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Department of Software Engineering, FSIT

SWE-431 Project / Thesis

Project Documentation

Paperless Vehicle Certification System: A Platform to Collaborate Transport Stakeholder of Bangladesh

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Table of Contents

Chapter 1 1

1.1 Project Overview 2

1.2 Project Purpose 3

1.2.1 Background 3

1.2.2 Benefits & Beneficiaries 3

1.2.3 Goals 4

1.3 Stakeholders 4

1.4 Proposed System Model 5

1.5 Project Schedule 8

1.5.1 Gantt Chart 8

1.5.2 Release Plan 10

Chapter 2 11

2.1 Functional Requirements 12

2.1.1 Traffic police search for vehicles 12

2.1.2 Traffic police see vehicle details 12

2.1.3 Traffic police see the driver details 12

2.1.4 Traffic police are permitted to impose case 12

2.1.5 Traffic police can give demerit points 13

2.1.6 Traffic update own profile 13

2.1.7 Data retrieve from cloud server 13

2.1.8 Owner add vehicle 13

2.1.9 Owner add insurance 13

2.1.10 Owner apply fitness 13

2.1.11 Owner search driver 14

2.1.12 Owner view car cases 14

2.1.13 BRTA approve users 14

2.1.14 BRTA approve vehicle 14

2.1.15 BRTA approve fitness 14

2.1.16 BRTA approve driving license 14

2.2 Data Requirements 15

2.3 Performance Requirements 15

2.3.1 Speed & Latency Requirements 15

2.3.2 Precision & Accuracy Requirements 15

2.3.3 Capacity Requirements 16
2.4 Dependability Requirements 16
2.4.1 Reliability & Availability Requirements 16
2.4.2 Robustness or Fault-Tolerance Requirements 16
2.4.3 Safety-Critical Requirements 16
2.5 Maintainability & Supportability Requirements 17
2.5.1 Maintainability Requirements 17
2.5.2 Supportability Requirements 17
2.5.3 Adaptability Requirements 17
2.6 Security Requirements 18
2.6.1 Access Requirements 18
2.6.2 Integrity Requirements 18
2.6.3 Privacy Requirements 18
2.7 Usability and Human-Interaction Requirements 19
2.7.1 Ease of Use Requirements 19
2.7.2 Personalization and Internationalization Requirements 19
2.7.3 Understandability and Politeness Requirements 19
2.7.4 Accessibility Requirements 19
2.7.5 User Documentation Requirements 19
2.7.6 Training Requirements 20
2.8 Look and Feel Requirements 20
2.8.1 Appearance Requirements 20
2.8.2 Style Requirements 20
2.9 Operational and Environmental Requirements 20
2.9.1 Expected Physical Requirements 20
2.9.2 Requirements for Interfacing with Adjacent Systems 21
2.9.3 Release Requirements 21
2.10 Legal Requirements 21
2.10.1 Compliance Requirements 21
2.10.2 Standards Requirements 21
Chapter 3 22
3.1 Use Case Diagram 23
3.1.1 Owner Add Vehicle 24
3.1.2 Owner View Vehicles 24

3.1.3 Owner Apply Insurance 25
3.1.4 Owner View Vehicle Insurance 25
3.1.5 Owner Apply Fitness 26
3.1.6 Owner View Vehicle Fitness 26
3.1.7 Owner Renew Registration 27
3.1.8 Owner Search Driver 27
3.1.9 Owner Assign Driver 28
3.1.10 Owner Apply Driving License 28
3.1.11 Owner View Car Cases 29
3.1.12 Owner View Jobs 29
3.1.13 BRTA Approve Car Owner 30
3.1.14 BRTA Approve Driver 30
3.1.15 BRTA Approve Traffic 31
3.1.16 BRTA Approve Vehicles 31
3.1.17 BRTA Approve Fitness 32
3.1.18 BRTA Approve Driving License 32
3.1.19 BRTA Update Vehicle Registration 33
3.1.20 Driver View Job Request 33
3.1.21 Driver Approve Job Request 34
3.1.22 Driver Reject Job Request 34
3.1.23 Driver Comment with Owner 35
3.1.24 Driver View Running Job 35
3.1.25 Driver View Job History 36
3.1.26 Driver Apply Driving License 36
3.1.27 Insurance View Car details 37
3.1.28 Insurance Approve Vehicle Insurance 37
3.1.29 Traffic Search Vehicle 38
3.1.30 Traffic Check Paper's Authentication 38
3.1.31 Traffic Impose Case 39
3.1.32 Traffic View Vehicle Details 39
3.1.33 Traffic View Driver Details 40
3.1.34 Traffic Give Demerit Points 40
3.2 Activity Diagram 41
3.2.1 Add Vehicle 41
3.2.2 View Vehicle 42

3.2.3 Apply Insurance 43
3.2.4 View Information 44
3.2.5 Apply Fitness 45
3.2.6 View Vehicle Fitness 46
3.2.7 Renew Registration 47
3.2.8 Search & Hire Driver 48
3.2.9 Assign Driver 49
3.2.10 Approve Users 49
3.2.11 Approve Fitness 50
3.2.12 Traffic View Vehicles 50
3.3 Sequence Diagrams 52
3.3.1 Add Vehicle: 52
3.3.2 View Vehicles 53
3.3.3 Apply Insurance 53
3.3.4 View Vehicle Insurance 54
3.3.5 Apply Fitness 54
3.3.6 View Vehicle Fitness 55
3.3.7 Renew Registration 55
3.3.8 Search Driver 56
3.3.9 Apply Driving License 57
3.3.10 View Car Cases 57
3.3.11 View Job History 58
3.3.12 Approve Car Owner 58
3.3.13 Approve Driver 59
3.3.14 Approve Traffic 59
3.3.15 Approve Vehicles 60
3.3.16 Approve Fitness 61
3.3.17 Approve Driving License 62
3.3.18 View Job Request 63
3.3.19 Apply Driving License 63
3.3.20 View Car Details 64
3.3.21 Traffic Search Vehicles 65
Chapter 4 66
4.1 Development tools and technology 67
4.1.1 User Interface Technology 67

4.1.2 Implemented tools and platform 68
4.2 Class Diagram 69
4.3 Database Design Diagram 70
Chapter 5 71
5.1 Testing Features 72
5.1.1 Features to be tested 72
5.2 Testing Strategy 73
5.2.1 Test approach 73
5.2.2 Pass / Fail Criteria 74
5.3 Testing Schedule 75
5.4 Trace Ability Matrix 75
5.5 Testing Environment 76
5.6 Test Cases 76
5.6.1 Log In 77
5.6.2 Input field is required in all pages 78
5.6.3 Add vehicle 79
5.6.4 Add insurance 80
5.6.5 Search vehicle 81
5.6.6 Search driver 82
5.6.7 Approve users 83
5.6.8 Assign driver 84
5.6.9 Car cases 85
5.6.10 Demerit points 86
5.6.11 Apply fitness 87
5.6.12 Approve license 88
5.6.13 Approve fitness 89
Chapter 6 90
6.1 Login Page 91
6.2 Registration page 92
6.3 Pending Users 93
6.4 Pending user details 94
6.5 Pending vehicle 95
6.6 Pending vehicle details 96

6.7 Pending driving license.....97
6.8 Pending license details.....98
6.9 Pending fitness.....99
6.10 Pending vehicle details.....100
6.11 Pending renewal list.....101
6.12 Pending renewal details.....102
6.13 Pending vehicle for insurance.....103
6.14 Vehicle details for insurance.....104
6.15 Pending job request for drivers.....105
6.16 Driver view running jobs.....106
6.17 Driver view job history.....107
6.18 Driver see driving license.....108
6.19 Owner add vehicle.....109
6.20 Owner view vehicle.....110
6.21 Owner apply insurance.....111
6.22 Owner view insurance status.....112
6.23 Owner apply fitness.....113
6.24 Owner view fitness.....114
6.25 Owner renew registration.....115
6.26 Owner search driver.....116
6.27 Owner assign driver.....117
6.28 Owner apply for driving license.....118
6.29 Owner view jobs.....119
6.30 User view profile.....120
6.31 Traffic login.....121
6.32 Traffic search vehicle.....122
6.33 Traffic verify vehicle papers.....123
6.34 Traffic apply demerit points to drivers.....124
6.35 Traffic impose case to vehicles.....125
6.36 Traffic view driver.....126
6.37 Traffic view vehicle information.....127

Chapter 7.....128
7.1 GitHub Link.....129
7.2 Project Summary.....129
7.3 Limitations.....129
7.4 Obstacles and Achievements.....129
7.5 Future Scope.....130
7.6 References.....130

