Adobe Photoshop CS5

Adobe Photoshop CS5v is image editing software, delivers advanced tools for graphic design, photo enhancement, and digital art creation. It supports various file formats. It used for image retouching all over the interface development.

4.2.4 Supported Browsers

Web-based system is compatible with popular web browsers like Mozilla Firefox, Internet Explorer (IE), and Google Chrome. This compatibility ensures that users can access and use the system seamlessly across these browsers, enhancing accessibility and usability.

4.2.5 Technology Selection

In this section discussed about technology which used to develop this system in detail.

4.2.5.1 HTML

HTML used for developed web-based system because HTML is Hypertext Markup Language used for structuring the content of the interface in the system. It structures information on webpages using tags, providing a hierarchical format for text, images, links, and multimedia. HTML's simplicity and versatility make it accessible to developing. It's compatible with all web browsers and platforms. HTML5, the latest version, introduced modern features.

4.2.5.2 CSS

CSS (Cascading Style Sheets) is used to control the presentation and layout of web pages, enhancing their visual appeal and user experience. CSS allows to define styles, such as fonts, colors, spacing, and responsive designs, for HTML elements. It provides a consistent and efficient way to manage a website's look and feel across different devices and screen sizes. With CSS, can separate content from presentation, making websites easier to maintain and update. It's a tool that create visually stunning and responsive web interfaces.

4.2.5.3 JavaScript

JS(JavaScript) is used for interactive behavior on web-based system. JavaScript can interact with HTML source code in dynamic content. jQuery is a Java Script library containing CSS manipulation, HTML event method, effect and animation etc.

4.2.5.4 PHP

PHP (PHP Hypertext Preprocessor) is a server-side language that used in web-based system development. This language can use for handling dynamic content. PHP can be embedded into regular HTML code and also open-source language. PHP language support for many databases, such as MySQL etc. Its readability and simplicity, reducing complex tasks to just a few lines of code. As an open-source platform, PHP offers full customization capabilities, enabling quick and easy modifications to meet specific needs.

Furthermore, PHP collaborating with HTML, CSS. The use of tags in PHP scripts simplifies the dynamic integration, allowing code and functions to be written in any order within a document. This flexibility code management, ensuring efficiency in web-based system development.

This web-based system, development using Pure PHP because of Pure PHP is simpler and has a lower learning curve compared to PHP frameworks. Pure PHP applications tend to be lightweight because they only include the code that's necessary for the project. Frameworks, on the other hand, come with a lot of built-in features, which might be complexing for simpler projects. With pure PHP, have full control over every aspect of the application. Pure PHP allows for complete customization.

4.2.5.5 MySQL

MySQL is used for developing a relational database management system in the web-based system. It is an open-source. MySQL has benefits such as scalability, high performance and availability. Additionally, MySQL offers strong security features to the data.

4.3. Reused Components

4.3.1 Bootstrap 5

Bootstrap is a free and open-source CSS framework that is a responsive, front-end framework used for web-based system interface development. It contains HTML, CSS and JavaScript-based design templates for typography, forms, buttons, navigation, and other interface components.

Bootstrap 5, the latest version of the popular front-end framework. It simplifies and accelerates the creation of responsive, visually appealing websites and web applications. Bootstrap 5 offers a rich set of pre-designed components, like navigation bars, forms, and carousels, that are easily customizable. Its mobile-first approach ensures performance across all devices. With its grid system, layout design and ensures consistency

4.3.2 PHPMailer

PHPMailer is a code library and used to send emails safely and easily via PHP code from a web server. PHPMailer simplifies the process of sending emails and it is very easy to use. PHPMailer library can set up via Gmail SMTP (“PHPMailer Gmail,” 2024). Using this library created an email notification functionality in this system.

4.3.3 TCPDF and mPDF

TCPDF and mPDF are the PHP-based library allows generating PDF documents (“Examples · TCPDF,” n.d.) (“Features – About mPDF – mPDF Manual,” n.d.). mPDF use to generate e-fitness certificate and inspection report because it can create many customizations.

4.4 Codes Segments

In this web-based system database connection is important code segment. Functions like added, deleted or updated in the system, the system always connects with the related database. Code segment given below links the system to its database.

```
WCVFEIS > include > dbconnection.php
1  <?php
2  $conn=mysqli_connect("localhost","root","","wcvfeis");
3
4  if (!$conn){
5      die("connection failed : " . mysqli_connect_error());
6  }
```

Figure 35 - Database Connection Code segment

Code segment of sign-up validation is illustrated in following figure.

```
c-vehicle-owner > c-include > c-signup-inc.php
6
7  if (isset($_POST["submit"])){
8      $cus_fname=$_POST['fname'];
9      $cus_lname=$_POST['lname'];
10     $nic=$_POST['nic'];
11     $cus_pno=$_POST['pno'];
12     $email=$_POST['email'];
13     $password=$_POST['password'];
14     $passwordsha=sha1($_POST['password']);
15
16     $sql_nic = "SELECT * FROM customer WHERE cusNic='$nic'";
17     $sql_e = "SELECT * FROM cus_login WHERE email='$email'";
18     $res_nic = mysqli_query($conn, $sql_nic);
19     $res_e = mysqli_query($conn, $sql_e);
20
21     //validation
22     if (!preg_match("/^[a-zA-Z ]*$/",$cus_fname)) {
23         $msg = "Only alphabets are allowed for First Name..";
24         header("Location:../c-signup.php?id=$msg");
25         exit();
26     }
27     elseif (!preg_match("/^[a-zA-Z ]*$/",$cus_lname)) {
28         $msg = "Only alphabets are allowed for Last Name..";
29         header("Location:../c-signup.php?id=$msg");
30         exit();
31     }
32     elseif (!preg_match ("/^[0-9]*$/", $cus_pno)) {
33         $msg = "Only numeric value is allowed for Phone Number..";
34         header("Location:../c-signup.php?id=$msg");
35         exit();
36     }
37     elseif (strlen ($cus_pno) != 10) {
38         $msg = "Mobile Number must contain 10 digits..";
39         header("Location:../c-signup.php?id=$msg");
40         exit();
41     }
42     elseif (!preg_match ("/^[0-9]*$/", $nic)) {
43         $msg = "Only numeric value is allowed for NIC..";
44         header("Location:../c-signup.php?id=$msg");
45         exit();
46     }
47     elseif (!filter_var($email, FILTER_VALIDATE_EMAIL)) {
48         $msg = "Invalid email format..";
49         header("Location:../c-signup.php?id=$msg");
50         exit();
51     }
52     elseif (strlen($password) <= 8) {
53         $msg = 'Password should be at least 8 characters in length..';
54         header("Location:../c-signup.php?id=$msg");
55         exit();
56     }
57     elseif(mysqli_num_rows($res_nic) > 0){
58         $msg = "Sorry... NIC already exists..";
59         header("Location:../c-signup.php?id=$msg");
60         exit();
61     }
62     elseif(mysqli_num_rows($res_e) > 0){
63         $msg = "Sorry... email already exists..";
64         header("Location:../c-signup.php?id=$msg");
65         exit();
66     }
67     else{
68
```

Figure 36 - Sign up code validation segment

Code segment of email notification is illustrated in following figure.

```
c-vehide-owner > c-include > c-signup-inc.php
75
76 //email notification
77 $mail = new PHPMailer(true);
78 $mail->isSMTP();
79 $mail->SMTPAuth = true;
80
81 //gmail use as smtp server
82 $mail->Host = "smtp.gmail.com";
83 $mail->SMTPSecure = PHPMailer::ENCRYPTION_STARTTLS;
84 $mail->Port = 587;
85 // sys username and app password
86 $mail->Username = "wcvfeisproject@gmail.com";
87 $mail->Password = "xz11 euej xvli frza";
88
89 $mail->setFrom("wcvfeisproject@gmail.com", "WCVFEIS");
90 $mail->addAddress($email,$cus_fname);
91 $mail->Subject = "Notification from Commercial Vechicle Fitness e-certificate Issuing System";
92 date_default_timezone_set('Asia/kolkata');
93 $mail->isHTML(true); // set email format to HTML
94
95 // HTML for the email body
96 $mail->Body = '<p><strong>You are successfully registered to the Vehicle Fitness e-certificate issuing system.</strong></p>' .
97 '<p>This email is automatically generated by the system. Please do not reply.</p>' .
98 '<p>Log time: ' . date('Y-m-d H:i:s') . '</p>';
99
100
101 //error handling
102 try {
103     $mail->send();
104     // sent successfully
105     $msg = "You are Successfully registered.";
106     header("Location:../c-login.php?id=$msg");
107 } catch (Exception $e) {
108     // could not be sent
109     $msg = "Message could not be sent. Mailer Error: " . $mail->ErrorInfo;
110     header("Location:../c-login.php?id=$msg");
111 }
112 exit();|
113
114
```

Figure 37 - email notification code segment

4.5 Summary

This chapter provided full description about the implementation stage of the project including implementation environment, technology selection and codes segments of the system. Next chapter will be describing the testing and evaluation stage of this project.

Chapter 5 – Testing and Evaluation

5.1 Introduction

This chapter has described the testing and evaluation of the developed WCVFEIS including related testing types, test cases, user evaluation process and the result of the testing to ensure better performance of the Product.

5.2 Related Testing Types

In the Software Development Life Cycle (SDLC) testing is a crucial stage. The testing phase is performed during the development and evaluation occurs after the system or a prototype has been implemented. There are various testing and evaluation strategies and used a few combinations of them to test and evaluate this project. At the development stage unit testing, integration testing, and system testing are used as functional test approaches in WCVFEIS and usability testing and acceptance testing are used as non-functional test approaches (Vijay, 2023).

5.2.1 Unit Testing

The development phase tested whether each of the individual units of source code was working appropriately. The individual unit of each user interface (UI) is tested with input and output manually to complete the unit testing of the system.

5.2.2 Integration Testing

Integration testing is tested to ensure relationship integrity and the flow of data between units. Every module in the system was tested after the unit testing.

5.2.3 system Testing

As a last testing approach in the development phase system testing tested the web-based system fulfilling with requirement specifications. Under that test the below main 3 processes and other processes to be integrated as a whole system to the proposed outcomes are fulfilled.

- Commercial vehicle owners can properly log in to the system and display their vehicle details and current state of license. If he is in the renewal stage, he can make an online appointment with the Vehicle Fitness Garage.

- The vehicle fitness officer accepts the appointment and after the vehicle inspection, proceeds to create a vehicle fitness certificate.
- Vehicle Fitness Garage can renew registration through their account.

5.2.4 Functionality Testing

Checked the database connection, all links and forms handling in the web-based system. (Timotic, 2023).

5.2.5 Compatibility Testing

Compatibility Testing, ensure that the web-based system displays as it should on all device types. Tested browser compatibility with Microsoft Edge, Mozilla web browser and Google Chrome.

5.2.6 Security Testing

Login implemented with password protection. Password policy was encouraged once a login was created. Defined roles and tested using test users and tested the login function. Passwords protected with SHA1.

5.2.7 Performance Testing

Performance Testing, tested web-based system under different internet speeds.

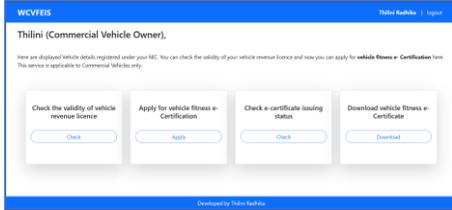
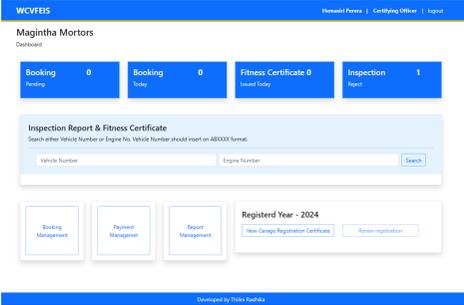
5.2.8 User Acceptance Testing

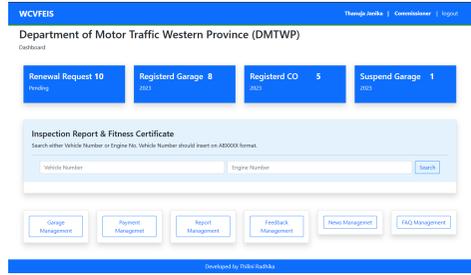
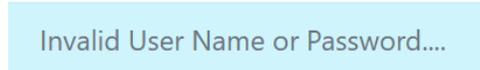
User acceptance testing ensures that the system works under system specifications and user requirements. After implementing stage testing the web-based system gathered feedback from using questionnaire methods from users of DMTWP, the Vehicle fitness Garage owners, the Vehicle fitness certifying officer's , and commercial vehicle owners.

5.3 Test Cases

The system is developed and tested module by module to reduce the complexity of both development and testing. The following are test cases for some of the major system modules ("How to Write Test Cases with Examples," n.d.).

5.3.1 Test Case for User Login

Test Case ID	Description	Test Priority	Pre-condition	Test Data	Test Steps	Expected Result	Actual Result	Test Status
1	Log in to the System as a Commercial Vehicle Owner	High		UN- radhika.trh@gmail.com PW- 123456789	<ul style="list-style-type: none"> Load the WCVFEIS Navigate to Commercial Vehicle fitness e-Certificate interface Click on the click here button Enter email and password Click login button 	Should be able to successfully login to the system and redirect to the commercial vehicle owner dashboard	As expected 	Success
2	Log in to the System as a Garage Owner or Certifying Officer	High		UN- hemasiri.kh@gmail.com PW- 123456789 User role- certifying officer	<ul style="list-style-type: none"> Load the WCVFEIS Navigate to Vehicle Fitness Garage interface Click on the click here button Enter email and password Select user role Click login button 	Should be able to successfully login to the system and redirect to the garage dashboard	As expected 	Success

Test Case ID	Description	Test Priority	Pre-condition	Test Data	Test Steps	Expected Result	Actual Result	Test Status
3	Log in to the System as an officer of DMTWP	High		UN- janika@gmail.com PW- 123456789 User role- certifying officer	<ul style="list-style-type: none"> • Load the WCVFEIS • Navigate to Department of Motor Traffic Western Province interface • Click on the click here button • Enter email and password • Select user role • Click login button 	The user should be able to successfully login to the system and redirect to the DMTWP dashboard	<p>As expected</p>  <p>The screenshot shows the WCVFEIS dashboard for the Department of Motor Traffic Western Province (DMTWP). It features a navigation bar with the user's name 'Tharanga Janika' and a 'Logout' button. Below the navigation bar, there are four summary cards: 'Renewal Request 10', 'Registered Garage 8', 'Registered CO 5', and 'Suspend Garage 1'. A central section is titled 'Inspection Report & Fitness Certificate' and includes a search bar with fields for 'Vehicle Number' and 'Engine Number'. At the bottom, there are several management buttons: 'Garage Management', 'Report Management', 'Feedback Management', 'News Management', and 'FAQ Management'.</p>	Success
4	Check user login with an invalid email address or invalid password	High		UN- radhika.trh@gmail PW- 123456789	<ul style="list-style-type: none"> • Load the WCVFEIS • Navigate to Commercial Vehicle fitness e-Certificate interface • Click on the click here button • Enter email and password • Click login button 	The user should not be able to log into the system. An error message should be displayed to the user	<p>As expected</p>  <p>The screenshot shows a light blue error message box with the text 'Invalid User Name or Password....' centered on a white background.</p>	Success

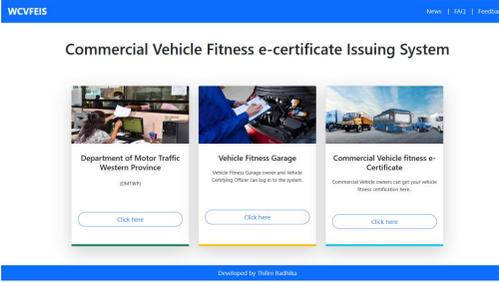
Test Case ID	Description	Test Priority	Pre-condition	Test Data	Test Steps	Expected Result	Actual Result	Test Status
5	Check user login with null value	High			<ul style="list-style-type: none"> • Load the WCVFEIS • Navigate to Commercial Vehicle fitness e-Certificate interface • Click on the click here button • Click login button 	The user should not be able to log into the system. An error message should be displayed to the user	<p>As expected</p> 	Success
6	User Logout	High			<ul style="list-style-type: none"> • Log into the WCVFEIS • Click logout button 	The user should be redirected to the WCVFEIS home page	<p>As expected</p> 	Success

Table 21- Test Case for User Login

5.3.2 Test Case for User Registration

Test Case ID	Description	Test Priority	Pre-condition	Test Data	Test Steps	Expected Result	Actual Result	Test Status
7	Register the user with a valid details	High		Thilini Radhika 905412745 0776488771 Radhika.trh@gmail.com 123456789	<ul style="list-style-type: none"> • Load the WCVFEIS • Navigate to Commercial Vehicle fitness e-Certificate interface • Click on the click here button • Click Sign Up • Enter details • Click Sign Up button 	The user should be redirected to the Commercial Vehicle Owner login interface with a successful message and email notification.	As expected You are Successfully registered.	Success
8	Register the user with a valid details	High		Thilini3 Radhika2 905412745V 07764887 Radhika.trh@gmail.com 123456789	<ul style="list-style-type: none"> • Load the WCVFEIS • Navigate to Commercial Vehicle fitness e-Certificate interface • Click on the click here button • Click Sign Up • Enter details • Click Sign Up button 	Display error message	As expected Only numeric value is allowed for NIC.. Only alphabets are allowed for First Name... Mobile Number must contain 10 digits.. Password should be at least 8 characters in length.	Success

Test Case ID	Description	Test Priority	Pre-condition	Test Data	Test Steps	Expected Result	Actual Result	Test Status
9	Enter existing email or NIC	High		Thilini Radhika 905412745 0776488771 Radhika.trh@gmail.com 123456789	<ul style="list-style-type: none"> • Load the WCVFEIS • Navigate to Commercial Vehicle fitness e-Certificate interface • Click on the click here button • Click Sign Up • Enter details • Click Sign Up button 	Display error message	As expected 	Success
10	Check customer registration with null value	High			<ul style="list-style-type: none"> • Load the WCVFEIS • Navigate to Commercial Vehicle fitness e-Certificate interface • Click on the click here button • Click Sign Up • Click Sign Up button 	Display error message	As expected 	Success

Table 22 - Test Case for User Registration

5.3.3 Test Case for Check the validity of vehicle revenue license

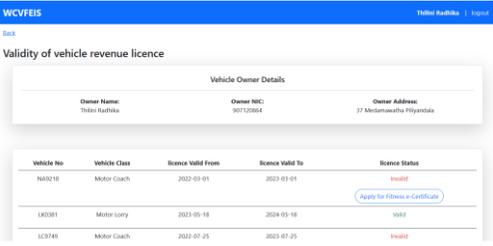
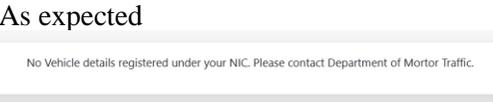
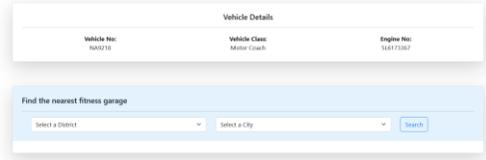
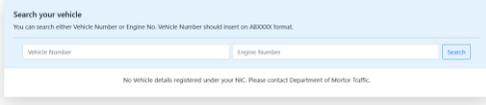
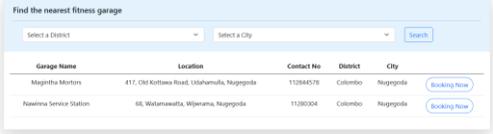
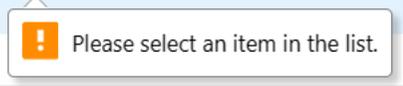
Test Case ID	Description	Test Priority	Pre-condition	Test Data	Test Steps	Expected Result	Actual Result	Test Status
11	Check the validity of the vehicle revenue license	High	The customer should license his vehicle for previous year	Thilini Radhika 905412745	<ul style="list-style-type: none"> • Login to WCVFEIS as Commercial Vehicle Owner • Navigate validity of the vehicle revenue license interface • Click on check button 	Display Vehicle owner details and list of registered vehicle under owner NIC	As expected 	Success
12	Check the validity of the vehicle revenue license - customer not registered vehicle in the previous year	High		Thilini Radhika 905412745	<ul style="list-style-type: none"> • Login to WCVFEIS as Commercial Vehicle Owner • Navigate validity of the vehicle revenue license interface • Click on check button 	Display the error message “No vehicle details registered under your NIC. Please contact the Department of Mortor Traffic”	As expected 	Success

Table 23 - Test Case for Check the validity of vehicle revenue license

5.3.4 Test Case for Apply for Vehicle Fitness e-Certification

Test Case ID	Description	Test Priority	Pre-condition	Test Data	Test Steps	Expected Result	Actual Result	Test Status
13	Apply for Vehicle Fitness e-Certification	High	The customer should license his vehicle for previous year	Vehicle No - NA9218 Engine No - 5L6173367	<ul style="list-style-type: none"> • Login to WCVFEIS as Commercial Vehicle Owner • Navigate to Apply for Vehicle Fitness e-Certification interface • Click on apply button • Enter vehicle no or engine no • Click on search button • Click Apply for fitness e-certificate button 	Display Vehicle details and find nearest garage interface	<p>As expected</p> 	Success
14	Apply for Vehicle Fitness e-Certification - customer does not renew license in the previous year	High		Vehicle No - NA9218 Engine No - 5L6173367	<ul style="list-style-type: none"> • Login to WCVFEIS as Commercial Vehicle Owner • Navigate to Apply for Vehicle Fitness e-Certification interface • Click on apply button • Enter vehicle no or engine no • Click on search button • Click Apply for fitness e-certificate button 	Display the error message “No vehicle details registered under your NIC. Please contact the Department of Motor Traffic”	<p>As expected</p> 	Success

Test Case ID	Description	Test Priority	Pre-condition	Test Data	Test Steps	Expected Result	Actual Result	Test Status
15	Apply for Vehicle Fitness e-Certification – already apply or issued e-certificate	high		Vehicle No - NA9218 Engine No - 5L6173367	<ul style="list-style-type: none"> • Login to WCVFEIS as Commercial Vehicle Owner • Navigate to Apply for Vehicle Fitness e-Certification interface • Click on apply button • Enter vehicle no or engine no • Click on search button • Click Apply for fitness e-certificate button 	Display the error message “Already applied for Fitness e-Certificate or issued.”	As expected <i>Already applied for Fitness e-Certificate or issued.</i>	Success
16	Select the district and city to find the nearest garage	high		District – Colombo City - Nugegoda	<ul style="list-style-type: none"> • Select district and city • Click the search button 	Display the Colombo district Nugegoda garage list	As expected 	Success
17	Select the district and city to find the nearest garage - Null value	high			<ul style="list-style-type: none"> • Click the search button 	Display error message	As expected 	Success

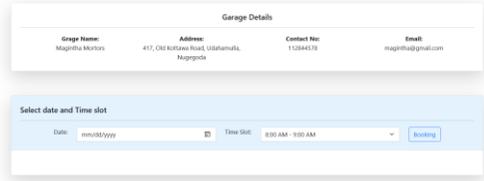
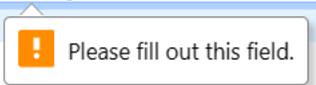
Test Case ID	Description	Test Priority	Pre-condition	Test Data	Test Steps	Expected Result	Actual Result	Test Status
18	Booking Now	high			<ul style="list-style-type: none"> Click on the booking button 	Display garage details and select the date and time interface	<p>As expected</p>  <p>The screenshot shows a 'Make A Reservation' form. It includes a 'Garage Details' section with fields for Garage Name (Magritha Motors), Address (417, Old Kottar Road, Udumalpet, Nagercoil), Contact No (112844378), and Email (magritha@gmail.com). Below this is a 'Select date and Time slot' section with a date input field (mm/dd/yyyy), a time slot dropdown menu (8:00 AM - 9:00 AM), and a 'Booking' button.</p>	Success
19	Make a reservation	high		<p>Date – 2023-12-13</p> <p>Time slot – 8.00 AM – 9.00AM</p>	<ul style="list-style-type: none"> Select a date and time slot Click on the booking button 	Display a successful booking message	<p>As expected</p> <p>Booking successful. Your booking for 2023-12-13 at 8:00 AM - 9:00 AM has been recorded. You can followup your booking status by Click here</p>	Success
20	Make a reservation - Null Value	high			<ul style="list-style-type: none"> Click on the booking button 	Display error message	<p>As expected</p>  <p>The screenshot shows a blue-bordered error message box with an orange exclamation mark icon and the text 'Please fill out this field.' pointing to a field in the form.</p>	Success

Table 24 - Test Case for Apply for Vehicle Fitness e-Certification

5.3.5 Test Case for Check e-certificate Issuing Status

Test Case ID	Description	Test Priority	Pre-condition	Test Data	Test Steps	Expected Result	Actual Result	Test Status
21	Check e-certificate Issuing Status	High	The customer should license his	Thilini Radhika 905412745	<ul style="list-style-type: none"> • Login to WCVFEIS as Commercial Vehicle Owner • Navigate to Check e-certificate Issuing Status interface • Click on check button 	Display booking details and status	<p>As expected</p> <p>Vehicle Fitness e-certificate issuing status</p> 	Success
22	Check e-certificate Issuing Status – customer does not renew license in the previous year	High		Thilini Radhika 905412745	<ul style="list-style-type: none"> • Login to WCVFEIS as Commercial Vehicle Owner • Navigate to Check e-certificate Issuing Status interface • Click on check button 	Display error message	<p>As expected</p> 	Success

Table 25 - Test Case for Check e-certificate Issuing Status

5.3.6 Test Case for Download vehicle fitness e-Certificate

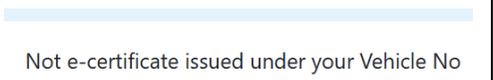
Test Case ID	Description	Test Priority	Pre-condition	Test Data	Test Steps	Expected Result	Actual Result	Test Status
23	Download vehicle fitness e-Certificate	High	Certifying officer should issued e-certificate	Vehicle No - NA9218 Engine No - 5L6173367	<ul style="list-style-type: none"> • Login to WCVFEIS as a Commercial Vehicle Owner • Navigate to Apply for Vehicle Fitness e-Certification interface • Click on download button • Enter vehicle no or engine no • Click on search button • Click on view or download button 	View or download e-certificate	As expected 	Success
24	Download vehicle fitness e-Certificate – certifying officer didn't issue e-certificate yet.	High		Vehicle No - NA9218 Engine No - 5L6173367	<ul style="list-style-type: none"> • Login to WCVFEIS as a Commercial Vehicle Owner • Navigate to Apply for Vehicle Fitness e-Certification interface • Click on download button • Enter vehicle no or engine no • Click on search button • Click on view or download button 	Show error message	As expected 	Success

Table 26 - Test Case for Download vehicle fitness e-Certificate

5.3.7 Test Case for Generate vehicle fitness e-Certificate

Test Case ID	Description	Test Priority	Pre-condition	Test Data	Test Steps	Expected Result	Actual Result	Test Status
25	Generate vehicle fitness e-Certificate	High	<ul style="list-style-type: none"> • Booking status – confirm • Inspection status – Pass • Payment status- Complete 	22T224, 27.2, Good, Lorry, Lorry, 750x15, 750x15, Dual, 10, Closed	<ul style="list-style-type: none"> • Login to WCVFEIS as a Vehicle certifying Officer • Click on booking management button • Click on Generate button • Fill the relevant data • Click on save button 	Show Successful Message	As expected generated successfully	Success
26	Generate vehicle fitness e-Certificate – Null Data	High			<ul style="list-style-type: none"> • Login to WCVFEIS as a Vehicle certifying Officer • Click on booking management button • Click on Generate button • Fill the relevant data • Click on save button 	Show error message	As expected 	Success

Table 27 - Test Case for Generate vehicle fitness e-Certificate

5.4 User Evaluation

User evaluation is an important phase in the system development life cycle typically occurring after the implementation phase. At this stage, the system is tested within the user's environment to ensure functionality. The evaluation is done by comparing the manual vehicle fitness certificate issuing system and the developed vehicle fitness e-certificate issuing system. All users of the system had an opportunity to give their feedback through the Google Form (“How to use Google Forms - Computer - Google Docs Editors Help,” n.d.). Figure 39 contains the template for the user evaluation form and feedback is summarized in the graphs in figures 40 to 53. This user evaluation is primarily aimed at the use interaction, functionality, productivity, security and user interface (“How to Conduct Usability Testing in Six Steps | Toptal®,” n.d.).

16 users including the following categories participated in this evaluation.

- Commercial Vehicle Owner
- Vehicle Fitness Garage Owner
- Certifying Officer
- Officer of the Department of Motor Traffic

Participant were able to express their experience selecting one of the following indicators.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

5.4.1 Template of the user evaluation form



Evaluation Form - **Web based Commercial vehicle fitness e-certificate issuing system for Western Province (WCVFEIS)**

Dear User,
Thank you for participating evolution of WCVFEIS.
Your sincere response in this regard is highly appreciated. Your responses will be used only for improving of this system.

radhika.trh@gmail.com [Switch account](#) 

Evaluation Form - **Web based Commercial vehicle fitness e-certificate issuing system for Western Province (WCVFEIS)**

I'm using WCVFEIS as a *

Choose 

Interface are user friendly? *

Choose 

You can navigate through the system easily? *

Choose 

System error message help you to understand what was the mistake? *

System response quickly? *

Easy to find information? *

Text size, type color are readable? *

Always display accurate information? *

Always system crash occurs? *

Overall performance of the System *

WCVFEIS increase efficiency of your work process? *

Where the system need to improvement? give your suggestion. *

Your answer _____

Commercial Vehicle owner

*If you are use this system as a **Commercial Vehicle owner** please fill out this following question also.*

Easily make a booking for vehicle inspection?

Choose ▼

Easily follow up progress of vehicle fitness e-certificate issuing status?

Choose ▼

Easily download the vehicle fitness e-certificate ?

Choose ▼

This system increase efficiency of vehicle fitness e-certificate issuing process ? I like to use this system.

Choose ▼

[Back](#) [Submit](#) [Clear form](#)

Figure 38 - Template of the user evaluation form

5.4.2 Graphs of User Evaluation Summary

I'm using WCVFEIS as a
16 responses

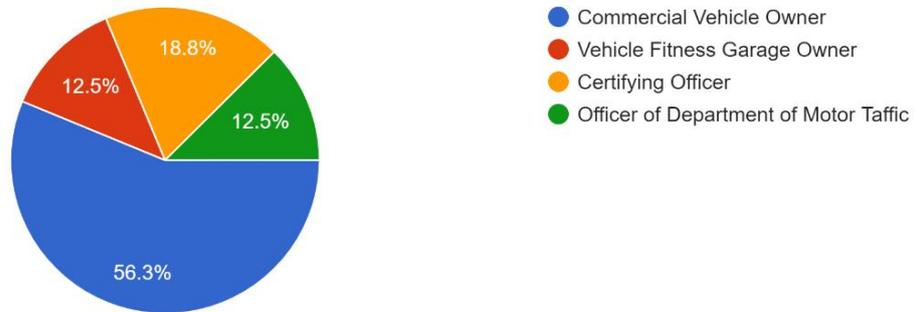


Figure 39 - Evaluation Feedback Summary - Question 1

Interface are user friendly?
16 responses

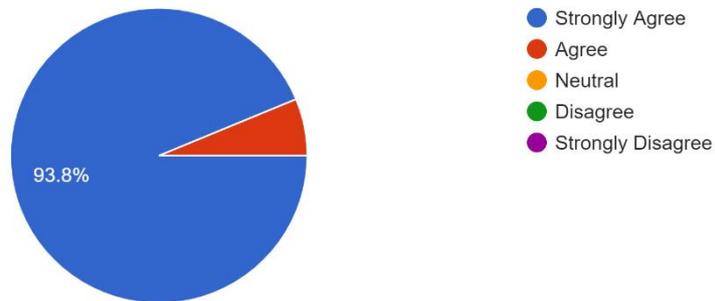


Figure 40 - Evaluation Feedback Summary - Question 2

You can navigate through the system easily?
16 responses

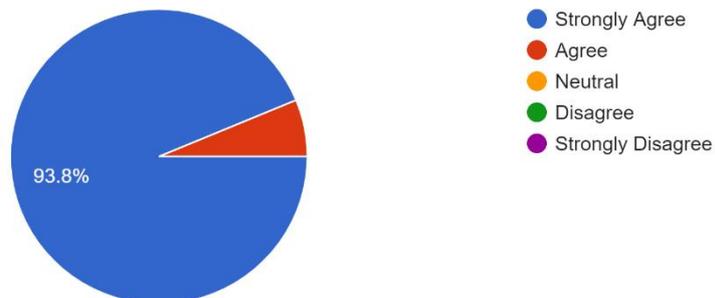


Figure 41 - Evaluation Feedback Summary - Question 3

System error message help you to understand what was the mistake?

16 responses

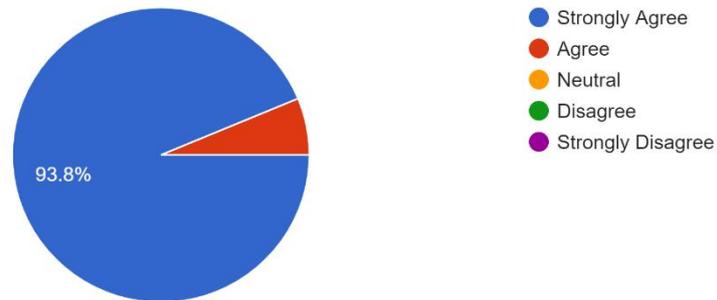


Figure 42 - Evaluation Feedback Summary - Question 4

System response quickly?

16 responses

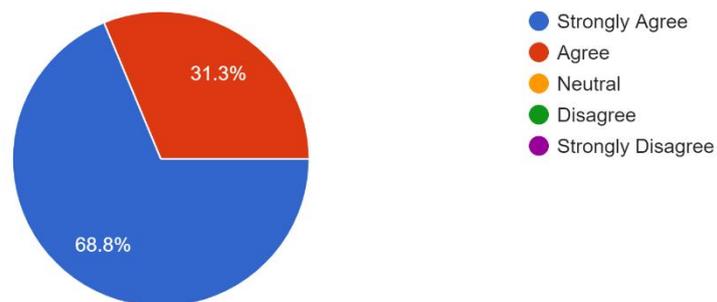


Figure 43 - Evaluation Feedback Summary - Question 5

Easy to find information?