List of Figures

Figure 1.1 Proposed System Model----------5

Figure 1.2 Gantt Chart----------8

Figure 3.1 Use Case----------23

Figure 3.2 Add Vehicle Activity----------41

Figure 3.3 View Vehicle Activity----------42

Figure 3.4 Apply Insurance Activity----------43

Figure 3.5 View information Activity----------44

Figure 3.6 Apply Fitness Activity----------45

Figure 3.7 View Vehicle Fitness Activity----------46

Figure 3.8 Renew Registration Activity----------47

Figure 3.9 Search & Hire Driver Activity----------48

Figure 3.10 Driver Assignment Activity----------49

Figure 3.11 User Approval Activity----------49

Figure 3.12 Fitness Approval Activity----------50

Figure 3.13 Traffic View Vehicles Activity----------50

Figure 3.14 Vehicle Add Sequence----------52

Figure 3.15 View Vehicle Sequence----------53

Figure 3.16 Apply Insurance Sequence----------53

Figure 3.17 View Vehicle Insurance Sequence----------54

Figure 3.18 Apply Fitness Sequence----------54

Figure 3.19 View Vehicle Fitness Sequence----------55

Figure 3.20 Renew Registration Sequence----------55

Figure 3.21 Search Driver Sequence----------56

Figure 3.22 Apply Driving License Sequence----------57

Figure 3.23 View Car Cases Sequence----------57

Figure 3.24 View Job History Sequence----------58

Figure 3.25 Approve Car Owner----------58
Figure 3.26 Approve Driver Sequence----------59
Figure 3.27 Traffic Approval Sequence----------59
Figure 3.28 Vehicle Approve Sequence----------60
Figure 3.29 Approve Fitness Sequence----------61
Figure 3.30 Approve Driving License Sequence----------62
Figure 3.31 View Job Request Sequence----------63
Figure 3.32 Apply Driving License Sequence----------63
Figure 3.33 View Car Details Sequence----------64
Figure 3.34 Traffic Search Vehicles Sequence----------65
Figure 4.1 Class Diagram----------69
Figure 4.2 Database Diagram----------70
Figure 6.1 Login Page Interface----------91
Figure 6.2 Registration Page Interface----------92
Figure 6.3 Pending Users Interface----------93
Figure 6.4 Pending User Details Interface----------94
Figure 6.5 Pending Vehicles Interface----------95
Figure 6.6 Pending Vehicle Details Interface----------96
Figure 6.7 Pending Driving License Interface----------97
Figure 6.8 Pending Driving License Details Interface----------98
Figure 6.9 Pending Fitness Interface----------99
Figure 6.10 Pending Vehicle Details Interface----------100
Figure 6.11 Pending Renewal List Interface----------101
Figure 6.12 Pending Renewal Details Page Interface----------102
Figure 6.13 Pending Vehicle for Insurance Interface----------103
Figure 6.14 Vehicle Details for Insurance Interface----------104
Figure 6.15 Pending Job Request for Driver Interface----------105

Figure 6.16 Driver View Running Jobs Interface----------106

Figure 6.17 Driver View Job History Interface----------107

Figure 6.18 Driver See Driving License Condition Interface----------108

Figure 6.19 Owner Add Vehicle Interface----------109

Figure 6.20 Owner View Vehicle Interface----------110

Figure 6.21 Owner Apply Insurance Interface----------111

Figure 6.22 Owner View Insurance Status Interface----------112

Figure 6.23 Owner Apply Fitness Interface----------113

Figure 6.24 Owner View Fitness Status Interface----------114

Figure 6.25 Owner Renew Registration Interface----------115

Figure 6.26 Owner Search Driver Interface----------116

Figure 6.27 Owner Assign Driver Interface----------117

Figure 6.28 Owner Apply Driving License Interface----------118

Figure 6.29 Owner View Jobs Interface----------119

Figure 6.30 User Profile Interface----------120

Figure 6.31 Traffic Login Interface----------121

Figure 6.32 Traffic Search Vehicle Interface----------122

Figure 6.33 Traffic Verify Papers Interface----------123

Figure 6.34 Traffic Apply Demerit Points to Drivers Interface----------124

Figure 6.35 Traffic Impose Case to vehicle Interface----------125

Figure 6.36 Traffic View Vehicle Driver Interface----------126

Figure 6.37 Traffic View Vehicle Information Interface----------127

Chapter 1
Introduction

1.1 Project Overview

Today we have computers with large computing power and almost every business is going to take the advantages of using those technologies. But nowadays digital certifications itself becomes an essential component for every business infrastructure. Because it provides security and it can identify every unique individual. Besides, it also provides confidential communications to the users.

Nowadays paperless communication enables people to access to everything by their unique identity life fingerprints or passwords. It has also successfully reduced the clutters of disorganizations which may arrive from files related to papers. Digital papers reduce the office space that required for business and gives more ability to access to information. Digital collaboration or payment gateway seems to be possible by digitization also.

Smart citizens want safe journey. But at present the total number of vehicles is increasing instantaneously. But the problem arises when it happens that fitness of these vehicles is not appropriate for some reason. Besides, a large number of drivers are driving vehicles without having a proper driving license. Moreover, many vehicle owners are not conscious about making registration due to administrative complication.

Drivers usually not having any driving licenses. If we consider from the perspective of them, then we are able to find that, most of the drivers in our country are under matured. Or they are not matured enough to drive a car. Another reason might be they are not properly literate. Therefore, they do not understand the process for getting driving license or which initiatives need to be taken to get proper registration for driving a car.

Besides drivers, most of the vehicle owners sometimes are not interested enough to register their vehicles in a proper way. It seems to happen mostly for those peoples who are not using cars regularly. They use car rarely and for that reason it is quite tough to track them by traffic police.

For making people's journey safe, traffic police playing a vital role at every moment. They have to work hard all day long for only checking driving license or vehicle registration related papers. It kills a lot of time and efforts for traffic police and passengers as well as drivers.

These are some common scenario across the country. And the reality is that, no one from out of this universe would come to solve our problem. We need to solve our own problem using our own resources as well. And the initiatives should come from us.

For that reason, we are going to make an application based on mobile devices especially for smartphones. By using this mobile application, drivers can be benefited as they would not face any hassles to make driving license. Besides, vehicle owners would be able to make registration related papers within a few days. Most importantly, the approach would be easier than past for traffic police to check driving license or registration papers. And the process would be done within a few seconds.

1.2 Project Purpose

The main purpose of this project named "Smart Citizen, Safe Journey" is to make an automation system which might be helpful for millions of users from different perspective by solving their a few problems. So this is why we are going to develop such a project.

1.2.1 Background

Suddenly we notice that, people from our country is facing a lot of problem at the time of their journey. And there are not any options remaining to escape those problem. Thousands of people are being suffering, but there is not any solution. So considering that, we have brainstormed and thinking that our problem is going to solve their problems.

1.2.2 Benefits & Beneficiaries

Our applications would be beneficial for some point of view. Now, I am mentioning those below:

- Our system helps vehicle owner to make registration easily
- It helps car owner to make insurance for their car more smoothly
- It would be helpful for vehicle owners to find drivers within a few seconds
- It is helpful for car owners to live track of their valuable vehicles
- It is also helpful for car owners to earn more by their vehicles
- It helps B.R.T.A to supply paperless certification within a moment
- This application makes authentication system for B.R.T.A very fast
- Our app helps insurance company to increase their business
- This app helps drivers to find trip easily
- Drivers are permitted to work as a freelancer
- The system also going to reduce unemployment problem
- Traffic police can easily find information of vehicles
- Traffic police can impose case within our application
- They can also provide demerit points to the drivers
- Traffic police can impose fine also
- Drivers are able to find fitness center according to their current location
- One stop fitness centers can invite or offer by using our apps

I have also mentioned some benefits as well as beneficiaries. So, I think this application is very much helpful for users.

1.2.3 Goals

The main goals of this project is to develop an application based on smartphone device. As more than 80% users of smartphones are using Android operating based mobile device according to statista survey report, so we are targeting to implement our system firstly for Android users. Our proposed system has six modules. And as we have limited time and resource, so this is why we will only develop the module named "Traffic Police Module". Because we really believe in quality products.

1.3 Stakeholders

There are six types of stakeholders in our "Traffic Police Module". Such as:

- Traffic Police
- Drivers
- Car owners
- Bangladesh Road & Transport Authority
- Insurance Company
- One stop fitness center

Now, I will write a brief description about stakeholders.

Traffic Police: Traffic police have an different version of this application. They check vehicles one after another to check related papers whether everything is fine or not. If there is no problem then, police give them clearance. But if there happen something wrong, then police are allowed to impose case according to rules. Or they can give demerit points to the drivers.

Drivers: Drivers will also use our application to find trip. But before that they need to be registered by their own identity. And it is to be said that, everything would be verified according to National Identification Number (NID).

Car Owners: Car owner first of all apply for their vehicle registration process through our apps to the BRTA. Then after completing that, they might be able to hire drivers for a specific period of time. This app will also help car owner to know the exact location of their car at any time.

Bangladesh Road & Transport Authority: Bangladesh Road & Transport Authority BRTA would collect data for both vehicles and owners to complete vehicle registration. BRTA also be able to inform them any update through push notification. For these purposes, BRTA need to use our apps.

Insurance Company: After purchasing vehicles, owners need to make insurance. And these insurance related everything will be happening on our apps. By using this app, insurance company would be able to promote their business.

One Stop Fitness Centre: There are many one stop fitness center across the country. And sometimes drivers need to go there for fitness purpose. But most of the time at unknown place drivers don't know where is exactly located the nearest fitness center. They seem to be confused. But using our apps they can easily locate those fitness center. Besides, fitness center has an opportunity to broad their business through application system now.

1.4 Proposed System Model

Before going to develop a system it is very important to have a system model. We have already prepared a system model. This model will clarify our proposed system in brief.