16 responses

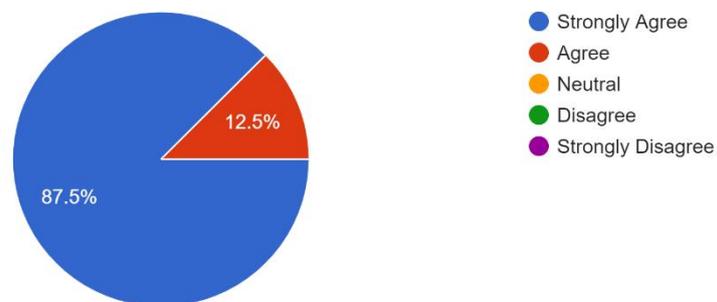


Figure 45 - Evaluation Feedback Summary - Question 6

Text size, type color are readable?

16 responses

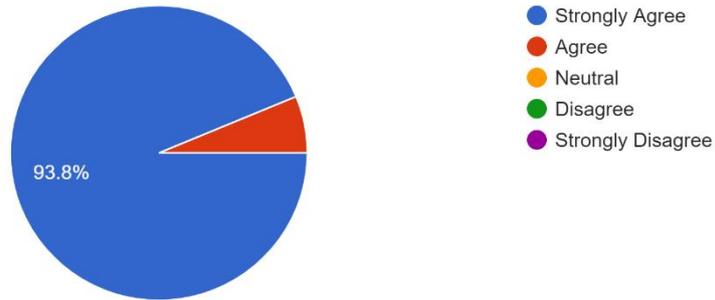


Figure 44 - Evaluation Feedback Summary - Question 7

Always display accurate information?

16 responses

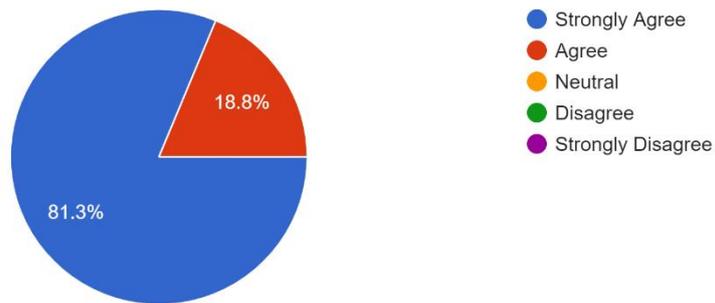


Figure 45 - Evaluation Feedback Summary - Question 8

Always system crash occurs?

16 responses

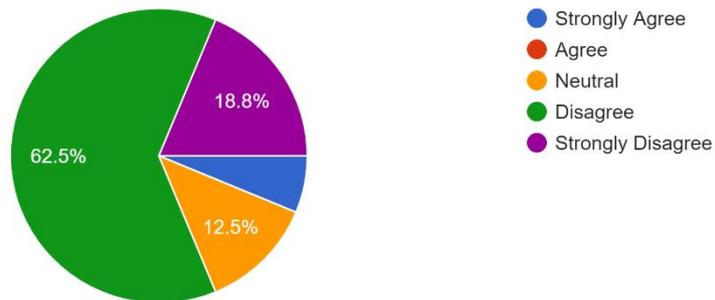


Figure 46 -- Evaluation Feedback Summary - Question 9

Overall performance of the System

16 responses

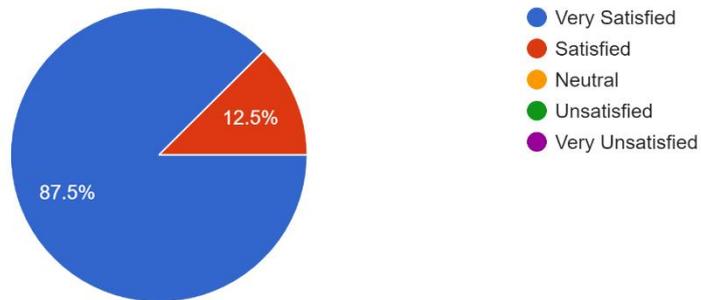


Figure 47 - Evaluation Feedback Summary - Question 10

WCVFEIS increase efficiency of your work process?

16 responses

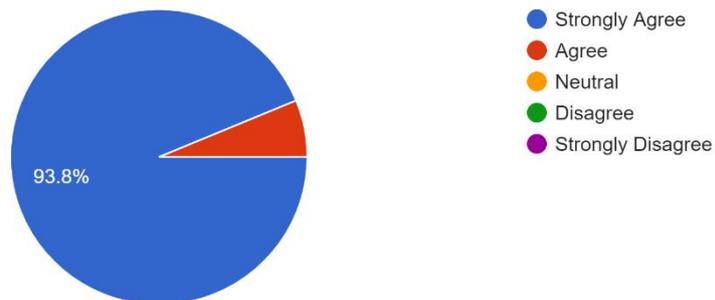


Figure 48 - Evaluation Feedback Summary - Question 11

Easily make a booking for vehicle inspection?

9 responses

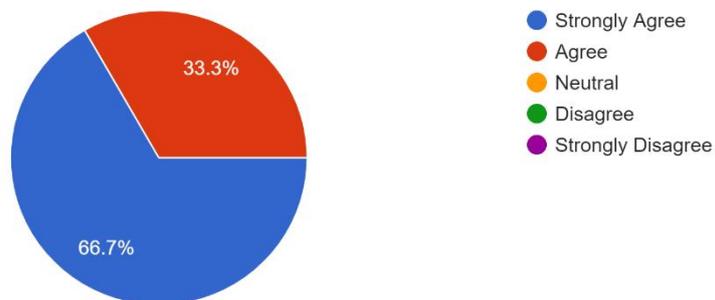


Figure 49 - Evaluation Feedback Summary - Question 13

Easily follow up progress of vehicle fitness e-certificate issuing status?

9 responses

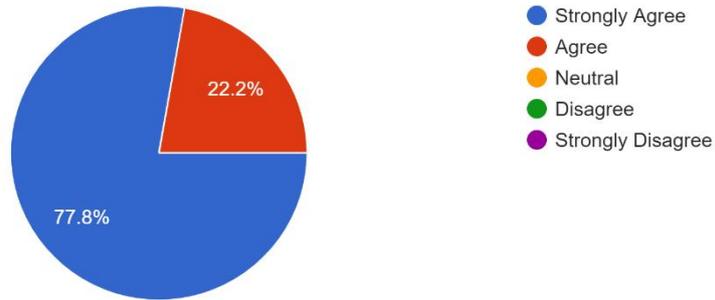


Figure 50 - - Evaluation Feedback Summary - Question 14

Easily download the vehicle fitness e-certificate ?

9 responses

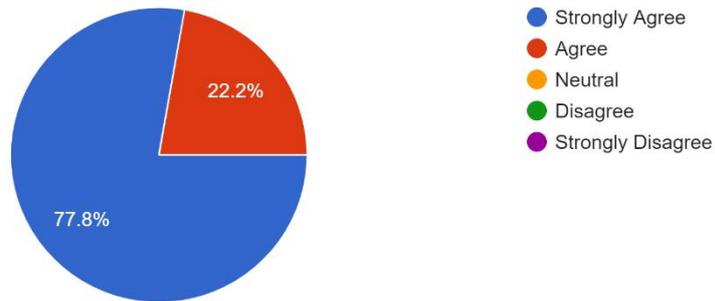


Figure 51 - Evaluation Feedback Summary - Question 15

This system increase efficiency of vehicle fitness e-certificate issuing process ? I like to use this system.

9 responses

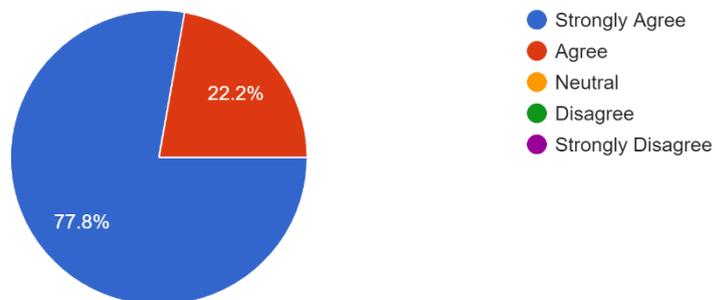


Figure 52 - Evaluation Feedback Summary - Question 16

5.5 Results of the Testing

At the beginning of the development phase Test cases were executed to assess how the system functions correctly. The initial phase failed some test cases and was fixed. The final version of the system passed all the test cases with stability. The following table shows the total outcome of test cases.

Function	Executed Test Case	Passed Test Case	Pending Test Case	Priority of Test Case
User Login	6	6	0	High
User Registration	4	4	0	High
Check the validity of the vehicle revenue license	2	2	0	High
Apply for Vehicle Fitness e-Certification (online booking)	8	8	0	High
Check e-certificate Issuing Status	2	2	0	High
Download vehicle fitness e-certificate	2	2	0	High
Generate vehicle fitness e-certificate	2	2	0	High
Total	26	26	0	

Table 28 - Results of the Testing

5.6 Results of the Evaluation

The following table shows summarization of the evaluation according to the online survey of the user.

Features	Rating				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
User-friendly Interface are	15	1	0	0	0
Navigate through the system easily	15	1	0	0	0
System error messages help to understand what was the mistake	15	1	0	0	0
System response quickly	11	5	0	0	0
Easy to find information	14	2	0	0	0
Text size, type and color are readable	15	1	0	0	0
Always display accurate information	13	3	0	0	0
Always system crash occurs	0	0	2	10	3

Overall performance of the System	14	2	0	0	0
The system increases the efficiency of the work process	15	1	0	0	0

Table 29 - Results of the Evaluation

5.7 Summary

This chapter provided full description about the testing and evaluation of the project including related testing types, test cases, user evaluation process and the result of the testing of the system. Next chapter will be describing the conclusion of this project.

Chapter 6 – Conclusion

6.1 Introduction

This chapter defines the conclusion of the entire project. Furthermore, this includes lessons learned, project practices, project results and future enhancement.

6.2 Critical review of achieved objectives

This project mainly focuses on the process of the manual vehicle fitness certificate issuing system, identifying its strengths and weaknesses, and identifying the functional and non-functional requirements. And successfully developed a Web-based vehicle fitness e-certificate issuing system (WCVFIS) for Western Province that prevents most of the problems and limitations that are identified in the manual system and provides accurate and effective service to users achieving the following objectives successfully.

To commercial vehicle owners

- ✓ Getting a Fitness e-Certificate for Commercial Vehicles
- ✓ Getting an e-Vehicle Report of Examination
- ✓ Getting Fitness Garage details and location
- ✓ Getting an online booking
- ✓ Online payment facility
- ✓ Getting notifications regarding the commercial vehicle e-fitness certificate issuing process.

To fitness garage owners and fitness certification officers

- ✓ Getting fitness Garage renewal of registration facility
- ✓ Keep customers records and issued Fitness Certificate reports and manage them efficiently and generate report easily.

To DMTWP

- ✓ Getting monthly fitness garage operational report quickly and monitor them easily
- ✓ Checking the vehicle fitness certificate online
- ✓ Checking vehicle report of examination online

6.3 Learning experiences

Through this entire Software Development Life Cycle (SDLC) I got opportunity to apply the previously learned theoretical lessons to a practically. I got experienced in time management within a fix timeline. In implementation phase I got chance to try out practically the academic knowledge that I have gained on programming languages. I gained a lot of knowledge and experience working with PHP including Libraries. And also HTML, CSS, JS, Bootstrap , and MYSql.

6.4 Difficulties & Challenges

If the System needs more customization functionalities in content management, there is no point in using CMS type developing framework to develop this kind of Software Solution. There I used pure PHP. It was challenging for me to complete the project within a limited period. But I succeeded with it. Also, it is difficult to complete payment gateway because most of the payment gateway has the procedure. In a remarkably short period, I made every effort to ensure that the main functions of the project would be completed.

6.5 Future Work

The developed system has certain places where to be upgraded as follows; Already system facilitate email notification but it can be extending the system to send SMS reminders to the online vehicle owner. Enhance the system to synchronize with the Department of Motor traffic Staff Management System and eRevenue Licence Service. Improvement of the security of the system. Extend the system for Online Payments using Payment Gateway. Implement Mobile Application for Commercial vehicle Owners to increase the interaction with system. Can be integrated to map to find fitness garage location while online booking.

6.6 Summary

This chapter provided conclusion of the project including critical review of achieved objectives, learning experiences, difficulties & challenges and future work.

List of References

- 10 Fundamental UI Design Principles You Need to Know | Dribbble [WWW Document], n.d. URL <https://dribbble.com/resources/ui-design-principles> (accessed 8.13.23).
- 10 Reasons To Learn HTML and CSS In 2023 [WWW Document], n.d. URL <https://javarevisited.blogspot.com/2023/04/10-reasons-to-learn-html-and-css-in-2023.html#axzz81BZ6sPgF> (accessed 6.24.23).
- Client-server architecture | Definition, Characteristics, & Advantages | Britannica [WWW Document], 2023. URL <https://www.britannica.com/technology/client-server-architecture> (accessed 6.24.23).
- contributors, M.O., Jacob Thornton, and Bootstrap, n.d. Get started with Bootstrap [WWW Document]. URL <https://getbootstrap.com/docs/5.3/getting-started/introduction/> (accessed 6.24.23).
- Costa, C.D., 2023. Scope of PHP for Beginners in 2023 [WWW Document]. Medium. URL <https://levelup.gitconnected.com/scope-of-php-for-beginners-in-2023-afc2c1e656b5> (accessed 6.24.23).
- Database design basics - Microsoft Support [WWW Document], n.d. URL <https://support.microsoft.com/en-gb/office/database-design-basics-eb2159cf-1e30-401a-8084-bd4f9c9ca1f5> (accessed 8.13.23).
- Dawson, C.W., 2009. Projects in computing and information systems: a student's guide, 2nd ed. ed. Addison-Wesley, Harlow, England ; New York.
- DOT Home [WWW Document], n.d. URL <https://www.transport.wa.gov.au/> (accessed 6.24.23).
- draw.io, n.d. Tutorials. draw.io. URL <https://drawio-app.com/tutorials/> (accessed 8.13.23).
- ER Diagram Representation | Tutorialspoint [WWW Document], n.d. URL https://www.tutorialspoint.com/dbms/er_diagram_representation.htm (accessed 8.13.23).
- ERL [WWW Document], n.d. URL <https://www.gov.lk/services/erl/es/erl/view/index.action> (accessed 6.24.23).
- Examples · TCPDF [WWW Document], n.d. URL <https://tcpdf.org/examples/> (accessed 3.6.24).
- Features – About mPDF – mPDF Manual [WWW Document], n.d. URL <https://mpdf.github.io/about-mpdf/features.html> (accessed 3.6.24).
- Garage Registrations & Fitness Certificates – Just another WordPress site, n.d. URL http://motortraffic.wp.gov.lk/si/?page_id=882&lang=en (accessed 6.24.23).
- Home | Parivahan Sewa | Ministry of Road Transport & Highways, Government of India [WWW Document], n.d. URL <https://parivahan.gov.in/parivahan/> (accessed 6.24.23).
- How to Conduct Usability Testing in Six Steps | Toptal® [WWW Document], n.d. . Toptal Design Blog. URL <https://www.toptal.com/designers/ux-consultants/how-to-conduct-usability-testing-in-6-steps> (accessed 2.28.24).
- How to use Google Forms - Computer - Google Docs Editors Help [WWW Document], n.d. URL

<https://support.google.com/docs/answer/6281888?hl=en&co=GENIE.Platform%3DDesktop#zippy=%2Ccreate-a-form-from-google-drive> (accessed 2.28.24).

How to Write Test Cases with Examples [WWW Document], n.d. URL <https://www.guru99.com/test-case.html> (accessed 2.28.24).

Iterative Waterfall Model in SDLC | PrepInsta [WWW Document], n.d. . PREP INSTA. URL <https://prepinsta.com/software-engineering/iterative-waterfall-model/> (accessed 6.24.23).

Japheth, B., n.d. THE FUNCTIONALITY OF A WEB BASED TUTORIAL MODEL. JavaScript Tutorial [WWW Document], n.d. URL <https://www.w3schools.com/js/> (accessed 6.24.23).

Khan, M., 2020. Which SDLC Model Is The Best For Your Business? RNF Technologies. URL <https://www.rnftechnologies.com/blog/best-sdlc-methodology/> (accessed 6.24.23).

Martin, R.C., n.d. UML Tutorial: Part 1 -- Class Diagrams. MySQL Tutorial [WWW Document], n.d. URL <https://www.w3schools.com/mysql/> (accessed 6.24.23).

Nechvolod, A., 2022. 12 software quality attributes to launch a high-quality product [WWW Document]. Syndicode - Custom Software Development Company. URL <https://syndicode.com/blog/12-software-architecture-quality-attributes/> (accessed 6.24.23).

PHP Introduction [WWW Document], n.d. URL https://www.w3schools.com/php/php_intro.asp (accessed 6.24.23).

PHPMailer Gmail: A Guide with Code Examples [2024] [WWW Document], 2024. URL <https://mailtrap.io/blog/phpmailer-gmail/> (accessed 2.29.24).

Project-Management.com, 2022. How to Write Effective Project Objectives [WWW Document]. project-management.com. URL <https://project-management.com/how-to-write-effective-project-objectives/> (accessed 6.24.23).