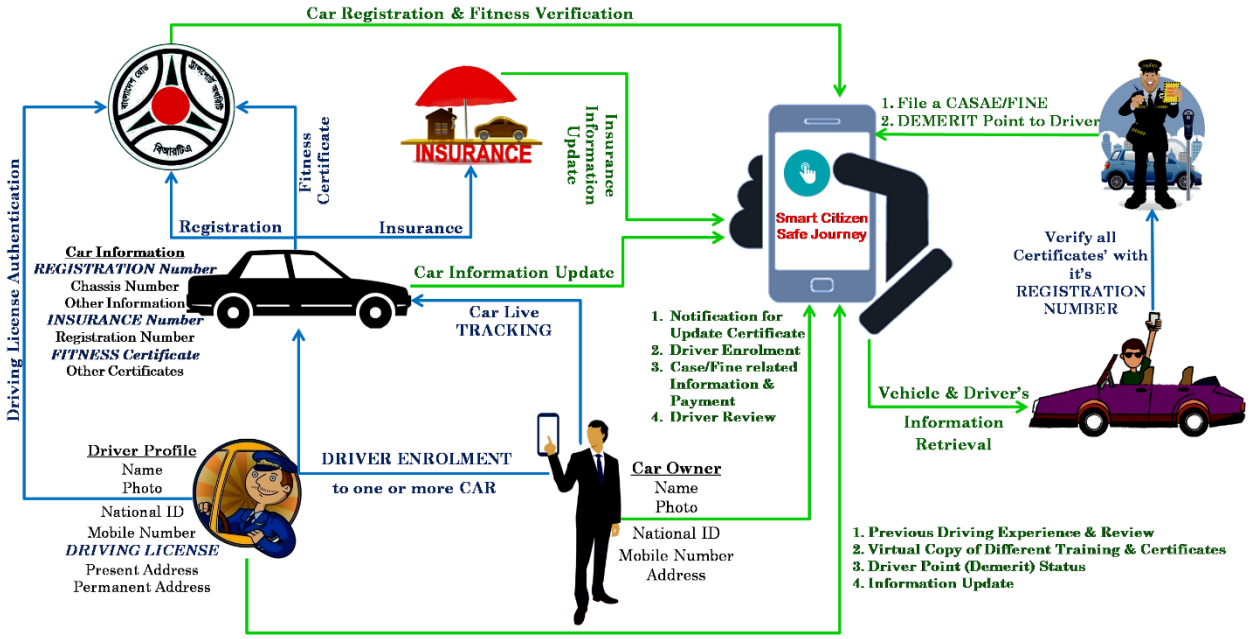

Figure 1.1: Proposed system model

Our project named "Smart Citizen, Safe Journey" is going to be developed based on mobile devices, especially on Android operating system. This application reserve different types of modules as well as user privileges. And each module architecture is different from another one. Before describing project overview, I need to expose about our system module architecture.

Such as:

- Vehicle Owner Module
- Bangladesh Road & Transport Authority (BRTA) module
- Insurance Company Module
- Driver Module
- Traffic Police Module
- One Stop Fitness Center Module

It is to be mentioned that, our mobile based system is consisting of different modules. And based on the user privileges, we are going to release different versions for the betterment of our application user. Now, I am going to give a brief description about those modules below:

Vehicle Owner Module

The main focus point of our application is vehicle owner module. Because the main functionality is related to vehicles. First of all, vehicle owners need to be registered by using our application. For that reason, they need to fill up the registration form, and then submit them for verifying. They may need to provide National Identification Number (NID) along with cell phone number. Then they need to submit their vehicle related all information like engine number, chassis number, engine type, fuel type, engine capacity, fuel capacity etc.

After checking those related information, BRTA would send then results. And vehicle owners would be notified then. Owners are permitted to pay through online banking or mobile banking as per organization's policy.

Another main feature of our application is that, vehicle owners are allowed to find drivers and appoint them for a specific period of time. In addition, owner can add one or more driver (personal/professional) who are permitted to drive that car only. Therefore, car hijacking or stealing can be easily identified.

Vehicle owner module also has an offline version by which they are permitted to save or read any kinds of profile or vehicle related information as well. But if they want to hire driver or eager to know the actual position of their vehicle, then it must require internet connectivity.

Bangladesh Road & Transport Authority Module

Normally, B.R.T.A allows vehicles to give permission or they supply registration related papers to the car owners. Bangladesh Road & Transport Authority B.R.T.A is also responsible to provide training to the drivers and at last provide them driving license as well. But, in this situation, they will be allowed using our application and make those related activities easier than past.

For starting registration process, it is important to submit papers related to vehicle information like vehicle registration number, chassis number, papers related to fitness checking etc. Besides, driver information is need to be submitted. Such as: driver name, address, National Identification Number (NID), driving license etc. Moreover, it is also very important to provide the car owner's information to our application system.

After getting all of those papers, B.R.T.A would verify those papers. And it is to be said that, all information need to be submitted through using our application. If everything sounds fine, then they send an approval to the car owner. But if there happens anything wrong, then BRTA also inform the car owners about that. There is a chance to resubmit papers to BRTA office after making correction. After that, BRTA will also recheck that as well. After checking all related information from user, they would prepare a virtual driving license and then send it through our application to that user.

In case, if any people want to sell or buy any kinds of vehicle, then they need to fill up a form to give proper information. It would also be included to our apps also. After checking those information, a virtual registration paper would be prepared and send it to both of them.

One more vital part is payment gateway system. Payment transaction might be through online banking or mobile banking system. Nowadays both services are available across the country. And all of those activities would be done within a few days. But at present all related process demands a lot of time and energy consumption.

Insurance Company Module

Insurance company provides all insurance related services to the vehicles. They need to keep all records and have all up-to-date data to make this process more efficient. In this system application, all activities related to insurance company would be automated.

It is not important to fix a meeting between insurance company and vehicle owners. Because, in this application, insurance related data have been used. And vehicle owners fill up forms and submit whether they are agreeing with all terms and conditions with insurance company. There they need to give information of cars. And insurance company would check those. If passes, then they would send a digital agreement paper to the vehicle owners. Insurance Company actually use the vehicles registration number to operate all operations.

Driver Module

Every driver has a profile in our apps. But before that, they need to be registered with their National Identification Number (NID). In their profile, there would be merits or demerit points as well. And that would be visible to the vehicle owners and traffic polices. According to that rating, they would be evaluated also. Previous experience, review or additional training related information can be found to their profile also.

Traffic Police Module

Traffic police have an important role in this system. They need to check information, driving license and many more to make our life easier. We have also developed a part for traffic system. Generally, traffic police are to be assigned to a specific area. And they need to check vehicle's registration or driving licenses as well. For that reason, it is very essential to have proper internet connection. But sometimes internet connection may not be available. It's a great problem.

To solve this problem, we have already planned to make an offline version for traffic police. In that offline version, there will be stored data for a specific area where the traffic police are to be assigned. It helps them in such a way that, traffic police would be able to check all related papers whether not having internet connectivity. Besides checking the related papers of any vehicles, they can be able to give merits or demerit points to the drivers at any time by using our application. All data will be synchronized while connecting to the internet. For doing this process successful, we will use batch processing to sync data with the cloud server. It allows smartphone to work through queue. And it doesn't need any manual intervention. But if they want to use our application and internet connection is not a big deal, they it directly stores data to the cloud server. Besides it also stores important data to the local storage of the smartphone.

One Stop Fitness Center Module:

Fitness center checks or examines the vehicle fitness and offers them related service. After that they make certifications which would be sending to the drivers. This application has a part for those fitness centers also. We have all information about one stop fitness center throughout the country. And that information would be visible by every vehicle owners and drivers to make their life easier.

In any emergency, they along with their vehicles can visit to the one stop car fitness center. One stop fitness centers also use our mobile based application platform. They receive damaged cars, check those cars and at last car owners would be notified about their car health within moments. Moreover, those one stops fitness centers would give them certificate related to car fitness. Processes are seeming to be easier to the at present.

1.5 Project Schedule

We need to prepare a scheduling plan to complete the project on time. It also refers to make communication with what task need to get done within timeframe.

1.5.1 Gantt Chart

Gantt chart is mainly a production control tools. It remained us to complete our assigned tasks within a certain period of time. For developing software, it is mostly used. Now I will show a Gantt chart for our project.

Activities		W 1	W 2	W 3	W 4	W 5	W 6	W 7	W 8	W 9	W 10	W 11	W 12	W 13	W 14	W 15	W 16
Planning	Ideas																
	Problem definition																
	Proposal planning																
Requirements	Requirement specification																
	Requirement analysis																
QA – 1	Quality assurance																
System design	Sketching																
	Design specification																
	Database design																
Implementation-1	Searching vehicles																
QA – 2	Test cases																
Implementation-2	Impose case & demerits																
Testing	Unit testing																
	Blackbox testing																
Delivery	Software release																
Scheduled time																	
Buffered time																	

Figure 1.2: Gantt Chart

1.5.2 Release Plan

The release plan or milestones are given below:

Activities	Duration in week	Total week
Brainstorming	Week 1	1
Problem identification	Week 1, Week 2	2
Requirement specification	Week 2	1
Requirement analysis	Week 2	1
Sketching	Week 4	1
Design specification	Week 4	1
Database design	Week 5	1
Vehicle search	Week 5, Week 6, Week 7, Week 8	4
Quality assurance	Week 3,	1
Test case	Week 3, Week 7, Week 8, Week 9	4
Impose case & demerits	Week 10, Week 11, Week 12, Week 13	4
Unit testing	Week 11, Week 12	2
Black-box testing	Week 13, Week 14, Week 15	3
Software release	Week 16	1

Figure: Release plan

Chapter 2
Software Requirement Specification

2.1 Functional Requirements

Functional requirements refer to the functions which are mandatory to the system. Functional requirements must be able to perform on the software system. Every system must have some functional requirements. Now, we are going to mention functional requirements associating with our project.

2.1.1 Traffic police search for vehicles

Requirements 1	**Traffic police search for vehicles**
Description	After arriving a car, traffic police may need to check or verify whether everything is okay or not. For that reason, police stop the car and ask driver for related papers. But in our apps this verification can be done by using a search option. Traffic police need to search car by registration number which is unique. Now, no need to check manually.
Stakeholders	Traffic police

2.1.2 Traffic police see vehicle details

Requirements 2	**Traffic police see vehicle details**
Description	After searching through registration number, everything related to that vehicle will be visible to the police. And police can be able to know the condition of that vehicle also.
Stakeholders	Traffic police

2.1.3 Traffic police see the driver details

Requirements 3	**Traffic police see the driver details**
Description	When police search for a vehicle, then they will be able to see the driver profile assigned to that vehicle. And then police will see the driver's driving history, previous employment, driving license clearance, demerit points etc.
Stakeholders	Traffic police

2.1.4 Traffic police are permitted to impose case

Requirements 4	**Traffic police are permitted to impose case**
Description	If something happens wrong, then traffic police can be able to impose case to the vehicle.
Stakeholders	Traffic police, Drivers

2.1.5 Traffic police can give demerit points

Requirements 5	Traffic police can give demerit points
Description	If any violence occurs by the driver, then traffic police can give them demerit points also.
Stakeholders	Traffic police

2.1.6 Traffic update own profile

Requirements 6	Traffic update own profile
Description	Traffic police might be transferred to another area. Or they need to update their profile. For updating own profile, they need to log in to the system.
Stakeholders	Traffic police

2.1.7 Data retrieve from cloud server

Requirements 7	Data retrieve from cloud server
Description	Data must be retrieved from server as the whole system will be dynamic. It is also to be said that, all operational functionality will be occurred on server also.
Stakeholders	Traffic police

2.1.8 Owner add vehicle

Requirements 8	Owner add vehicle
Description	Car owner need to add his/her car information to our application so that BRTA would be able to approve that vehicle.
Stakeholders	Car owner

2.1.9 Owner add insurance

Requirements 9	Owner add insurance
Description	Car owner need to make agreement with insurance company for their valuable vehicles. For that reason they would be able apply for insurance through our application.
Stakeholders	Car owner

2.1.10 Owner apply fitness

Requirements 10	Owner apply fitness
Description	Car owner need to apply for fitness to get fitness approval from BRTA
Stakeholders	Car owner

2.1.11 Owner search driver

Requirements 11	Owner search driver
Description	Car owner need to search driver so that they would be able to assign driver for a certain period of time for their vehicles. Owner need to search driver by their registration number and then they send a hire request to that driver.
Stakeholders	Car owner

2.1.12 Owner view car cases

Requirements 12	Owner view car cases
Description	Car owner also be able to see the cases of their own vehicles. And after completing the payment of cases they mark that cases as solved.
Stakeholders	Car owner

2.1.13 BRTA approve users

Requirements 13	BRTA approve users
Description	We have different user privileges like driver, car owner, traffic. And every user will be approved by BRTA.
Stakeholders	Car owner, traffic, driver.

2.1.14 BRTA approve vehicle

Requirements 14	BRTA approve vehicle
Description	After getting pending request of vehicle, BRTA need to approve those vehicles. But before that, they need to match data of vehicles with their existing database.
Stakeholders	BRTA, Car owner

2.1.15 BRTA approve fitness

Requirements 15	BRTA approve fitness
Description	BRTA is responsible to provide fitness to every vehicle. But before that BRTA need to have pending fitness request also.
Stakeholders	BRTA, Car owner

2.1.16 BRTA approve driving license

Requirements 16	Owner approve driving license
Description	Drivers will request for their driving license. And after that BRTA would verify their skills. At last BRTA provide them driving license.
Stakeholders	BRTA, Diver

2.2 Data Requirements

For defining data requirements, we need to build the model. For our application maximum data would be loaded from remote user. And for that purpose we need to focus on some major points. Such as:

- Types of entity of the system
- Route data locations
- Capacity and resources of the data requirements
- Data source sequence
- Data availability schedules
- Quantity of data
- Availability of data

2.3 Performance Requirements

It is very important to maintain performance of any software system. To ensure performance, we need to maintain some steps. Now, I will explain some perspective by which we are going to enhance the performance of our project.

2.3.1 Speed & Latency Requirements

Speed and latency requirements must be ensured while retrieving data from the cloud server.

SLR-1	Search result must be faster.
Description	When traffic police search for a vehicle, then the search result must show within seconds.
Stakeholders	Traffic police

2.3.2 Precision & Accuracy Requirements

Results that is to be shown to the end user is need to be accurate. Because, wrong information might be ruined the whole business process.

PAR-1	Search result must be accurate
Description	When traffic police search for a vehicle, then the search result must be according to the input value given by traffic police.
Stakeholders	Traffic police

2.3.3 Capacity Requirements

The developed system by us must be capable to handle user data, provide accurate information, handling database, manage http request etc.

CR-1	The system will handle thousands of data.
Description	The system need to handle data thousands of data every moment.
Stakeholders	Traffic police

2.4 Dependability Requirements

The term dependability is measured based on four dimensions. Such as:

- Availability
- Reliability
- Safety
- Security

If we want to say that our application system is dependable then it must fulfill the four dimensions. But there are other tasks. Like there is no way to make mistakes or our system should have the ability to detect and then remove errors. Besides that, it is also very important to limit the damage which might be caused by system failure.

2.4.1 Reliability & Availability Requirements

Now, I will mention requirements which is related to reliability and availability.

RAR-1	The system must be available on 24 X 7
Description	• Our system must be available all day long, every day in a week • The system must be updated regularly • System must be malware free
Stakeholders	Traffic police

2.4.2 Robustness or Fault-Tolerance Requirements

To ensure robustness and fault-tolerance facilities to the end users, it is urgent to ensure 0% crush. Moreover, it must show accurate results.

RFT-1	The system handles all user access without system errors
Description	Thousands of user might hit our application system at a time. All their requests must be handled without any fault.
Stakeholders	N/A

2.4.3 Safety-Critical Requirements

There are no safety-critical requirements in our project.

2.5 Maintainability & Supportability Requirements

It is very important to provide after service or support to the end users.

2.5.1 Maintainability Requirements

MR-1	**System helps to update user profile**
Description	It is very important to update user profile.
Stakeholders	Traffic police

2.5.2 Supportability Requirements

Supportability requirements may have related to some extends. Like:

- Testability
- Extensibility
- Adaptability
- Maintainability
- Compatibility
- Configurability
- Serviceability
- Install ability

Our application meets all of the above requirements related to supportability.

2.5.3 Adaptability Requirements

There are no adaptability requirements in our system software.

2.6 Security Requirements

Making software security as a requirement is very important. Software security requirements should be its functional requirement. Software security enforces security of an application system. Functionality related to software security can either be directly tested or observed. Some security related requirements is given below:

- Signing in a traffic police
- Get access according to logged in user
- Set points to the drivers without having any issue
- Signing out as a traffic police
- Handling encrypted passwords

While accessing to the system, each and every module must provide a central authentication mechanism. There is also a process to prevent entering into the system by ensuring hashed password for the unauthenticated users.

2.6.1 Access Requirements

For accessing to our application system, there remains some authentication and authorization techniques. And every module of our system will provide it. Now I will provide an explanation below.

AR-1	**Application provides security mechanism.**
Description	Every module is designed in such a way that it only give access to the authorized and authenticated users.
Stakeholders	Traffic police, Drivers.

2.6.2 Integrity Requirements

Integrity requirements refers to a security system which ensures an expectation of data quality. It also ensures that all data of the system would never be exposed to the malicious modification or accidental destruction. For that reason, we will store our user passwords as encrypted format which is impossible to decrypt. It is also called hashed password.

2.6.3 Privacy Requirements

It is very important to ensure privacy of the system users. Privacy requirements enhances to protect stakeholder's privacy. In this way, all data or a partial part of data are going to be disclosed according to system's privacy policy. To ensure privacy, the central database should be protected by the anonymous. Users are permitted to get access to those data which are being associated by them which can be ensured by the user log in system.

2.7 Usability and Human-Interaction Requirements

The main target of developing any system is to make the system user friendly and easy to usable for the end users.

2.7.1 Ease of Use Requirements

Our application is easy to use and also easily understandable.

EUR-1	**Application must be usable for the end users.**
Description	This apps is enough usable to the traffic police by which they can operate this system easily.
Stakeholders	Traffic police, Drivers

2.7.2 Personalization and Internationalization Requirements

There are not any personalization and internationalization requirements to our system. This maiden version of our application is only be operated by Bangladesh.

2.7.3 Understandability and Politeness Requirements

It is already said that the application which we are going to develop, is understandable enough. The system provides hints to users whether any error occurred or wrong. By reading those errors users can be able to operate the system easily.

2.7.4 Accessibility Requirements

There are no specific accessibility requirements associated to our system yet.

2.7.5 User Documentation Requirements

Documentation are mainly two types. One is internal documentation which is generally written by the application engineers. It is prepared to make development life cycle easier for the system engineers or system analysts.

UDR-1	**The system engineer documentation.**
Description	To develop our application named smart citizen, safe journey, firstly we have make a system analysis team as well as documentation team.
Stakeholders	System analysts or software developers.

2.7.6 Training Requirements

Training requirements involved in after service of any application. It is very necessary to properly train up end users to the system so that they would be capable to operate easily. After launching the full package to the market, firstly we provide training to the different end users like traffic police, drivers, vehicle owners, insurance company, Bangladesh Road & Transport Authority, one stop service centers.