Register and insure a vehicle in Ontario | ontario.ca [WWW Document], n.d. URL <http://www.ontario.ca/page/register-and-insure-vehicle-ontario> (accessed 6.24.23).

Revenue License – Just another WordPress site, n.d. URL http://motortraffic.wp.gov.lk/si/?page_id=860&lang=en (accessed 6.24.23).

SLTB [WWW Document], n.d. URL <https://www.sltb.lk/> (accessed 6.24.23).

Software development for enterprise systems [WWW Document], n.d. . Software development for enterprise systems. URL <https://www.open.edu/openlearn/digital-computing/software-development-enterprise-systems/digital-computing/software-development-enterprise-systems> (accessed 8.13.23).

Software Quality Attributes | Top 9 Software Quality Attributes, 2021. . EDUCBA. URL <https://www.educba.com/software-quality-attributes/> (accessed 6.24.23).

stepBystep.pdf, n.d.

System architecture for web mapping | GEOG 585: Web Mapping [WWW Document], n.d. URL <https://www.e-education.psu.edu/geog585/node/684> (accessed 8.13.23).

UML - Activity Diagrams [WWW Document], n.d. URL https://www.tutorialspoint.com/uml/uml_activity_diagram.htm (accessed 8.13.23).

- UML - Standard Diagrams [WWW Document], n.d. URL https://sceweb.sce.uhcl.edu/helm/WEB-TOC-UML/Tutorial/uml__standard_diagrams.html (accessed 8.13.23).
- UML - Use Case Diagrams [WWW Document], n.d. URL https://sceweb.sce.uhcl.edu/helm/WEB-TOC-UML/Tutorial/uml__use_case_diagrams.html?fbclid=IwAR1Ouz1v_iT8qh7C8mQ846mSnZiEgvWNjUEPOGLvnpGrQHSXSWqKYztV-Hk (accessed 8.13.23).
- UML Sequence Diagram Tutorial [WWW Document], n.d. . Lucidchart. URL <https://www.lucidchart.com/pages/uml-sequence-diagram> (accessed 8.13.23).
- Vijay, 2023. Web Application Testing Guide: How To Test A Website [WWW Document]. Software Testing Help. URL <https://www.softwaretestinghelp.com/web-application-testing/> (accessed 2.28.24).
- What Is a Web-based Application? Examples and Benefits - Designveloper [WWW Document], n.d. URL <https://www.designveloper.com/blog/what-is-a-web-based-application/> (accessed 6.24.23).
- What Is JavaScript & Why Is It Important? [WWW Document], n.d. URL <https://blog.hubspot.com/website/what-is-javascript> (accessed 6.24.23).
- What is User Interface (UI) Design? [WWW Document], n.d. . The Interaction Design Foundation. URL <https://www.interaction-design.org/literature/topics/ui-design> (accessed 8.13.23).

Appendix A – User Manual

A.1 Guid for access the WCVFEIS

To access the WCVFEIS, by entering [http://localhost/ WCVFEIS /](http://localhost/WCVFEIS/) in the address bar in any web browser and the user will find the home page illustrated in figure A.1.

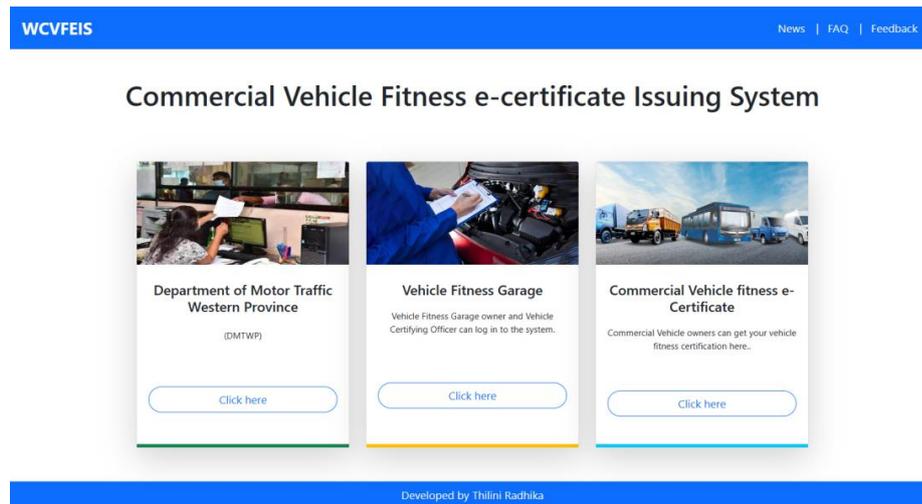


Figure A.1 - Home page

A.2 Guid for Commercial Vehicle Owner

Step 1 - Clicking “click here” button on Commercial Vehicle fitness e-certificate card can get Commercial Vehicle Owner login page illustrated in figure A.2.

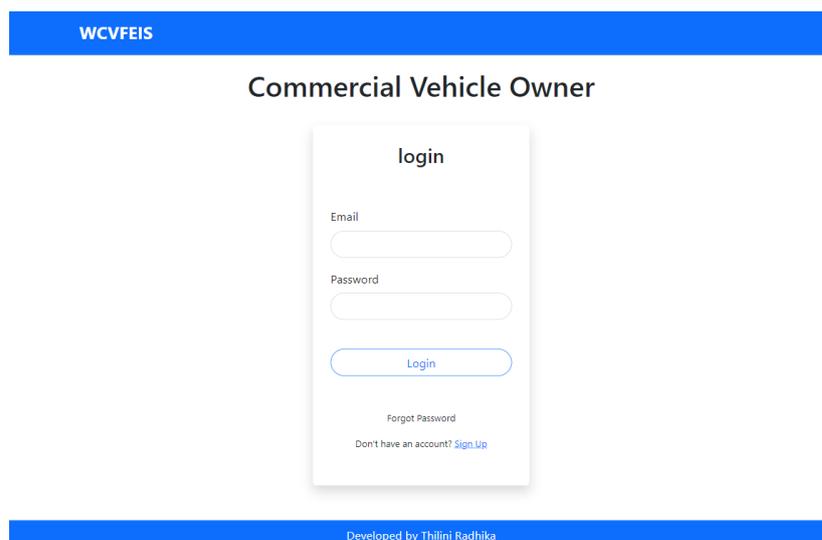


Figure A.2 - Login page

Step 2 - If you don't have an account Sign Up to the system using Sign Up page illustrated in figure A.3.

WCVFEIS

Commercial Vehicle Owner

Sign Up

First Name
Thilini

Last Name
Hemasiri

NIC
Type number without 'V' or 'X'

Phone No
0000000000

Email
thilini@gmail.com
We'll never share your email with anyone else.

Password
Use Strong Password

Sign Up

Do you have an account? [Login](#)

Figure A.3 - Signup page

Step 3 - Commercial Vehicle Owner dashboard illustrated in figure A.4.

WCVFEIS

Thilini Radhika | logout

Thilini (Commercial Vehicle Owner),

Here are displayed Vehicle details registered under your NIC. You can check the validity of your vehicle revenue licence and now you can apply for **vehicle fitness e- Certification** here. This service is applicable to Commercial Vehicles only.

Check the validity of vehicle revenue licence
Check

Apply for vehicle fitness e-Certification
Apply

Check e-certificate issuing status
Check

Download vehicle fitness e-Certificate
Download

Developed by Thilini Radhika

Figure A.4 – Commercial vehicle owner dashboard

Step 4 - Check the validity of vehicle revenue licence using page illustrated in figure A.5. This page shows vehicle details registered under your NIC. You can apply vehicle fitness e-certificate here or at apply vehicle fitness e-certificate page illustrated in figure A.6.

WCVFEIS Thilini Radhika | logout

[Back](#)

Validity of vehicle revenue licence

Vehicle Owner Details

Owner Name: Thilini Radhika	Owner NIC: 907120864	Owner Address: 37 Medamawatha Piliyandala
---------------------------------------	--------------------------------	---

Vehicle No	Vehicle Class	licence Valid From	licence Valid To	licence Status
NA9218	Motor Coach	2022-03-01	2023-03-01	Invalid <i>Already applied for Fitness e-Certificate</i>
LK0381	Motor Lorry	2023-05-18	2024-05-18	Valid
LC9749	Motor Coach	2022-07-25	2023-07-25	Invalid Apply for Fitness e-Certificate

Figure A.5 – validity of vehicle revenue licence page

Step 5 - Apply for vehicle fitness e-certificate using page illustrated in figure A.6. You can search your vehicle using either Vehicle No or Engine No.

WCVFEIS Thilini Radhika | logout

[Back](#)

Apply for vehicle fitness e-Certification

Search your vehicle
You can search either Vehicle Number or Engine No. Vehicle Number should insert on ABXXXX format.

Vehicle No	Vehicle Class	Engine Number	Action
LC9749	Motor Coach	6HL1320922	Apply for Fitness e-Certificate

Developed by Thilini Radhika

Figure A.6 – Apply for vehicle fitness e-certificate page

Step 6 - Find nearest vehicle fitness garage using page illustrated in figure A.7. You can search using District and City, then listed garage and you click booking now button for add a reservation.

WCVFEIS Thilini Radhika | [logout](#)

[Back](#)

Apply for vehicle fitness e-Certification

Vehicle Details

Vehicle No: LC9749	Vehicle Class: Motor Coach	Engine No: 6HL1320922
------------------------------	--------------------------------------	---------------------------------

Find the nearest fitness garage

Select a District Select a City

Garage Name	Location	Contact No	District	City	
Maginta Mortors	417, Old Kottawa Road, Udahamulla, Nugegoda	112844578	Colombo	Nugegoda	<input type="button" value="Booking Now"/>
Nawinna Service Station	68, Watamawatta, Wijwrama, Nugegoda	11280304	Colombo	Nugegoda	<input type="button" value="Booking Now"/>

Figure A.7 – find nearest garage page

Step 7 - Make a reservation using page illustrated in figure A.8. This page shows selected garage details. You can select available date and time here.

WCVFEIS Thilini Radhika | [logout](#)

[Back](#)

Make A Reservation

Online reservation system has been created for your convenience. Now make reservations for your vehicle inspection.

Garage Details

Grage Name: Maginta Mortors	Address: 417, Old Kottawa Road, Udahamulla, Nugegoda	Contact No: 112844578	Email: maginta@gmail.com
---------------------------------------	---	---------------------------------	------------------------------------

Select date and Time slot

Date: Time Slot:

Figure A.8 – make a reservation page

Step 8 - You can follow up booking status using *click here* illustrated in figure A.9 or clicking on check e-certificate issuing status button on dashboard illustrated in figure A.4. or email notification received for registered email address illustrated in figure A.10.

WCVFEIS Thilini Radhika | logout

[Back](#)

Make A Reservation

Online reservation system has been created for your convenience. Now make reservations for your vehicle inspection.

Garage Details

Grage Name: Magintha Mortors	Address: 417, Old Kottawa Road, Udahamulla, Nugegoda	Contact No: 112844578	Email: magintha@gmail.com
--	---	---------------------------------	-------------------------------------

Select date and Time slot

Date: Time Slot:

Booking successful. Your booking for 2024-02-15 at 8:00 AM - 9:00 AM has been recorded. You can followup your booking status by [Click here](#)

Figure A.9 – select date and time page

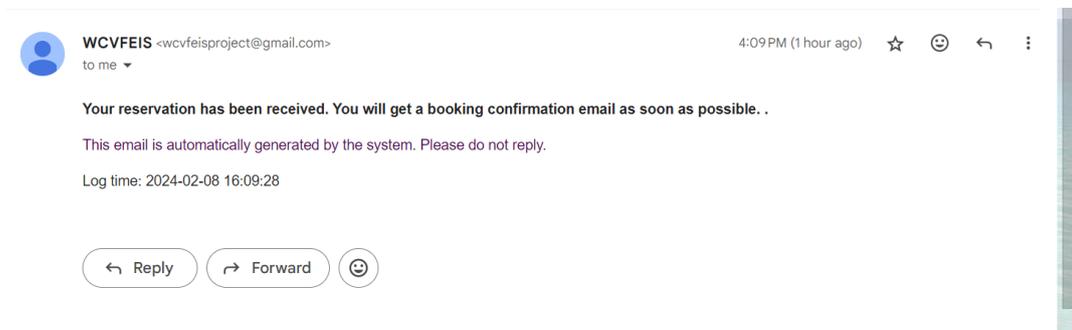


Figure A.10 – booking confirm email notification

Step 9 - You can Cancel the booking before issuing the e-certificate using Vehicle fitness e-certificate issuing status page following illustrated figure A.11.

WCVFEIS Thilini Radhika | logout

localhost says
Do you want to delete the Booking? Any payment you made will not be refunded

[Back](#)

Vehicle Fitness e-certificate issuing status

Vehicle Number	Booking Date	Booking Time	Garage Name	Booking Status	Payment Status	Inspection Certificate Status	Fitness Certificate Status
NA9218	2023-12-13	8:00 AM - 9:00 AM	Magintha Mortors	Confirm	Complete	Complete	Complete
LC9749	2024-02-15	8:00 AM - 9:00 AM	Magintha Mortors	Pending <input type="button" value="Cancel"/>	Pending	Pending	Pending

Figure A.11 - Cancel booking page

Step 10 - When Vehicle Fitness garage accepted booking you will receive email notification illustrated in figure A.12.

WCVFEIS <wcvfeisproject@gmail.com> 1:00 PM (0 minutes ago) ☆ 😊 ↶ ⋮
to me ▾

Your booking has been confirmed. Take your vehicle for an inspection on 2024-02-16 at 8:00 AM - 9:00 AM.

This email is automatically generated by the system. Please do not reply.

Log time: 2024-02-09 13:00:15

↶ Reply ↷ Forward 😊

Figure A.12 - Cancel booking email notification

Step 11 - When your vehicle passes the inspection, you will receive email notification illustrated in figure A.13. When your vehicle failed the inspection, you will receive email notification illustrated in figure A.14. Then make the necessary adjustments to your vehicle and submit it to your garage for re-inspection.

Notification from Commercial Vehicle Fitness e-certificate Issuing System ✕ 🖨️ 📧
Inbox x

WCVFEIS <wcvfeisproject@gmail.com> 11:39 AM (57 minutes ago) ☆ 😊 ↶ ⋮
to me ▾

Your vehicle inspection is Passed. Please make the Payment. Your e-certification issuing fee is Rs.1000/-. You can pay through the system *Log in to the system and visit Check e-certificate issuing status* or pay at garage Premises..

This email is automatically generated by the system. Please do not reply.

Log time: 2024-02-09 11:39:48

Figure A.13 - infection pass email notification



WCVFEIS <wcvfeisproject@gmail.com>
to me ▾

11:25 AM (0 minutes ago) ☆ 😊 ↶ ⋮

Your vehicle inspection is rejected. Please make the necessary adjustments to your vehicle and submit it to your garage for re-inspection within 2 weeks and get your e-certificate of Vehivle Fitness.

This email is automatically generated by the system. Please do not reply.

Log time: 2024-02-15 11:25:45

Figure A.14 - infection fail email notification

Step 12 - Then you can either make payment by using vehicle fitness e-certificate issuing status page illustrated in figure A.15. or at the garage premises.

WCVFEIS Thilini Radhika | logout

[Back](#)

Vehicle Fitness e-certificate issuing status

Vehicle Number	Booking Date	Booking Time	Garage Name	Booking Status	Payment Status	Inspection Certificate Status	Fitness Certificate Status
NA9218	2023-12-13	8:00 AM - 9:00 AM	Magintha Mortors	Confirm	Complete	Complete	Complete
LC9749	2024-02-15	8:00 AM - 9:00 AM	Magintha Mortors	Confirm Cancel	Pending Pay	Pending	Pending

Developed by Thilini Radhika

Figure A.15 - vehicle fitness e-c certificate issuing status page

[Back](#)

Payment

Fitness Certificate issue fee is **Rs. 1000** . You can pay at either the Garage premises or online here.

Pay by Credit Card * Condition applied

Payment Amount - Rs. 1000

Card Type

Cardholder Name

Card Number

Expiry Date CCV

Figure A.16 - Payment page

Step 13 - When you make payment, you will receive email notification illustrated in figure A.17. You redirected to the Vehicle Fitness e-certificate issuing status page illustrated in A.12. You can see payment status in as illustrated in A.18.

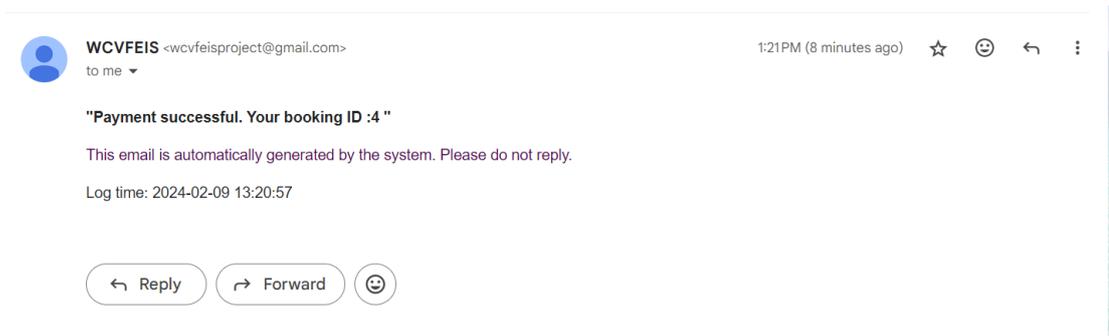


Figure A.17 - payment request email notification

WCVFEIS Thilini Radhika | [logout](#)

[Back](#)

Vehicle Fitness e-certificate issuing status

Payment successful. Your booking ID :4.