2.8 Look and Feel Requirements

Look and feel requirements mainly refers how the system will look like and how the user interface or graphical user interface of our system will display to the user.

2.8.1 Appearance Requirements

Traffic police and all other user must know which input fields are required and which are not. For that reason, we will use labels for all input fields. Input fields might be text type, radio, checkbox, spinner etc.

AR-1	Labels of mandatory fields must be bold.
Description	The mandatory field's label must be bold and all input fields must have placeholder to make it easier for the users.
Stakeholders	Traffic police and Any other end users.

2.8.2 Style Requirements

After keeping all contents, it is very essential to load stylesheet to the application. For mobile application like android system, extensive markup language or xml is used. It is to be said that we are going to develop our system at android platform. Style makes the system lucrative.

SR-1	The appearance must be controllable using stylesheet file.
Description	For android application stylesheet files are xml. So, all stylesheet must be controllable by the xml file.
Stakeholders	Software developer.

2.9 Operational and Environmental Requirements

Operational and environmental requirement refers to the capabilities, performance measurements, process, measurements of effectiveness, measurements of performance, measures of sustainability, measurements of technical performances etc.

2.9.1 Expected Physical Requirements

There are no expected physical requirements in our system.

2.9.2 Requirements for Interfacing with Adjacent Systems

There are no requirements for interfacing with adjacent system for our project.

2.9.3 Release Requirements

There are no specific release requirements in our system.

2.10 Legal Requirements

Legal requirements normally refer to the terms and conditions or privacy policy of any organizations. The terms and condition of our application is that, no third party software or person are allowed to engage to use our data for their business purpose.

2.10.1 Compliance Requirements

There are no specific compliance requirements for our system.

2.10.2 Standards Requirements

There are no specific standards requirements for our system.

Chapter 3
Requirement Analysis

3.1 Use Case Diagram

We have use case diagram. And there are five actors. Each actor plays different role. And those are already indicated to this use case diagram. This diagram will clarify our system in brief.

Figure 3.1: Use Case diagram for “Smart Citizen, Safe Journey”

3.1.1 Owner Add Vehicle

Use Case Title	**Owner Add Vehicle**
Goal	Owner save vehicle data to the platform
Preconditions	• User must be authenticated. • User type must be car owner
Success End Condition	Car owner successfully insert vehicle related data.
Failure End Condition	Car owner cannot be able to save data
Primary Actors: **Secondary Actors:**	Vehicle owner Bangladesh Road & Transport Authority (BRTA)
Trigger	Vehicle data visible to BRTA
Description / Main Success Scenario	Owner will add his own vehicle to our platform for registration approval to BRTA
Alternative Flows	N/A
Quality Requirements	N/A

3.1.2 Owner View Vehicles

Use Case Title	**Owner View Vehicles**
Goal	Vehicle owner view his own vehicle list
Preconditions	• User must be authenticated. • User type must be car owner
Success End Condition	Car owner can see his own vehicle information
Failure End Condition	Car owner cannot be able to see his vehicles
Primary Actors: **Secondary Actors:**	Car owner
Trigger	Data come to the car owner
Description / Main Success Scenario	Car data will be visible to the car owner after providing related information properly
Alternative Flows	N/A
Quality Requirements	N/A

3.1.3 Owner Apply Insurance

Use Case Title	**Owner Apply Insurance**
Goal	Car owner apply to the insurance company for his different car
Preconditions	• User must be authenticated. • User type must be car owner. • Car owner need to provide car and amount. • Vehicle must need to be registered.
Success End Condition	Car owner will be able to apply for his car to insurance company
Failure End Condition	Car owner cannot be able to apply for insurance
Primary Actors: **Secondary Actors:**	Car Owner Insurance company
Trigger	
Description / Main Success Scenario	Vehicle owner apply for insurance for their individual car to the insurance company with proper information. Like car registration number, amount.
Alternative Flows	N/A
Quality Requirements	N/A

3.1.4 Owner View Vehicle Insurance

Use Case Title	**Owner View Vehicle Insurance**
Goal	Insurance related data come to the owner
Preconditions	• Vehicle must be registered. • User must apply for insurance.
Success End Condition	Car owner can see vehicle insurance confirmation
Failure End Condition	Car owner cannot see vehicle insurance related data
Primary Actors: **Secondary Actors:**	Car owner
Trigger	Vehicle insurance data visible to the owner
Description / Main Success Scenario	Car owner can be able to view their vehicle insurance through our application.
Alternative Flows	N/A
Quality Requirements	N/A

3.1.5 Owner Apply Fitness

Use Case Title	**Owner Apply Fitness**
Goal	Car owner apply for his vehicle's fitness to BRTA
Preconditions	• Owner must be authenticated. • Owner must provide proper information. • User must be car owner. • Vehicle must be registered.
Success End Condition	Owner can successfully apply for insurance
Failure End Condition	Owner cannot apply for insurance
Primary Actors: **Secondary Actors:**	Vehicle Owners Bangladesh Road & Transport Authority
Trigger	Vehicle related data come to BRTA for fitness
Description / Main Success Scenario	Vehicle owner must provide required information to the application and It will be submitted to BRTA for fitness checking.
Alternative Flows	N/A
Quality Requirements	N/A

3.1.6 Owner View Vehicle Fitness

Use Case Title	**Owner View Vehicle Fitness**
Goal	Car owner see the vehicle fitness
Preconditions	• User must be authenticated. • User type must be car owner. • Owner must have registered vehicles
Success End Condition	Vehicle owner see the fitness related data
Failure End Condition	Vehicle owner cannot see data properly
Primary Actors: **Secondary Actors:**	Car owner
Trigger	Fitness related come to the car owner
Description / Main Success Scenario	Vehicle owner will be able to check all of his vehicle's fitness related information from our application.
Alternative Flows	N/A
Quality Requirements	N/A

3.1.7 Owner Renew Registration

Use Case Title	Owner Renew Registration
Goal	Car owner can be able to apply for registration renewal for his cars
Preconditions	• User must be authenticated. • User type must be car owner. • User must have registered cars.
Success End Condition	Car owner can apply for his car's registration renewal properly.
Failure End Condition	Car owner cannot be able to apply for his vehicle's registration.
Primary Actors: **Secondary Actors:**	Car owner. Bangladesh Road & Transport Authority
Trigger	Related data come to BRTA for approval
Description / Main Success Scenario	Car owner apply to BRTA for renew registration of his cars.
Alternative Flows	N/A
Quality Requirements	N/A

3.1.8 Owner Search Driver

Use Case Title	Owner Search Driver
Goal	Car owner search driver for his cars
Preconditions	• User must be authenticated. • User type must be car owner. • User must have registered cars.
Success End Condition	Car owner find drivers according to his need
Failure End Condition	Driver data not visible to the car owner
Primary Actors: **Secondary Actors:**	Car owner
Trigger	Driver data is shown to the car owner
Description / Main Success Scenario	Vehicle owner search driver by using his/her registration number. And data will be visible to the application.
Alternative Flows	N/A
Quality Requirements	N/A

3.1.9 Owner Assign Driver

Use Case Title	**Owner Assign Driver**
Goal	Car owner assign driver for his car
Preconditions	• User must be authenticated. • User type must be car owner. • User must have registered cars. • Owner must hire drivers.
Success End Condition	Owner can assign driver for his car
Failure End Condition	Owner cannot be able to assign driver
Primary Actors: **Secondary Actors:**	Car owner Driver
Trigger	Car owner assign driver to his car
Description / Main Success Scenario	Car owner can be able to assign driver from the list of his drivers those were hired already.
Alternative Flows	N/A
Quality Requirements	N/A

3.1.10 Owner Apply Driving License

Use Case Title	**Owner Apply Driving License**
Goal	Car owner apply for driving license
Preconditions	User must be authenticated. User type must be car owner.
Success End Condition	Owner apply for driving license
Failure End Condition	Owner cannot apply for his driving license
Primary Actors: **Secondary Actors:**	Vehicle owner
Trigger	Application data come to BRTA
Description / Main Success Scenario	Car owner need to apply for his own driving license to BRTA
Alternative Flows	N/A
Quality Requirements	N/A

3.1.11 Owner View Car Cases

Use Case Title	**Owner View Car Cases**
Goal	Car owner see his car cases
Preconditions	• User must be authenticated. • User type must be car owner. • Owner must have registered cars. • Car must have cases.
Success End Condition	Car owner see car cases.
Failure End Condition	Car owner cannot be able to see car cases.
Primary Actors: **Secondary Actors:**	Car Owner
Trigger	Car case related data come to the car owner
Description / Main Success Scenario	Car owner see the cases for every car. And case types also be visible to the car owner.
Alternative Flows	N/A
Quality Requirements	N/A

3.1.12 Owner View Jobs

Use Case Title	**Owner View Jobs**
Goal	Car owner view job history
Preconditions	• User must be authenticated. • User type must be car owner. • Owner must have registered cars. • Owner must have minimum a single job.
Success End Condition	Car owner see the job history and running jobs.
Failure End Condition	Jobs related data is not visible to the car owner
Primary Actors: **Secondary Actors:**	Car Owner
Trigger	Jobs data come to the car owner profile
Description / Main Success Scenario	Car owner will be able to view the running jobs and the job history by signing to our application.
Alternative Flows	N/A
Quality Requirements	N/A