Vehicle Number	Booking Date	Booking Time	Garage Name	Booking Status	Payment Status	Inspection Certificate Status	Fitness Certificate Status
NA9218	2023-12-13	8:00 AM - 9:00 AM	Magintha Mortors	Confirm	Complete	Complete	Complete
LC9749	2024-02-16	8:00 AM - 9:00 AM	Magintha Mortors	Confirm Cancel	Complete	Pending	Pending

Developed by Thilini Radhika

Figure A.18 - payment status page

Step 14 - When Vehicle Certifying Officer generate report of vehicle inspection and fitness e-certificate, you will receive email notification illustrated in figure A.19. Then go to the click on Download Vehicle Fitness e-certificate button on dashboard illustrated in A.4. You can search them using vehicle no or engine number and download or view them on the Download Vehicle Fitness e-certificate page illustrated in A.21.

 **WCVFEIS** <wcvfeisproject@gmail.com> 1:35 PM (0 minutes ago) ☆ 😊 ↶ ⋮
to me ▾

Your report of Vehicle Inspection and Fitness e-certificate has been successfully generated. Please visit the Download Vehicle Fitness e-Certificate page and download your certificate.

This email is automatically generated by the system. Please do not reply.

Log time: 2024-02-10 13:35:28

↶ Reply
↷ Forward
😊

Figure A.19 - payment confirmation email notification

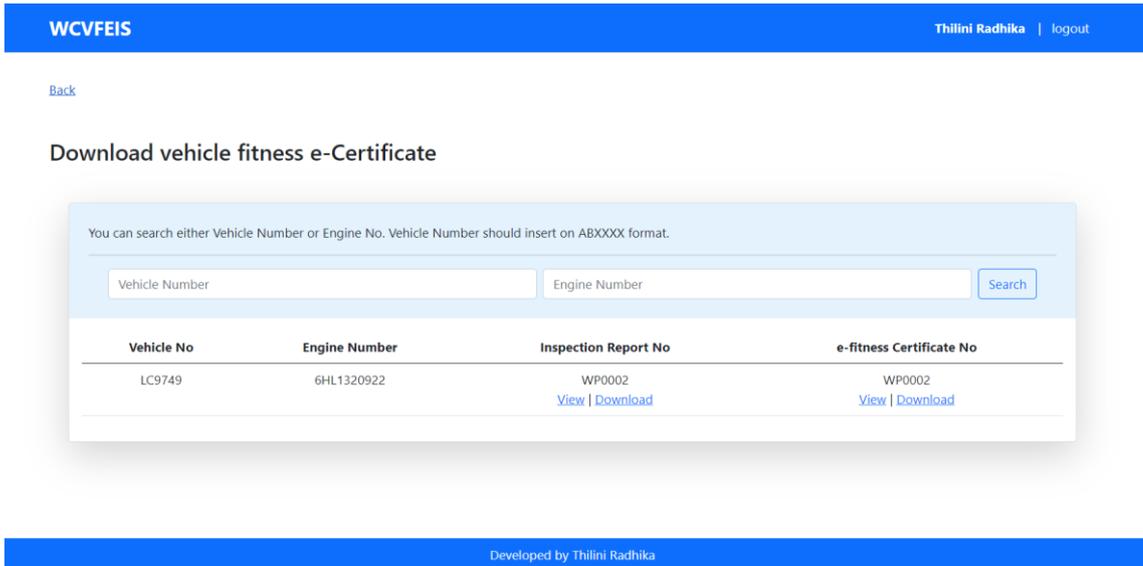


Figure A.21- Issued Certificate search interface

Step 15 - You can View your report of inspection as illustrated in A.22. and fitness e-certificate as illustrated in A.23.

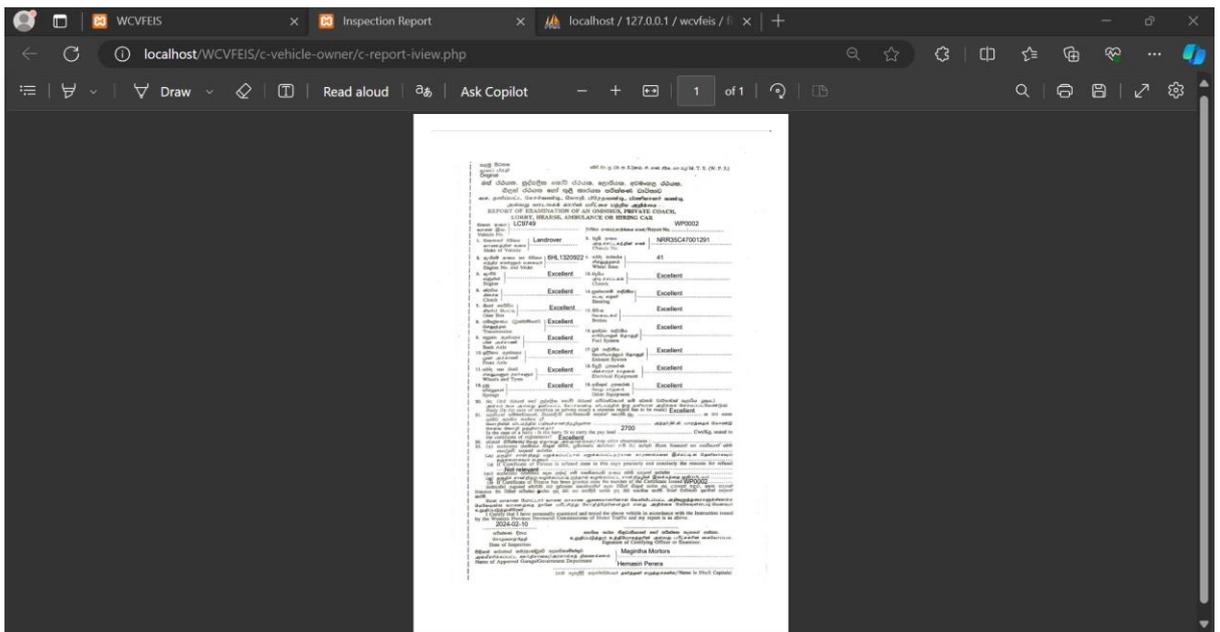


Figure A.22 - Inspection report

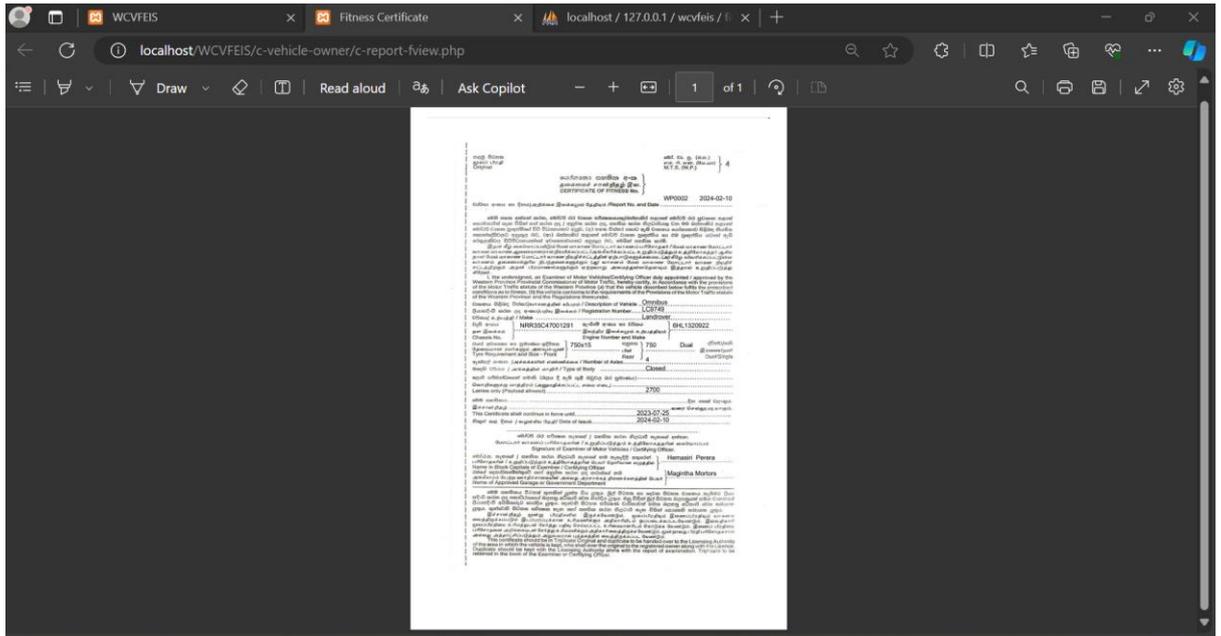


Figure A.23 - fitness report

Step 16 - You can view news, FAQ and feedback regarding vehicle fitness e-certificate issuing system on home page illustrated in A.24.

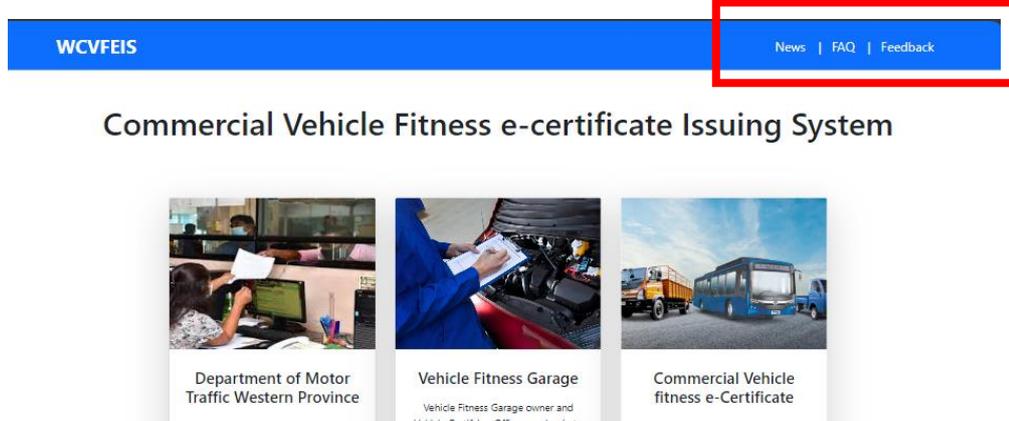


Figure A.24 - FAQ, Feedback ,news button

Step 17 - News page illustrated in A.25.

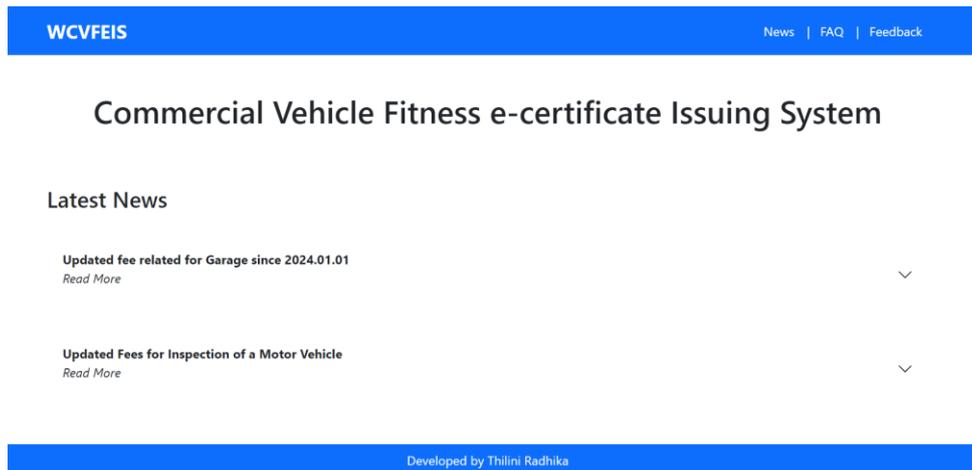


Figure A.25 - News page

Step 18- FAQ page illustrated in A.26.

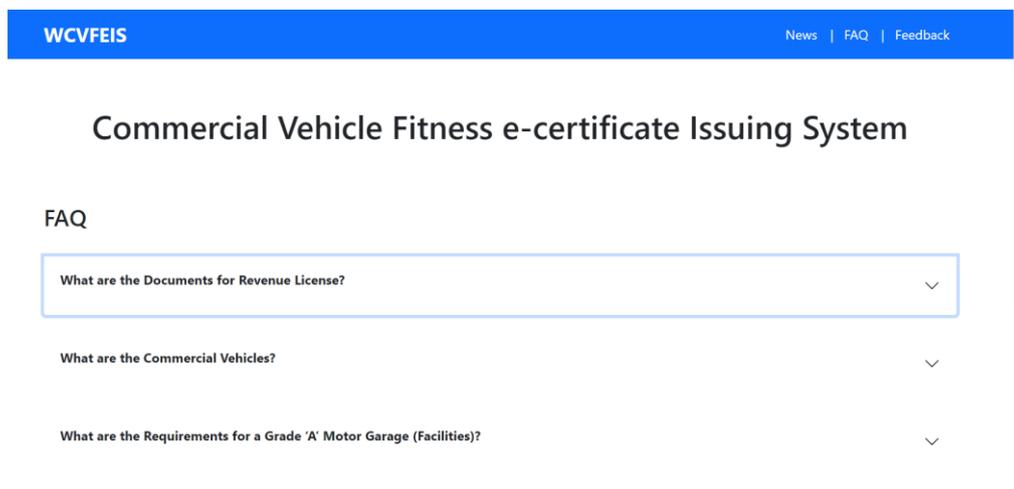


Figure A.26 - FAQ page

Step 19 - You can add feedback on Feedback page illustrated in A.27.

WCVFEIS News | FAQ | Feedback

Your Feedback Is Important For Us..

Name

Feedback

Save Clear

Kumara Perera

Good Service.
2023-12-15

Sadew

Highly Recommend. Great job on handling that customer's issue quickly and professionally
2024-02-13

Developed by Thilini Radhika

Figure A.27 - Feedback page

A.3 Guid for Vehicle Fitness Garage Owner and Vehicle Certifying Officer

Step 1 - Clicking click here button on Vehicle Fitness Garage card can get Vehicle Fitness Garage login page illustrated in figure A.28. You can select your role here.

Click here'. At the bottom of the page, there is a blue footer with the text 'Developed by Thilini Radhika'."/>

WCVFEIS

Vehicle Fitness Garage

login

Email

Password

Role

Garage Owner

Garage Owner

Certifying Officer

Login

Don't have an account? [Click here](#)

Developed by Thilini Radhika

Figure A.28 - garage login page

Step 2 - Garage Dashboard page for certifying officer illustrated in figure A.29.

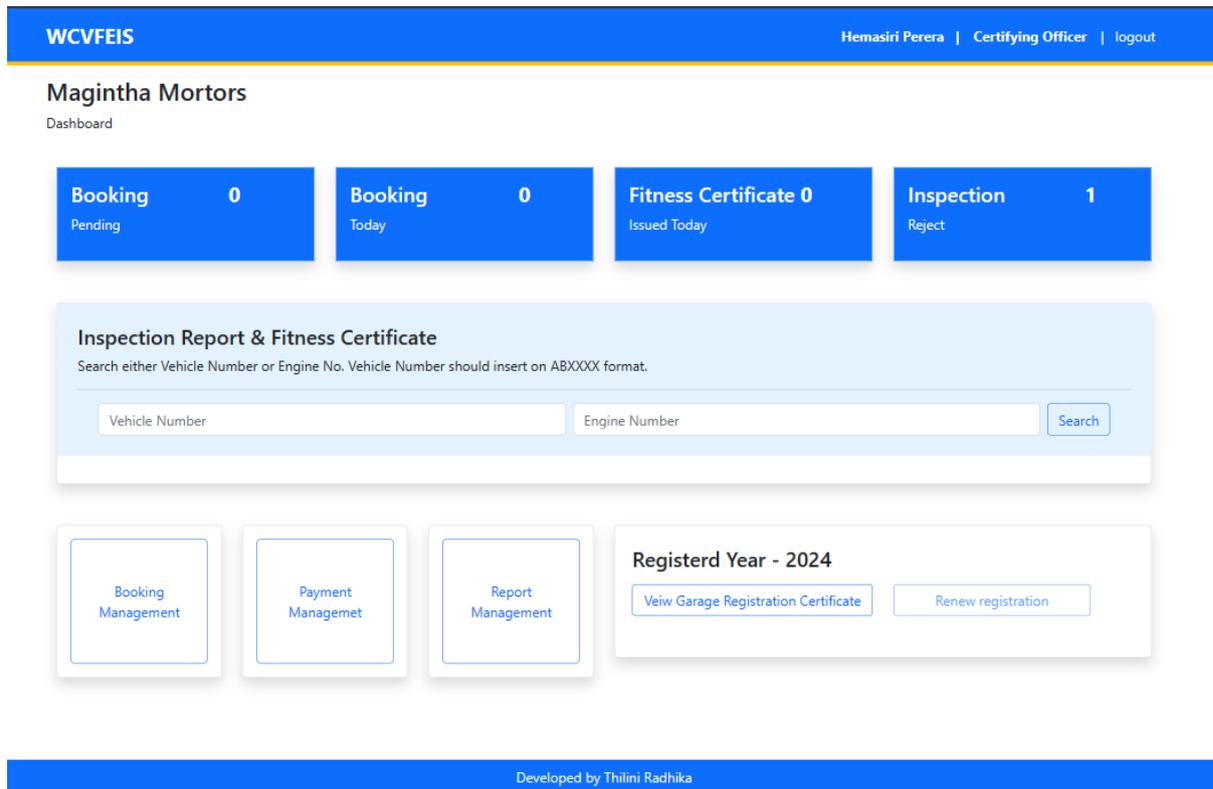


Figure A.29 - garage dashboard

Step 3 - You can view the number of pending bookings, bookings for today, fitness Certificates issued today and inspections rejected as a summary in the dashboard illustrated in Figure A.30.



Figure A.30 - garage summary

Step 4 - You can check Whether an e-fitness certificate and inspection report has been issued for any vehicle on the dashboard illustrated in A.31. You can search them using vehicle no or engine number and download or view them.

Inspection Report & Fitness Certificate

Search either Vehicle Number or Engine No. Vehicle Number should insert on ABXXXX format.

Vehicle No	Engine Number	Inspection Report No	Vehicle fitness e-Certificate No
NA9218	5L6173367	WP0001 View Download	WP0001 View Download

Figure A.31 - check inspection fitness report

Step 5 - Click on the Booking Management button on the dashboard, and you will be redirected to the bookings page illustrated in A.32. This page displays all bookings belonging to your Garage. You can search by using any word (Garage Owner can only View this section)

WCVFEIS
Hemasiri Perera | Certifying Officer | [logout](#)

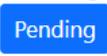
Magaintha Mortors

Bookings

Booking Id	Vehicle Number	Booking Date	Booking Time	Customer Name	Booking Status	Payment Status	Vehicle Inspection	Inspection Certificate Status	Fitness Certificate Status	Action
1	NA9218	2023-12-13	8:00 AM - 9:00 AM	Thilini Radhika	Complete Complete	Complete	Pass	Complete	Complete	Cancel Pay Generate
2	LC9749	2024-01-02	8:00 AM - 9:00 AM	Thilini Radhika	Pending Pending	Pending	Pending P R	Pending	Pending	Cancel Pay Generate
3	LB4788	2024-02-22	8:00 AM - 9:00 AM	Ishara perera	Pending Pending	Pending	Pending P R	Pending	Pending	Cancel Pay Generate
4	ND3887	2024-02-29	11:00 AM - 12:00 AM	Supun Silva	Pending Pending	Pending	Pending P R	Pending	Pending	Cancel Pay Generate

Developed by Thilini Radhika

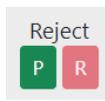
Figure A.32 - booking management page

Step 6 - Accept booking by clicking on the  button on the booking page illustrated in A.32. After that Pay button and Vehicle inspection button are activated.

3	LB4788	2024-02-22	8:00 AM - 9:00 AM	Ishara perera	Confirm Confirm	Pending	Pending P R	Pending	Pending	Cancel	Pay	Generate
---	--------	------------	-------------------	---------------	--------------------	---------	----------------	---------	---------	--------	-----	----------

Figure A.33 - Pay button and Vehicle inspection button are activate

Step 7 - When after vehicle inspection if inspection is passed click  button, if inspection is failed click  button (Reject).



Step 8 - If  click on Pass Button Vehicle inspection status updated as Pass. If click on reject button status update as Reject. When vehicle resubmit with necessary adjustments and passed the re-inspection click on  button.

Step 9 - Customer can make online payment. Otherwise, if the customer pays at your garage, you can confirm payment by clicking  button. After completing payment Generate button activated.

3	LB4788	2024-02-22	8:00 AM - 9:00 AM	Ishara perera	Confirm Confirm	Complete	Pass	Pending	Pending	Cancel	Pay	Generate
---	--------	------------	-------------------	---------------	--------------------	----------	------	---------	---------	--------	-----	----------

Figure A.34 generate button are activate

Step 10 - Clicking on Generate button you will redirect to the Inspection Report & Fitness Certification page illustrated in A.34.

WCVFEIS Hemasiri Perera | Certifying Officer | Logout

[Back](#)

Maginta Mortors

Generate Inspection Report & Fitness Certification

Report of examination

1.Vehicle No LC9749	2.Engine No GHL1320922	3.Engine Make <input type="text"/>
4.Chassis No NRR35C47001291	5.Wheel Base cm	6.Engine Excellent
7.Clutch Excellent	8.Gear Box Excellent	9.Transmission Excellent
10.Back Axle Excellent	11.Front Axle Excellent	12.Wheels and Tyres Excellent
13.Springs Excellent	14.Chassis Excellent	15.Steering Excellent
16.Brakes Excellent	17.Fuel System Excellent	18.Exhaust System Excellent
19.Electrical Equipment Excellent	20.Other Equipment Excellent	21.Body Excellent
22.Pay Load (Lorry) kg	23.Pay Load Condition Not relevant	24.Observations (If reject) <input style="width: 100%;" type="text"/>

Certificate of Fitness

Description of Vehicle Omnibus	Make of Vehicle <input type="text"/>
Tyre size- Front <input type="text"/>	Rear <input type="text"/>
Tyre requirement Dual	
Number of Axles <input type="text"/>	Type of Boady Closed

Developed by Thilini Radhika

Figure A.34 - Inspection and fitness certificate form page

Step 11 - After generating reports You should click Confirm button on bookings page illustrated in A.32 for Complete the booking.

3	LB4788	2024-02-22	8:00 AM - 9:00 AM	Ishara perera	Confirm <input type="button" value="Confirm"/>	Complete	Pass	Complete	Complete	<input type="button" value="Cancel"/>	<input type="button" value="Pay"/>	<input type="button" value="Generate"/>
---	--------	------------	-------------------	---------------	---	----------	------	----------	----------	---------------------------------------	------------------------------------	---

Figure A.35 - Active complete button

Step 12 - When clicking on payment management button on dashboard you will redirect to the payment page illustrated in A.36 display all the payment details regarding booking of the garage.

WCVFEIS Hemasiri Perera | Certifying Officer | [logout](#)

[Back](#)

Magintha Mortors

Payments

Booking Id	Vehicle Number	Booking Date	Booking Time	Customer Name	Amount	Pay Type	Pay Date	Approved By
1	NA9218	2023-12-13	8:00 AM - 9:00 AM	Thilini Radhika	1000	on-site	2023-12-13	Hemasiri
3	LB4788	2024-02-22	8:00 AM - 9:00 AM	Ishara perera	1000	on-site	2024-02-15	Hemasiri

Developed by Thilini Radhika

Figure A.36 - payment page

Step 13 - When clicking on Report Management button on dashboard you will redirect to the report generate page illustrated in A.37

WCVFEIS Hemasiri Perera | Certifying Officer | [logout](#)

[Back](#)

Magintha Mortors

Report Generate

Booking

Payment

Fitness e-Certificate

Vehicle Inspection

Developed by Thilini Radhika

Figure A.37 - report generate page

Step 14 - You can generate booking, payment, fitness e-certificate and vehicle inspection reports customizing data range and category. You can generate PDF and Excel version here. Booking report generate page illustrated in A.38.

[Back](#)

Magintha Mortors

Reports are downloaded in PDF format and editable Excel File Format

Report Generate - Booking

Start Date: End Date:

Category:

Figure A.38 - booking report generate page

Step 15 - When clicking on View Garage Registration Certificate on dashboard you will redirect to the Garage Registration Certificate page illustrated in A.39

[Back](#)

Certificate of registration as a garage in the Western Province suitable for issuing fitness certificates for the year 2023

Garage Details

Garage ID: 1
 Garage Name: Magintha Mortors
 Garage Address: 417, Old Kottawa Road, Udahamulla, Nugegoda
 Garage Tel. No: 112844578
 Email: magintha@gmail.com
 District: Colombo
 City: Nugegoda
 Registered Year: 2023

Garage Owner Details

Owner ID: 1
 Owner Name: Nihal Magintha
 Owner NIC: 587458741
 Owner Tel. No: 778954712

Certifying Officer(s) Details

Certifying Officer Id	Name	NIC	Tel. No
1	Hemasiri Perera	575524821	771879517
2	Namal Dodangoda	544785416	715896547

Figure A.39 - Garage registration Certificate

Step 16 - When clicking on [Renew registration](#) dashboard you will redirect to the Renew Registration page illustrated in A.40. When Select request year and apply you will redirect to the renew registration request detail Page illustrated in A.41. (This section access for only Garage Owner)

WCVFEIS Nihal Magintha | Garage Owner | logout

[Back](#)

Renew Registration

Garage Details

Garage ID: 1
 Garage Name: Magintha Mortors
 Garage Address: 417, Old Kottawa Road, Udahamulla, Nugegoda
 Garage Tel. No: 112844578
 Email: magintha@gmail.com
 District: Colombo
 City: Nugegoda
 Registered Year: 2023

Garage Owner Details

Owner ID: 1
 Owner Name: Nihal Magintha
 Owner NIC: 587458741
 Owner Tel. No: 778954712

Certifying Officer(s) Details

Certifying Officer Id	Name	NIC	Tel. No
1	Hemasiri Perera	575524821	771879517
2	Namal Dodangoda	544785416	715896547

Request year:

* If there are any changes in the details please contact DMTWP

Developed by Thilini Radhika

Figure A.40 - Garage renew registration page

WCVFEIS Nihal Magintha | Garage Owner | logout

[Back](#)

Renew Registration

Renew request send successfully

Renew Request Status

Renew Id	Garage Id	Request year	Renew Status	Payment Status	Request By	Request Date
1	1	2024	Pending	Pending	Nihal	2024-02-15

Developed by Thilini Radhika

Figure A.41 - Garage renew registration request detail page

Step 17 - When DMTWP Accept your renewal request Pay button will be activated and you can make the payment by clicking pay button illustrated in A.42. This section access for only Garage Owner)

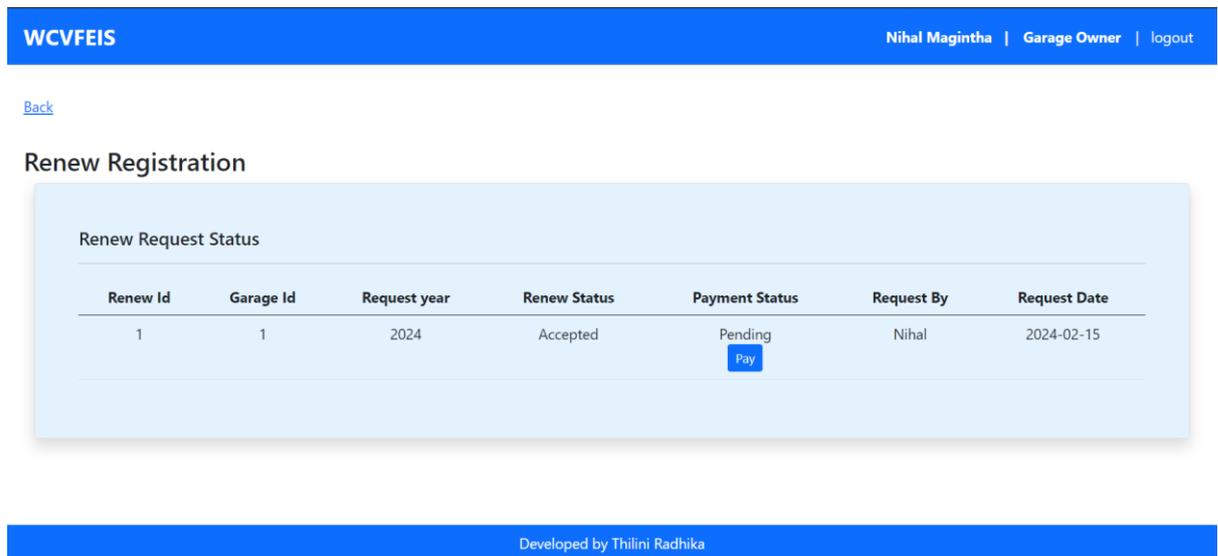


Figure A.42 - Garage renew pay button activate

A.4. Guide for Department of Morter Traffic Western Province (Commissioner/Subject Officer)

Step 1 - Login page illustrated in A.43.

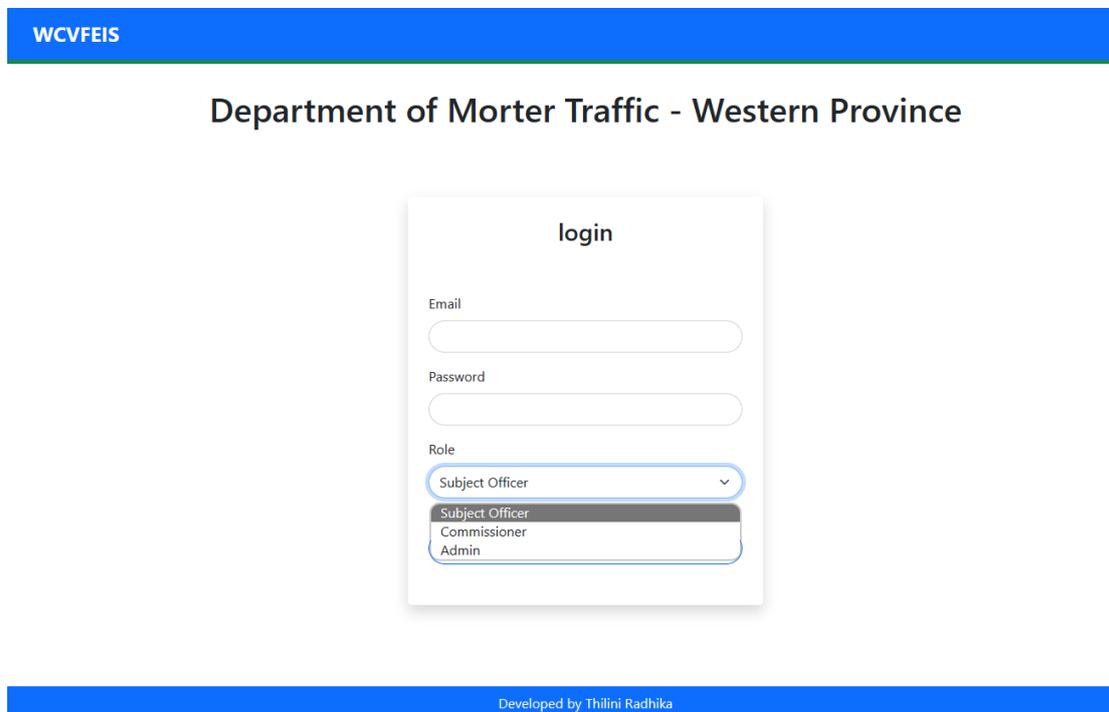


Figure A.43 - DMTWP login page

Step 2 - Dashboard page illustrated in A.44.

The dashboard for the Department of Motor Traffic Western Province (DMTWP) features a blue header with the logo 'WCVFEIS' and the user 'Thanuja Janika | Commissioner | logout'. Below the header, the title 'Department of Motor Traffic Western Province (DMTWP)' and 'Dashboard' are displayed. The main content area contains four blue cards: 'Renewal Request 10 Pending', 'Registered Garage 8 2023', 'Registered CO 5 2023', and 'Suspend Garage 1 2023'. A central section titled 'Inspection Report & Fitness Certificate' includes a search form for 'Vehicle Number' and 'Engine Number'. At the bottom, there are six buttons for 'Garage Management', 'Payment Management', 'Report Management', 'Feedback Management', 'News Management', and 'FAQ Management'. A footer bar states 'Developed by Thilini Radhika'.

Figure A.44 - DMTWP dashboard

Step 3 - Summary of the DMTWP illustrated in A.45

This summary view displays four blue cards: 'Renewal Request 10 Pending', 'Registered Garage 8 2023', 'Registered CO 5 2023', and 'Suspend Garage 1 2023'.

Figure A.45 – summary of DMTWP

Step 4 - When clicking on Garage Management button on dashboard you will redirect to Garage Mange Page illustrated in A.45.

The 'Garage Manage' page has a blue header with 'WCVFEIS' and 'Thanuja Janika | Commissioner | logout'. A 'Back' link is present. Below the header, there is a 'Renew request' button and a search bar. The main content is a table with the following data:

Garage Id	Garage Name	Garage Address	Garage Pno	Garage email	District	City	Registered Year	Registered By	Registered Date	Operation Status
1	Maginta Mortors	417, Old Kottawa Road, Udahamulla, Nugegoda	112844578	maginta@gmail.com	Colombo	Nugegoda	2023	Thanuja	2023-01-01	Active A S
2	Isuru Traders	179, Hilevel Road, Galawilawatta, Homagama	112555921	isuru@gmail.com	Colombo	Homagama	2023	Janika	2023-01-01	Active A S

A footer bar at the bottom states 'Developed by Thilini Radhika'.

Figure A.43 - garage management page

Step 5 - Garage Manage Page display basic details of the garage. You can change Operational Status clicking on Active bottom and Suspend button illustrated in A.44.

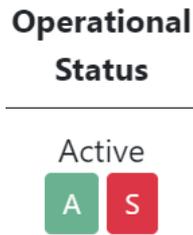


Figure A.44 - operational status button

Step 6 - Clicking on [View](#) You can see all the details including Certifying Officers details regarding to relevant garage page illustrated in A.45.