3.1.13 BRTA Approve Car Owner

Use Case Title	**BRTA Approve Car Owner**
Goal	BRTA approve pending car owners
Preconditions	• User must be registered as car owner. • User must be authenticated as car owner.
Success End Condition	Car owner get the access of our system as given.
Failure End Condition	Car owner cannot get access to the whole system
Primary Actors: **Secondary Actors:**	Bangladesh Road & Transport Authority Car Owner
Trigger	Car owner approved successfully
Description / Main Success Scenario	BRTA approve car owner after verifying that user properly. After that car owner will be able to use our application properly.
Alternative Flows	N/A
Quality Requirements	N/A

3.1.14 BRTA Approve Driver

Use Case Title	**BRTA Approve Driver**
Goal	BRTA approve pending drivers
Preconditions	• User must be registered as Driver. • User must be authenticated as driver.
Success End Condition	Drivers get the access of our system as given.
Failure End Condition	Driver cannot get access to the whole system
Primary Actors: **Secondary Actors:**	Bangladesh Road & Transport Authority Driver
Trigger	Driver approved successfully
Description / Main Success Scenario	BRTA approve drivers after verifying that user properly. After that they will be able to use our application properly.
Alternative Flows	N/A
Quality Requirements	N/A

3.1.15 BRTA Approve Traffic

Use Case Title	**BRTA Approve Traffic**
Goal	BRTA approve pending traffics
Preconditions	• User must be registered as traffic • User must be authenticated as traffic
Success End Condition	Traffics get the access of our system as given.
Failure End Condition	Traffic cannot get access to the whole system
Primary Actors: **Secondary Actors:**	Bangladesh Road & Transport Authority Traffic
Trigger	Traffic approved successfully
Description / Main Success Scenario	BRTA approve traffics after verifying that user properly. After that they will be able to use our application properly.
Alternative Flows	N/A
Quality Requirements	N/A

3.1.16 BRTA Approve Vehicles

Use Case Title	**BRTA Approve Vehicles**
Goal	BRTA approve pending vehicles
Preconditions	• User must be authenticated. • User type must be BRTA • Owner must apply for approve vehicle
Success End Condition	BRTA approve vehicles
Failure End Condition	BRTA not approve vehicles
Primary Actors: **Secondary Actors:**	Bangladesh Road & Transport Authority Car owner
Trigger	Vehicle data approved of the car owner
Description / Main Success Scenario	After getting the vehicle data, BRTA first match data to their given database. Then BRTA approve those vehicles.
Alternative Flows	N/A
Quality Requirements	N/A

3.1.17 BRTA Approve Fitness

Use Case Title	**BRTA Approve Fitness**
Goal	BRTA approve pending fitness applications
Preconditions	• User must be authenticated. • User type must be BRTA. • Owner must apply for fitness.
Success End Condition	BRTA approve vehicle fitness.
Failure End Condition	BRTA not approve vehicle fitness.
Primary Actors: **Secondary Actors:**	Bangladesh Road & Transport Authority. Car Owner
Trigger	Approval information come to owner profile
Description / Main Success Scenario	BRTA approve vehicle fitness after getting the fitness request through our application. But before that BRTA must verify vehicle fitness physically and related information that is provided by the owner.
Alternative Flows	N/A
Quality Requirements	N/A

3.1.18 BRTA Approve Driving License

Use Case Title	**BRTA Approve Driving License**
Goal	BRTA approve pending driving license applications
Preconditions	• User must be authenticated. • User type must be BRTA. • Owner or driver must apply for driving license.
Success End Condition	BRTA approve driving license.
Failure End Condition	BRTA not approve driving license.
Primary Actors: **Secondary Actors:**	Bangladesh Road & Transport Authority. Car Owner or Driver
Trigger	Approval information come to driver's profile
Description / Main Success Scenario	BRTA approve driving license after getting the request through our application.
Alternative Flows	N/A
Quality Requirements	N/A

3.1.19 BRTA Update Vehicle Registration

Use Case Title	**BRTA Update Vehicle Registration**
Goal	BRTA update pending registration applications
Preconditions	• User must be authenticated. • User type must be BRTA. • Owner must apply for car registration.
Success End Condition	BRTA approve vehicle registration.
Failure End Condition	BRTA not approve registration.
Primary Actors: **Secondary Actors:**	Bangladesh Road & Transport Authority. Car Owner
Trigger	Approval information come to owner's profile
Description / Main Success Scenario	BRTA update vehicle registration after getting the request through our application.
Alternative Flows	N/A
Quality Requirements	N/A

3.1.20 Driver View Job Request

Use Case Title	**Driver View Job Request**
Goal	Driver can see the pending job request by signing in to our application.
Preconditions	• User must be authenticated. • User type must be driver. • User must have driving license.
Success End Condition	Driver see the job request on his profile.
Failure End Condition	Job request not visible to driver's profile.
Primary Actors: **Secondary Actors:**	Driver Car Owner
Trigger	Confirmation goes to car owner
Description / Main Success Scenario	After giving the hire request from car owner to driver, driver will be able to view those request.
Alternative Flows	N/A
Quality Requirements	N/A

3.1.21 Driver Approve Job Request

Use Case Title	**Driver Approve Job Request**
Goal	Driver approve his/her job request from the pending job list.
Preconditions	• User must be authenticated. • User type must be driver. • Owner need to request for hire him.
Success End Condition	Driver is hired by the car owner.
Failure End Condition	Driver is not hired by that car owner.
Primary Actors: **Secondary Actors:**	Driver Car owner
Trigger	Pending data come to the driver's profile
Description / Main Success Scenario	Driver may approve his/her job request as their wish from that list which are pending.
Alternative Flows	N/A
Quality Requirements	N/A

3.1.22 Driver Reject Job Request

Use Case Title	**Driver Reject Job Request**
Goal	Driver reject his/her job request from the pending job list.
Preconditions	• User must be authenticated. • User type must be driver. • Owner need to request for hire him.
Success End Condition	Driver rejected the hire request from the car owner.
Failure End Condition	Driver not reject the hire request.
Primary Actors: **Secondary Actors:**	Driver Car owner
Trigger	Pending data come to the driver's profile
Description / Main Success Scenario	Driver may reject his/her job request as their situation from that list which is pending.
Alternative Flows	N/A
Quality Requirements	N/A

3.1.23 Driver Comment with Owner

Use Case Title	Driver Comment with Owner
Goal	Driver can be able to ask any query to the driver related to agreement.
Preconditions	• User must be authenticated. • User type must be driver. • Owner need to send request for hire him.
Success End Condition	Driver can make any comment with the car owner.
Failure End Condition	Driver cannot be able to comment with owner.
Primary Actors: **Secondary Actors:**	Driver Car owner
Trigger	Comment data will be visible from the owner's profile.
Description / Main Success Scenario	Driver may need to ask any query for the agreement. And so this is why driver will have an option to comment with car owner.
Alternative Flows	N/A
Quality Requirements	N/A

3.1.24 Driver View Running Job

Use Case Title	Driver View Running Jobs
Goal	Driver will be able to see the jobs that are running then.
Preconditions	• User must be authenticated. • User type must be driver. • Driver must have minimum a single running job.
Success End Condition	Driver can see the running job list.
Failure End Condition	Driver cannot be able to see the running job list.
Primary Actors: **Secondary Actors:**	Driver Car Owner
Trigger	Running job list come to the driver's profile.
Description / Main Success Scenario	Driver sometimes need to check the current jobs. So that's why there is an option to check running jobs from driver's profile.
Alternative Flows	N/A
Quality Requirements	N/A

3.1.25 Driver View Job History

Use Case Title	Driver View Job History
Goal	Driver will be able to see the jobs that were already completed.
Preconditions	• User must be authenticated. • User type must be driver. • Driver must have minimum a single completed job.
Success End Condition	Driver can see the completed job list.
Failure End Condition	Driver cannot be able to see the history.
Primary Actors: **Secondary Actors:**	Driver Car Owner
Trigger	Job history come to the driver's profile.
Description / Main Success Scenario	Driver sometimes need to check the history. So that's why there is an option to check that.
Alternative Flows	N/A
Quality Requirements	N/A

3.1.26 Driver Apply Driving License

Use Case Title	Driver Apply Driving License
Goal	Driver will be able to apply for his own driving license.
Preconditions	• User must be authenticated. • User type must be driver.
Success End Condition	Driver will be able to apply for driving license with proper information.
Failure End Condition	Driver will not be able to apply for a driving license.
Primary Actors: **Secondary Actors:**	Driver
Trigger	Application will be visible to BRTA
Description / Main Success Scenario	Driver need to have a driving license for his own. So this is why he will apply for that through our application. Or he/she is able to check his driving license validity.
Alternative Flows	N/A
Quality Requirements	N/A

3.1.27 Insurance View Car details

Use Case Title	Insurance View Car details
Goal	Insurance company will be able to view the pending car information that are applied for making insurance for their vehicle.
Preconditions	• User must be authenticated. • User type must be insurance company. • Car owner must apply for insurance company for their vehicle.
Success End Condition	Insurance company see the pending car list.
Failure End Condition	Insurance company not see the car list.
Primary Actors: **Secondary Actors:**	Insurance company Driver
Trigger	Car owner will be able to view that data.
Description / Main Success Scenario	Insurance company need to see the pending vehicle list. After seeing that insurance company check the information.
Alternative Flows	N/A
Quality Requirements	N/A