The screenshot displays a light blue background with three sections of information, each separated by a horizontal line. The first section is 'Garage Details', the second is 'Garage Owner Details', and the third is 'Certifying Officer(s) Details'. The 'Certifying Officer(s) Details' section contains a table with four columns: 'Certifying Officer Id', 'Name', 'NIC', and 'Tel. No'.

Certifying Officer Id	Name	NIC	Tel. No
1	Hemasiri Perera	575524821	771879517
2	Namal Dodangoda	544785416	715896547

Figure A.45 - Full garage details page

Step 7 - Click on [Renew request](#) button in Booking Manage page you will redirect to Renew Request Manage page illustrated in A.46.

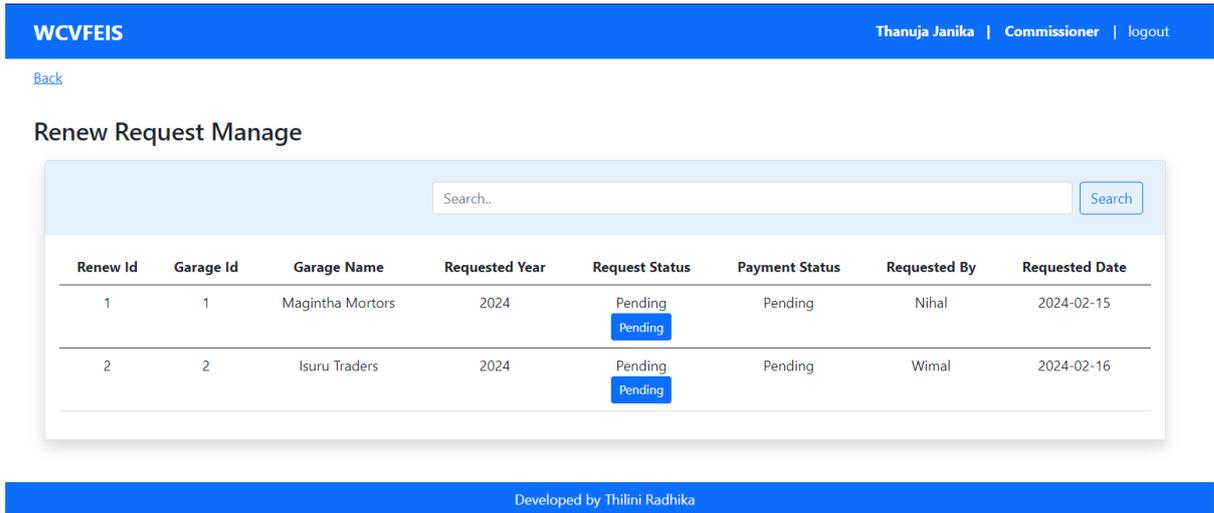


Figure A.46 - renew request page

Step 8 - Click on [Pending](#) button for accept the renewal request and activate pay button to the Garage Owner.

Step 9 - When Garage Owner make the payment, Payment Status updated as Completed and [Accepted](#) button Activated. Then click on Activated button make Complete the process and Update registered year. (Only Commissioner has access to Click on Accepted button and Complete the Process)

Step 10 - Click on Feedback Management button in dashboard you will redirect to Feedback Manage page illustrated in A.47. You can delete feedback here.

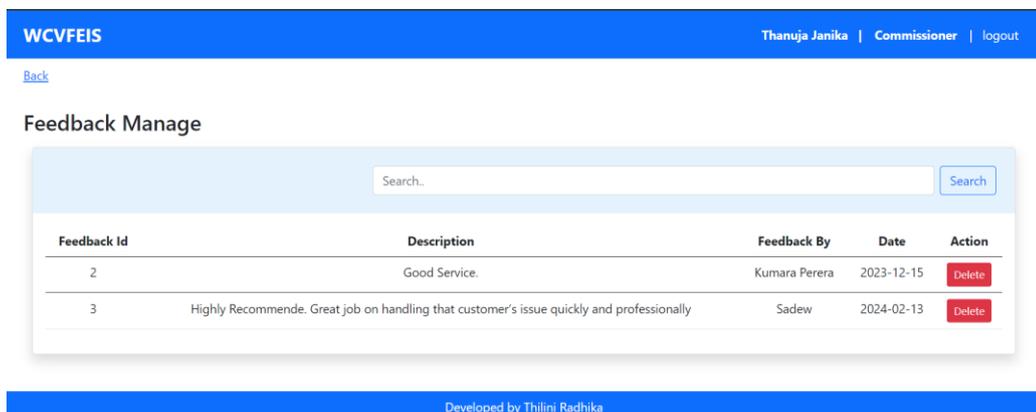


Figure A.47- feedback management page

Step11 - Click on News Management button in dashboard you will redirect to News Manage page illustrated in A.48.

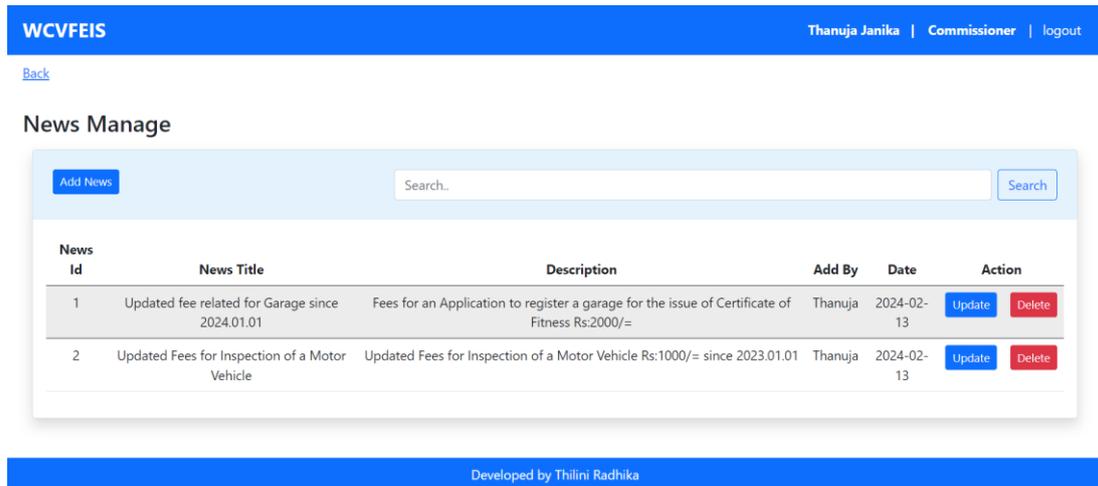


Figure A.48- News management page

Step 12 - Click on Add News button in News Manage you will redirect to Add News page illustrated in A.49.

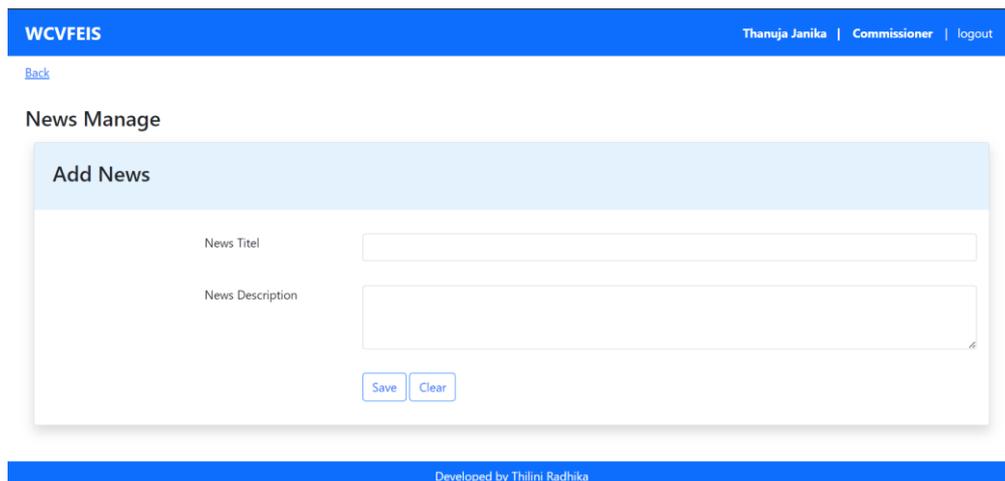


Figure A.49- Add news page

Step 13 - Click on Update News button in News Manage you will redirect to Update News page illustrated in A.50.

WCVFEIS Thanuja Janika | Commissioner | logout

[Back](#)

News Manage

Update News

News Id:

News Title:

News Description:

Developed by Thilini Radhika

Figure A.50- Add news page

Step 14 - Click on FAQ Management button in dashboard you will redirect to FAQ Manage page illustrated in A.51.

WCVFEIS Thanuja Janika | Commissioner | logout

[Back](#)

FAQ Manage

FAQ Id	Question	Answer	Add By	Date	Action
1	What are the Documents for Revenue License?	Registration Certificate of Vehicle or The Extract Containing Particulars of the Vehicle Issued by the Commissioner of Motor Traffic (CMT-76 or MTA-11) or Certified Photo Copy of C.R. Approved by Finance Organization. Revenue License of the Previous Year. Valid Vehicle Insurance Policy Certificates. Fitness Certificates for Commercial Vehicles. Passenger Service permits for Omni Bus. Valid Emission certificate	Thanuja	2024-02-13	<input type="button" value="Update"/> <input type="button" value="Delete"/>
2	What are the Commercial Vehicles?	Motor Lorry Private Couches Omni Bus Motor tricycle van Ambulance Hearse	Thanuja	2024-02-13	<input type="button" value="Update"/> <input type="button" value="Delete"/>
3	What are the Requirements for a Grade 'A' Motor Garage (Facilities)?	A pit 20 feet long, 21/2 feet deep or a ramp or a hoist offering similar facilities for inspection of motor vehicles. A taply meter or roller brake tester. Equipment or place together with a board to inspect head lamps. Testing lamp. Set of tools required for inspections. (This set should consist of spanners and tools of all standard sizes). Alignment gauge. Electrical and gas welding equipment.	Thanuja	2024-02-13	<input type="button" value="Update"/> <input type="button" value="Delete"/>
4	What are the requirement for Certifying officer and the staff?	National Diploma in Technology or junior Technical Officers' Certificate in Mechanical Engineering ;or A Certificate in Technology issued by London City and Guilds Institution which is equivalent to (i) above; and Not less than two years practical experience in a recognized motor garage.(Persons with training aboard in motor engineering and those possessing the certificate in motor engineering issued by the Ceylon German Technical Training Institute with over 15 years experience in motor engineering in a government recognized institution will be considered for exemption from the above requirements	Thanuja	2024-02-13	<input type="button" value="Update"/> <input type="button" value="Delete"/>

Figure A.51- FAQ management page

Step 15 - Click on Add FAQ button in FAQ Manage you will redirect to Add FAQ page illustrated in A.52.

WCVFEIS Thanuja Janika | Commissioner | [logout](#)

[Back](#)

FAQ Manage

Add FAQ

Question

Answer

Developed by Thilini Radhika

Figure A.52- Add FAQ

Step 16 - Click on Update FAQ button in News Manage you will redirect to Update FAQ page illustrated in A.53.

WCVFEIS Thanuja Janika | Commissioner | [logout](#)

[Back](#)

FAQ Manage

Update FAQ

FAQ Id

Question

Answer

Developed by Thilini Radhika

Figure A.53- Update FAQ

Appendix B – MIS Reports

B.1 Description of MIS Report Module

MIS (Management Information System) reports are a type of structured report that organizations use to provide information and support decision-making. These reports typically contain data from various sources within an organization and are designed to help management monitor and control different aspects of the organizations.

WCVFEIS provide five reports to provide information. Those are;

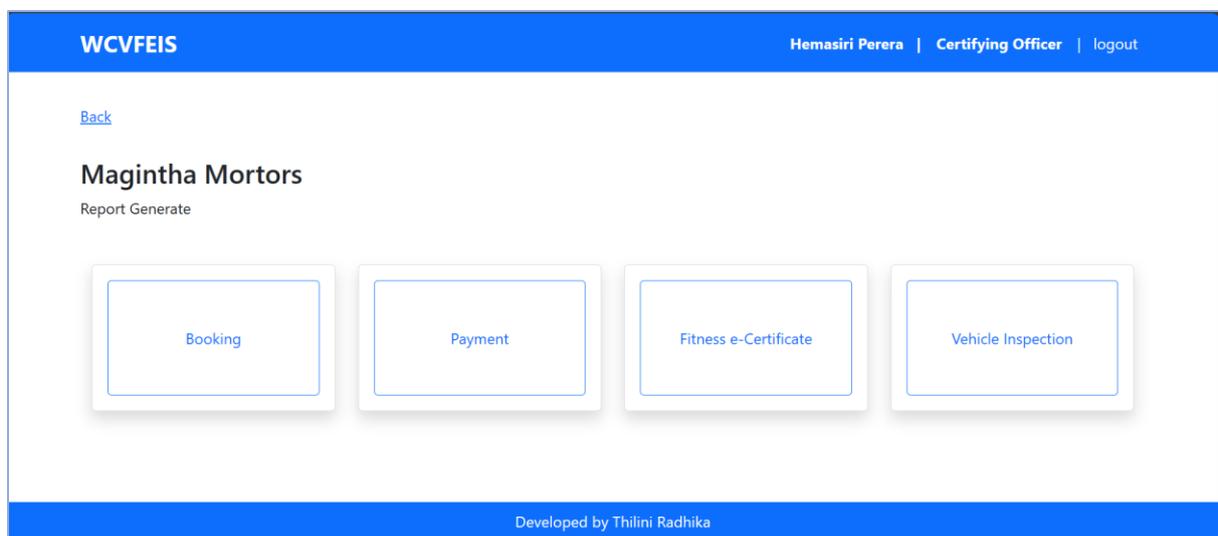


Figure B.53- Report generating module interface for garage user

B.1.1 Booking report

Under the Booking Report filter booking details specific periods and categories as follows;

- All - Number of bookings made within a specific period.
- Complete - Number of bookings that have been completed.
- Confirm - Number of bookings that are currently confirmed by the garage.
- Pending - Number of bookings that are not confirmed yet.

The report can be downloaded in editable Excel File Format and PDF format.

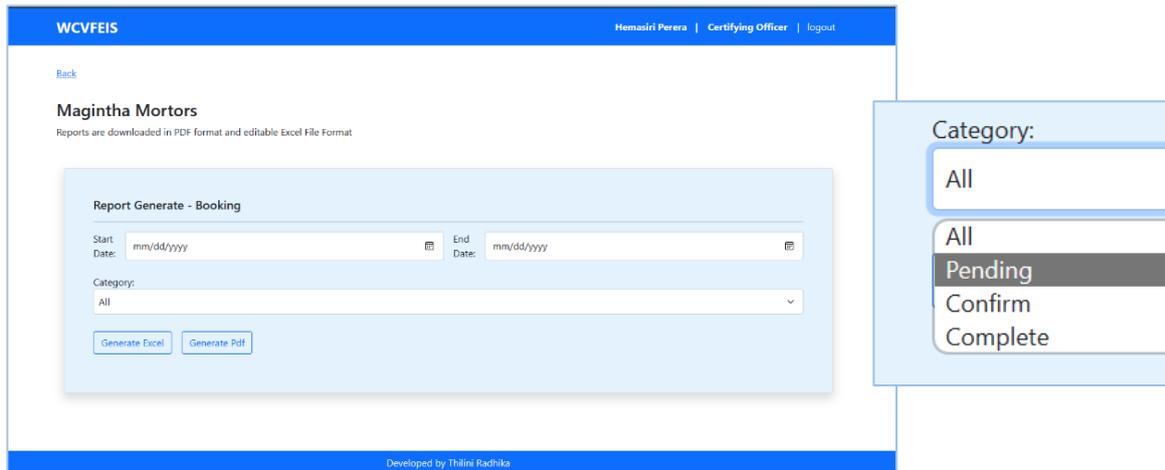


Figure B.54 - Booking report Generating interface

Also, the garage dashboard provides pending booking and active booking counts daily. It provides initial details of daily performance.

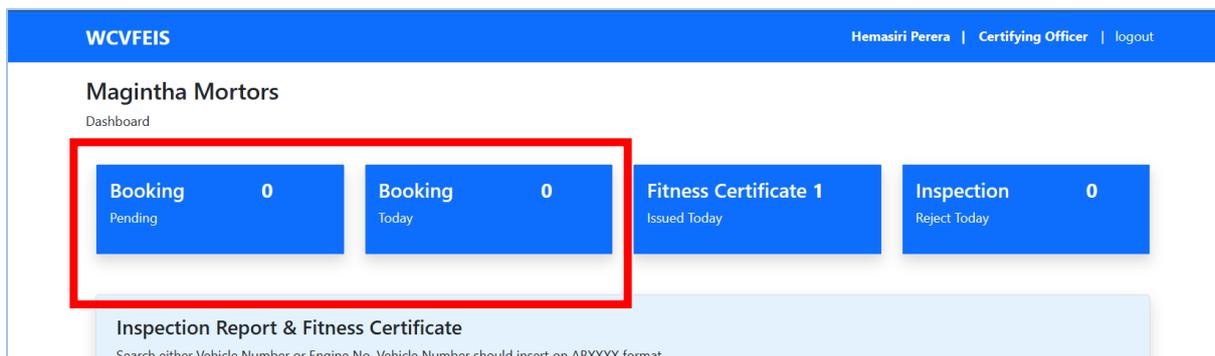


Figure B.55 - Garage Dashboard

B.1.2 Payment report

Under the Payment Report Generate module can filter using a specific period of payments received for bookings. The report can be downloaded in editable Excel File Format and PDF format. Those details are supported by deciding the Financial Performance of the Garage.