3.1.28 Insurance Approve Vehicle Insurance

Use Case Title	Insurance Approve Vehicle Insurance
Goal	Insurance company approve the vehicle insurance after verifying all of vehicle's data.
Preconditions	• User must be authenticated. • User type must be insurance company. • Owner must apply for vehicle insurance. • Minimum a single car must have at pending condition.
Success End Condition	Insurance company approve the vehicle insurance.
Failure End Condition	Insurance company not approve insurance.
Primary Actors: **Secondary Actors:**	Insurance company Vehicle owner
Trigger	Data come to the vehicle owner's profile.
Description / Main Success Scenario	After apply for insurance from the car owner, insurance company will approve those after validating data.
Alternative Flows	N/A
Quality Requirements	N/A

3.1.29 Traffic Search Vehicle

Use Case Title	Traffic Search Vehicle
Goal	Traffic find the search result according to his keyword.
Preconditions	• User must be authenticated. • User type must be traffic. • Driving license must be exists.
Success End Condition	Traffic find the vehicle information.
Failure End Condition	Traffic not find the vehicle related data.
Primary Actors: **Secondary Actors:**	Traffic
Trigger	Data comes to the traffic police application.
Description / Main Success Scenario	Traffic search the vehicles according to their registration number and see the information.
Alternative Flows	N/A
Quality Requirements	N/A

3.1.30 Traffic Check Paper's Authentication

Use Case Title	Traffic Check Paper's Authentication
Goal	Traffic find the search result and check whether related papers are valid or not.
Preconditions	• User must be authenticated. • User type must be traffic.
Success End Condition	Traffic verify vehicle information.
Failure End Condition	Traffic not verify vehicle related data.
Primary Actors: **Secondary Actors:**	Traffic
Trigger	Data comes to the traffic police application from server.
Description / Main Success Scenario	Traffic search the vehicles according to their registration number and verify those information.
Alternative Flows	N/A
Quality Requirements	N/A

3.1.31 Traffic Impose Case

Use Case Title	Traffic Impose Case
Goal	Traffic police can be able to impose case to the vehicles for any kind of rules violation.
Preconditions	• User must be authenticated. • User type must be traffic.
Success End Condition	Traffic impose case to the car.
Failure End Condition	Traffic not impose case to the vehicle.
Primary Actors: **Secondary Actors:**	Traffic
Trigger	Data comes to the car owner profile.
Description / Main Success Scenario	Traffic police impose case to those vehicles that violate traffic rules & regulations.
Alternative Flows	N/A
Quality Requirements	N/A

3.1.32 Traffic View Vehicle Details

Use Case Title	Traffic View Vehicle Details
Goal	Traffic view vehicle details after searching a car.
Preconditions	• User must be authenticated. • User type must be traffic.
Success End Condition	Traffic see vehicle information.
Failure End Condition	Traffic cannot see vehicle related data.
Primary Actors: **Secondary Actors:**	Traffic
Trigger	Data comes to the traffic police application from server.
Description / Main Success Scenario	Traffic search the vehicles according to their registration number.
Alternative Flows	N/A
Quality Requirements	N/A

3.1.33 Traffic View Driver Details

Use Case Title	Traffic View Driver Details
Goal	Traffic view vehicle details after searching a car.
Preconditions	• User must be authenticated. • User type must be traffic.
Success End Condition	Traffic see driver's information.
Failure End Condition	Traffic cannot see driver related data.
Primary Actors: **Secondary Actors:**	Traffic
Trigger	Data comes to the traffic police application from server.
Description / Main Success Scenario	Traffic search the vehicles and see the driver list of the car.
Alternative Flows	N/A
Quality Requirements	N/A

3.1.34 Traffic Give Demerit Points

Use Case Title	Traffic Give Demerit Points
Goal	Traffic give demerit points to the drivers.
Preconditions	• User must be authenticated. • User type must be traffic.
Success End Condition	Traffic give demerit points to the drivers.
Failure End Condition	Traffic cannot apply demerit points to the drivers.
Primary Actors: **Secondary Actors:**	Traffic
Trigger	Related data send to the server
Description / Main Success Scenario	Traffic apply demerit points to the drivers, if and only if they violate any rules. This point range from 1 to 10
Alternative Flows	N/A
Quality Requirements	N/A

3.2 Activity Diagram

We have prepared some activity diagram according to our use case. These activity diagrams are properly referring the flow of the individual conditions of our project.

3.2.1 Add Vehicle

The very initial step of a car owner is to add his/her own registered vehicle to cross-match with BRTA. After that Bangladesh Road & Transport Authority BRTA will cross-match with their server data. If everything seems fine, then BRTA will approve that vehicle. Now I will figure out the activity diagram below.

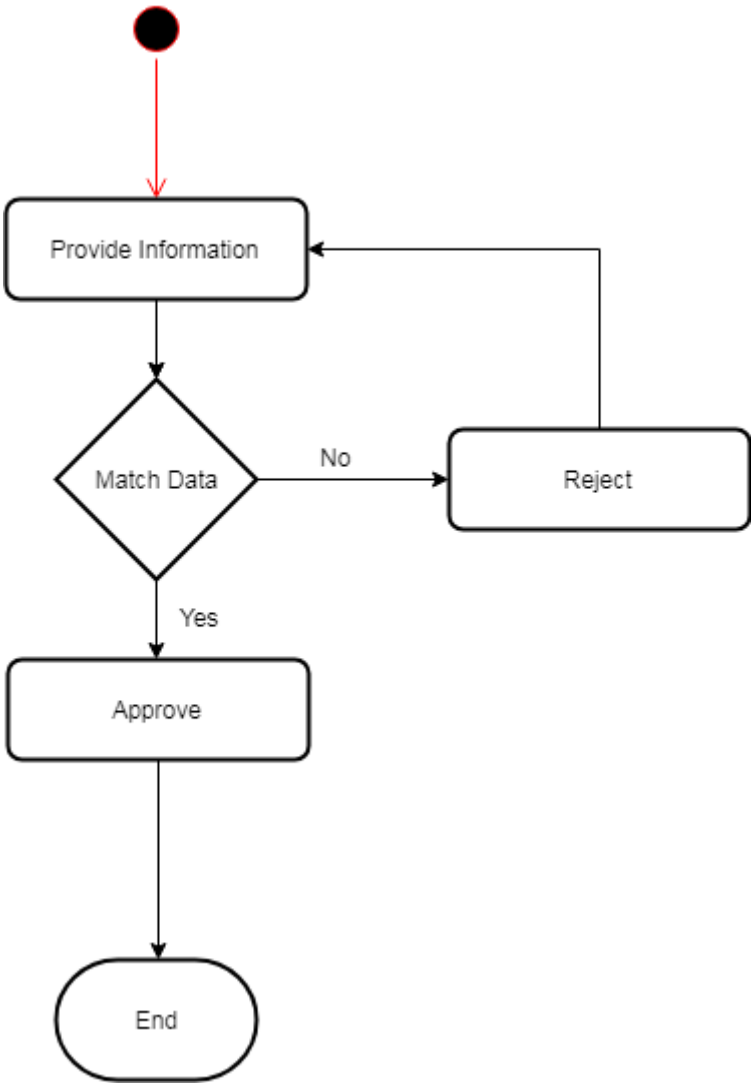

Figure 3.2: Add Vehicle

3.2.2 View Vehicle

Vehicle can be viewed by car owner. And a single car owner may have one more registered vehicle. Now I will show the activity diagram of viewing vehicles below.

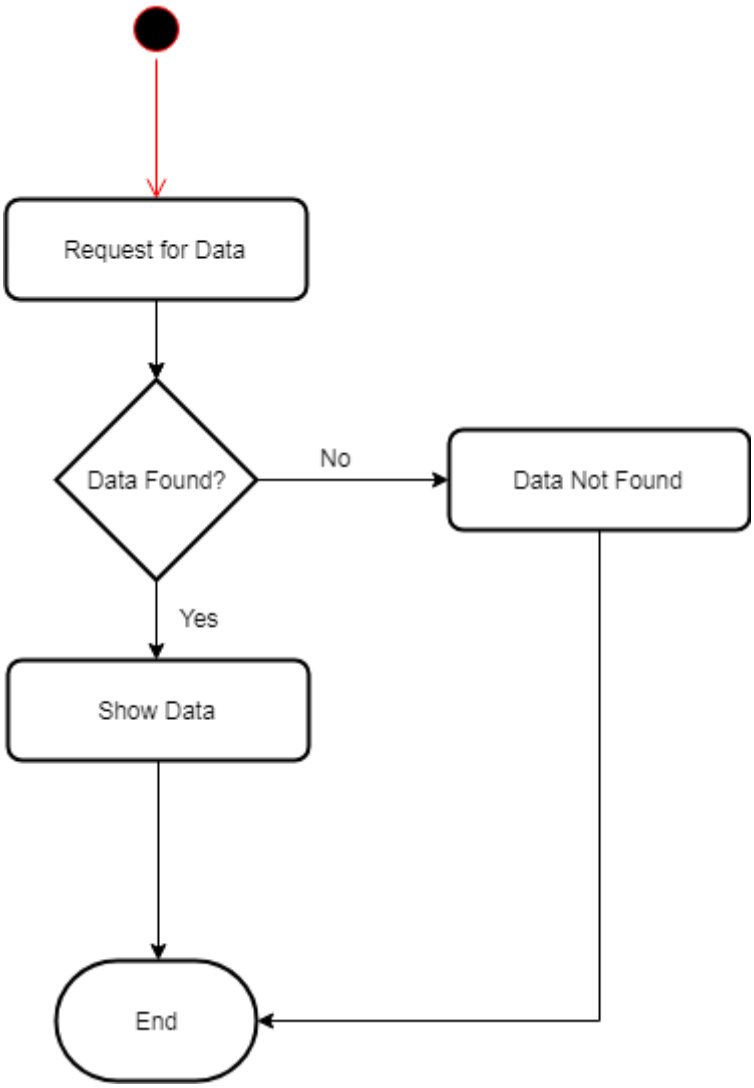

Figure 3.3: View Vehicle

3.2.3 Apply Insurance

After completing the registration process, it is very important to apply for an insurance. Nowadays, almost every vehicle must have an insurance. So this feature is very important for our application. Now I will show the activity diagram of how vehicle owner would apply for insurance for his vehicle.