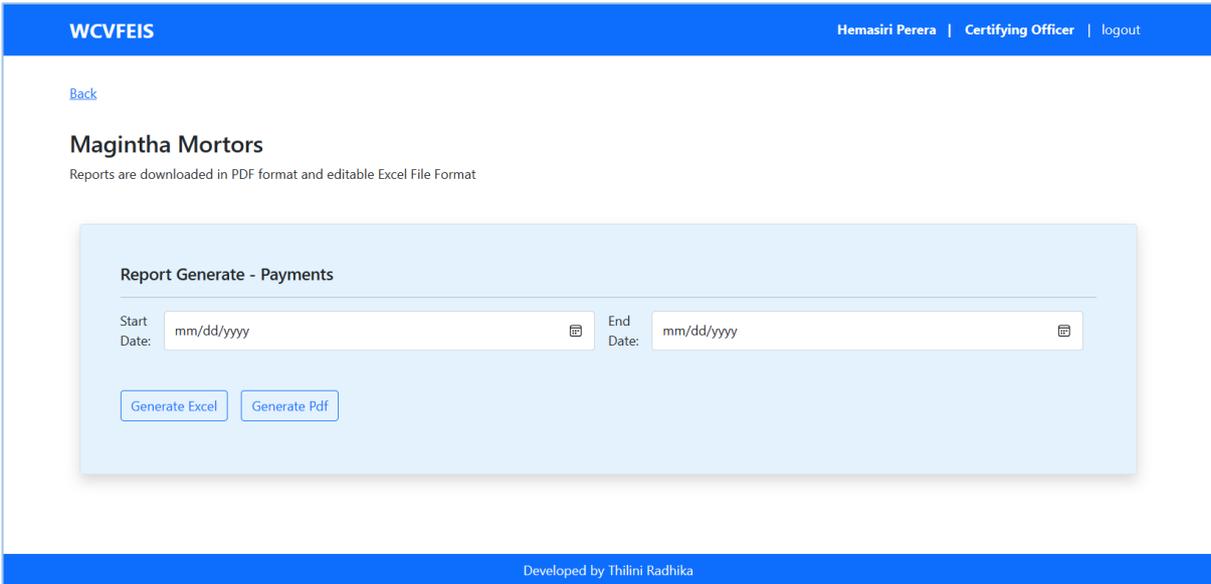
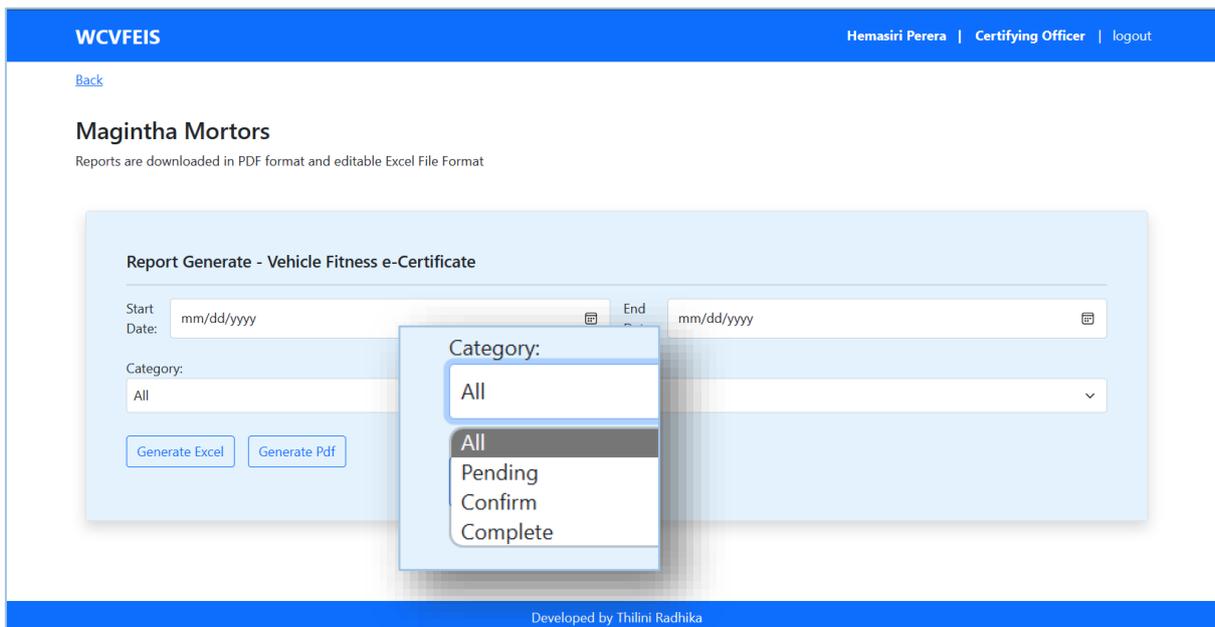


Figure B.56 - Payment report generating interface

B.1.3 Issued Vehicle Fitness e-Certificate report

Under the Report Generate module can filter using specific periods and categories (Pending, Confirm, Complete). The report can be downloaded in editable Excel File Format and PDF format. Through this report, can get an idea of the performance of the garage.



FigureB. 57 - Issued fitness e-certificate report generating interface

The garage and Department of Motor Traffic dashboard facilitate viewing and downloading issued Vehicle Fitness e-Certificate filtering vehicle number or engine number. These reports help decision-making to proceed with the process of renewing the Revenue license.

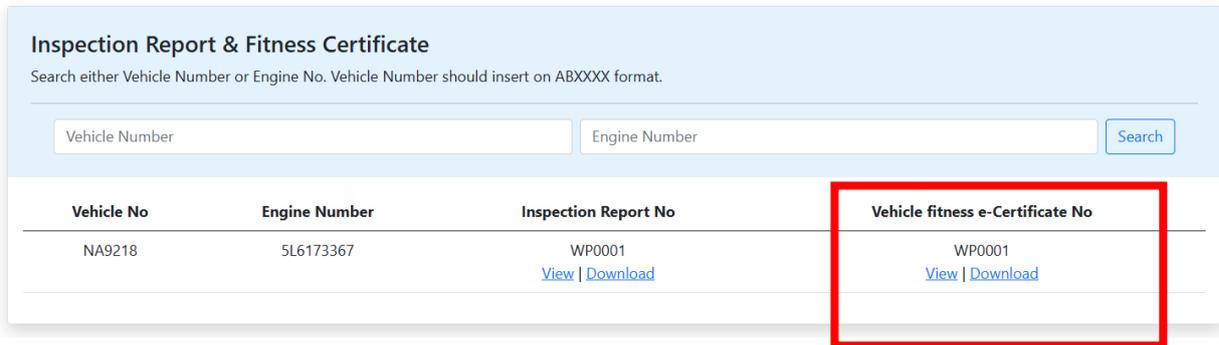


Figure B.58 – Fitness e-certificate view and download interface

B.1.4 Issued Vehicle Inspection Report

Under the Report Generate module can filter using specific periods and categories (Pending, Confirm, Complete). The report can be downloaded in editable Excel File Format and PDF format. Through this report, can get an idea of a number of inspections done by the garage and the performance of the garage.

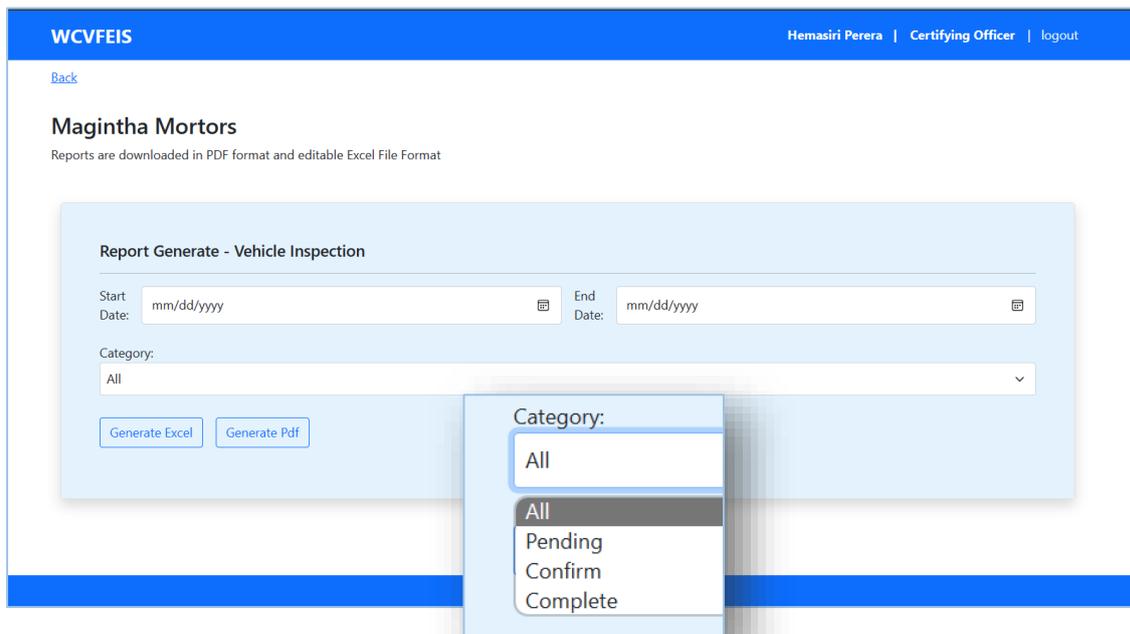


Figure B 59 - Issued inspection report details generating interface

The garage and Department of Motor Traffic dashboard facilitate viewing and downloading issued fitness reports filtering vehicle number or engine number. These reports help decision-making to proceed with the process of renewing the Revenue license.

Inspection Report & Fitness Certificate
 Search either Vehicle Number or Engine No. Vehicle Number should insert on ABXXXX format.

Vehicle Number Engine Number

Vehicle No	Engine Number	Inspection Report No	Vehicle fitness e-Certificate No
NA9218	5L6173367	WP0001 View Download	WP0001 View Download

Figure B. 60 - Inspection Report view and download interface

B.1.5 Garage Details Report

Under the Report Generate module can filter using specific periods, categories (Active and Suspend) and district vice (Colombo, Gampaha, Kaluthara). The report can be downloaded in editable Excel File Format and PDF format. Through this report, can get an idea of a number of registered Fitness Garages and certifying officer in the Western province. This report generate facility available on DMTWP users only.

WCVFEIS Thanuja Janika | Commissioner | [logout](#)

[Back](#)

DMTWP
Report Generate

Garage Details

Bookings

Fitness Certificates

Vehicle Inspection

Developed by Thilini Radhika

Figure B.61 -Report generating module interface for DMTWP user

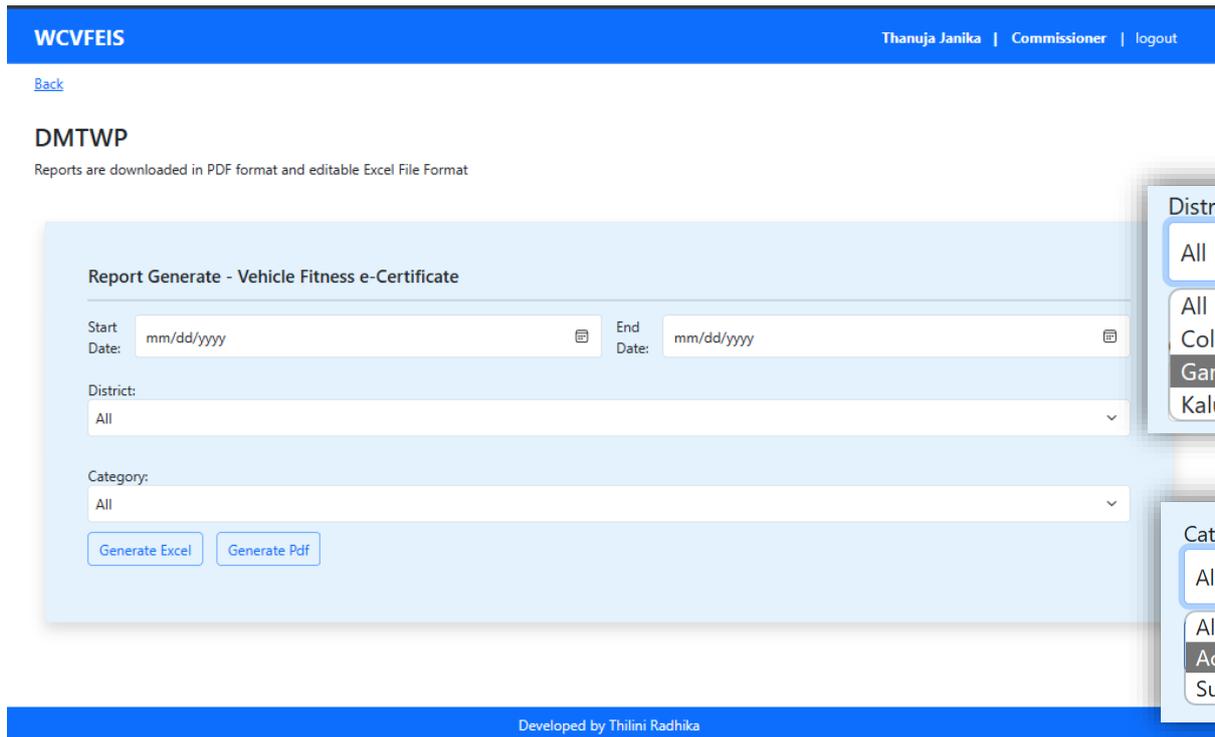


Figure B. 62 - Garage details report generating interface

B.2 Evidence of the report

B.2.1 Booking report

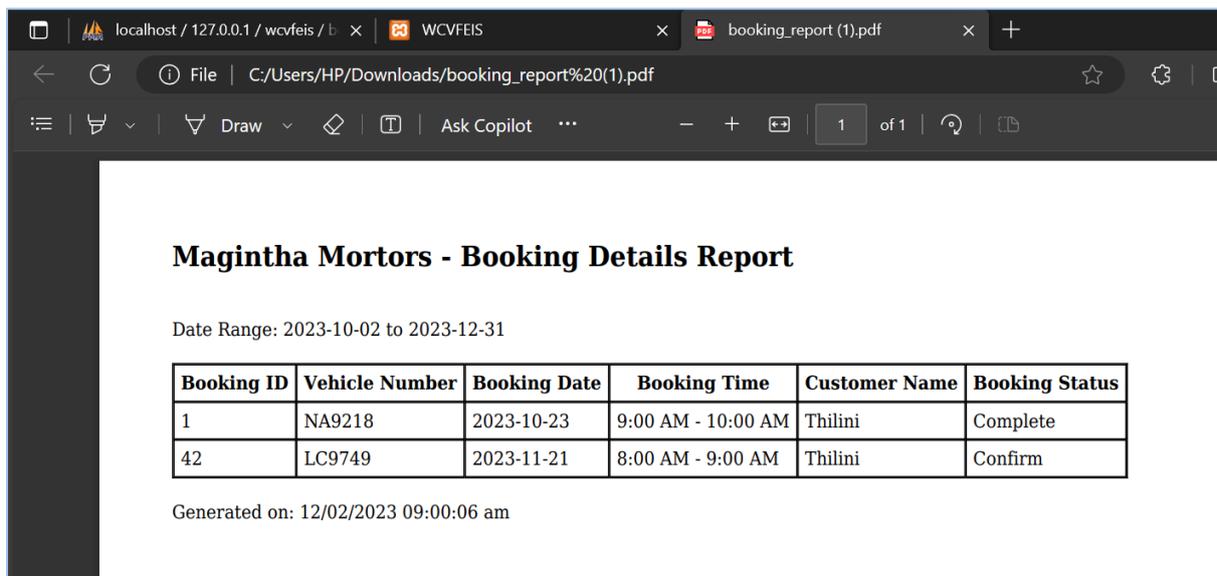


Figure B.63 – Booking details report

B.2.2 Payment report

Magintha Mortors - Payment Details Report

Date Range: 2023-01-01 to 2023-12-02

Payment ID	Booking ID	Vehicle Number	Booking Date	Booking Time	Customer Name	Pay Type	Pay Date	Approved By
1	1	NA9218	2023-10-23	9:00 AM - 10:00 AM	Thilini	on-site	2023-11-16	Hemasiri
2	42	LC9749	2023-11-21	8:00 AM - 9:00 AM	Thilini	on-site	2023-11-23	Hemasiri

Generated on: 12/02/2023 09:05:56 am

Figure B. 64 - Payment details report

B.2.3 Issued Vehicle Fitness e-Certificate report

Magintha Mortors - Vehicle Fitness e-certificate issued Details Report

Date Range: 2023-10-01 to 2023-12-31

Issue ID	Vehicle Number	Booking ID	Customer Name	Issuing Status	Fitness e-certificate No	Issue Date	Issued By
1	NA9218	1	Thilini	Complete	WP0001	2023-11-16	Hemasiri

Generated on: 12/02/2023 07:52:18 am

Figure B.65 - Issued Vehicle Fitness e-Certificate details report