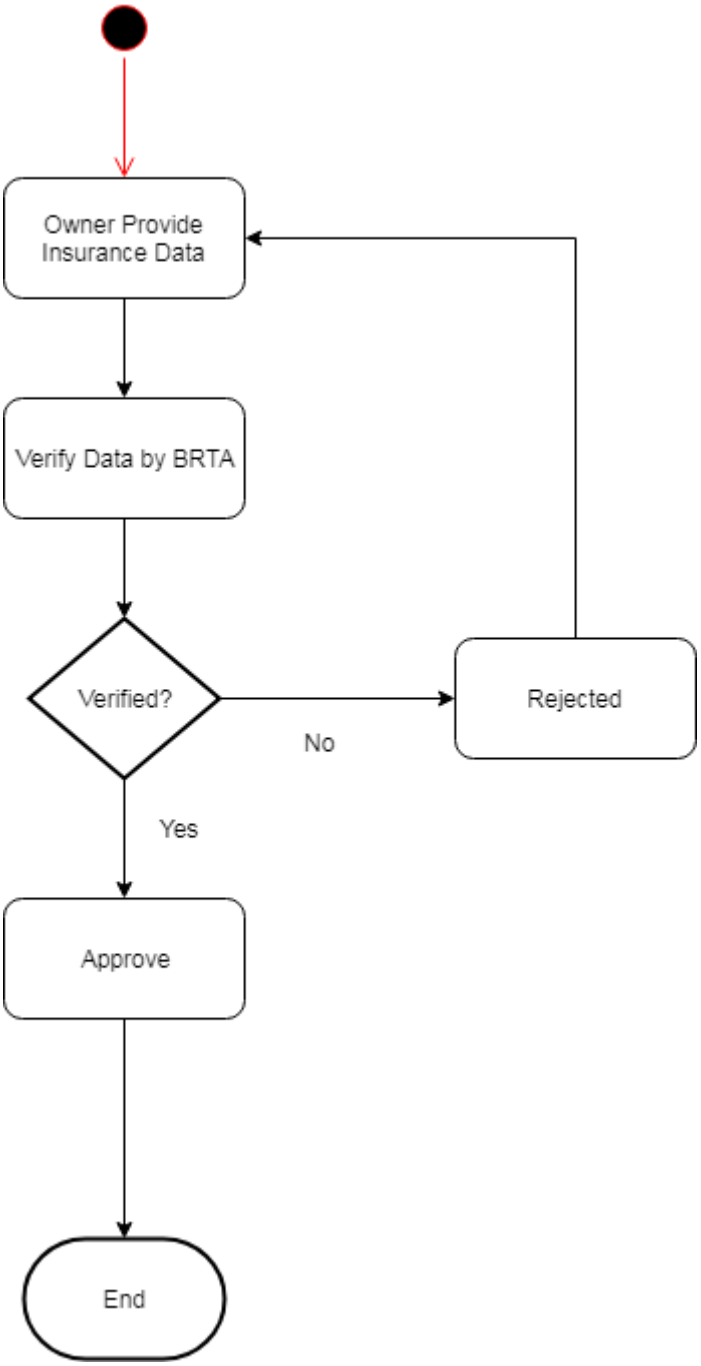

Figure 3.4: Apply Insurance

3.2.4 View Information

It is also very general to view any data of vehicle or related to vehicle. Like: insurance, fitness, registration, renewal, car cases etc. Now, I will show the activity diagram of the vehicle view process.

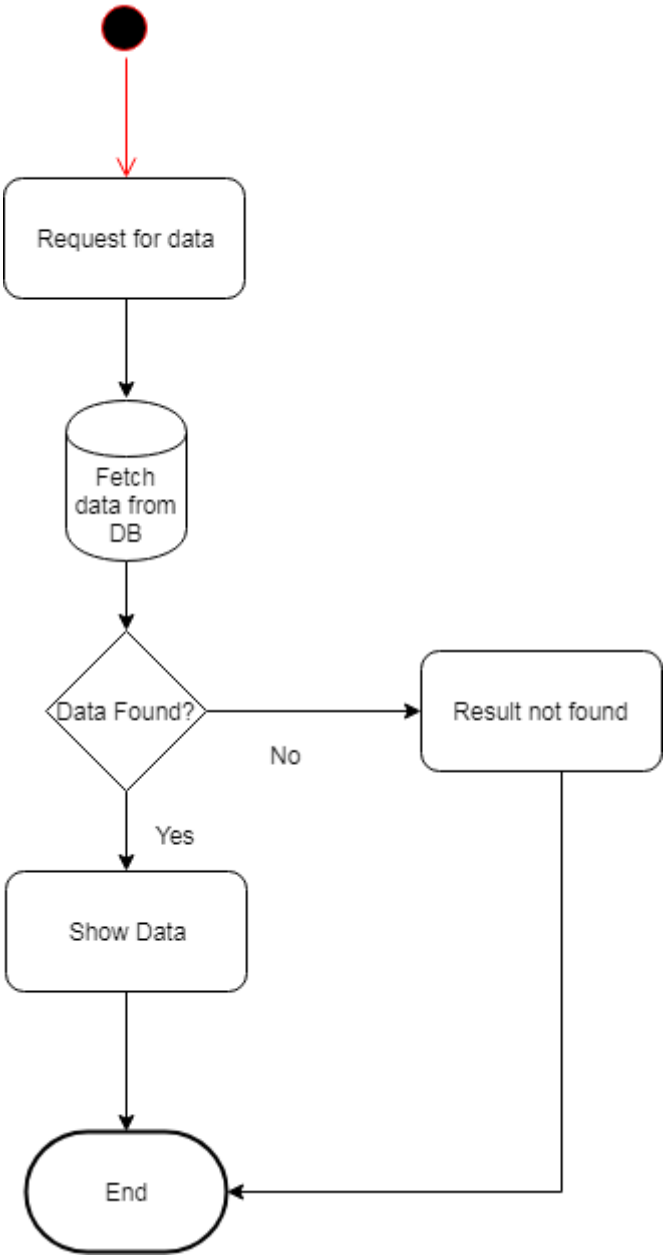

Figure 3.5: View information

3.2.5 Apply Fitness

Proper fitness ensures the safety of passengers of that vehicle. So it is very urgent to make fitness certificate from BRTA authority. For that reason, vehicle owner need to apply to BRTA through using our application. Now I will show the activity diagram of the application process from our platform to BRTA for fitness. Figure is given below.

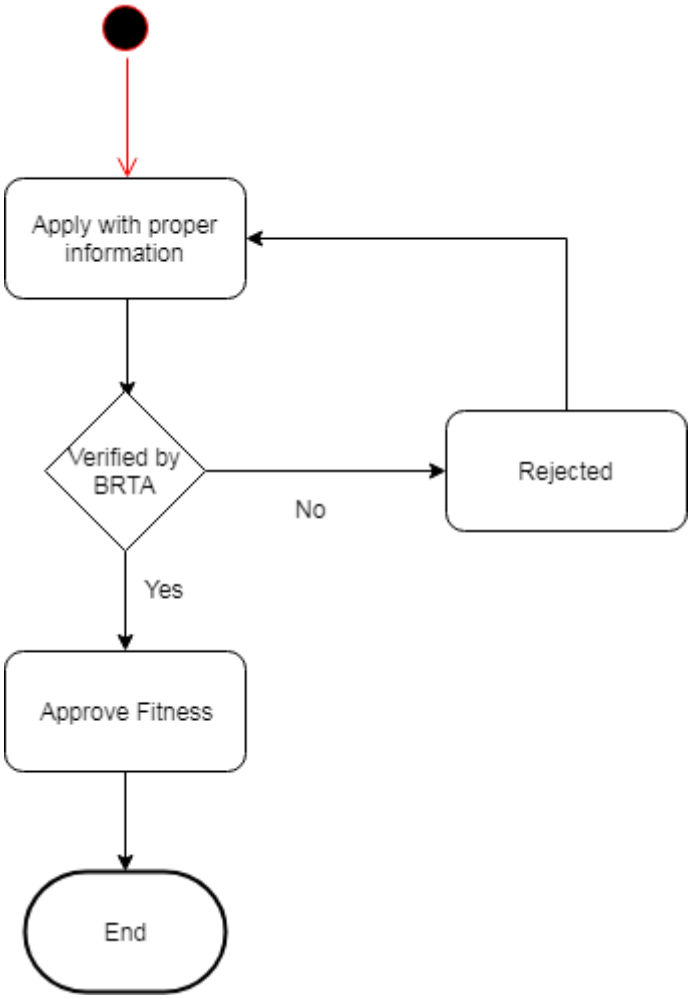

Figure 3.6: Activity Diagram for Apply Fitness

3.2.6 View Vehicle Fitness

After submitting to BRTA with proper information for vehicle fitness, it is simple to check whether BRTA approve the fitness of my vehicle or not. So this is why, there are also have an option to check or view vehicle fitness status. Now I will show the activity diagram of vehicle fitness below.

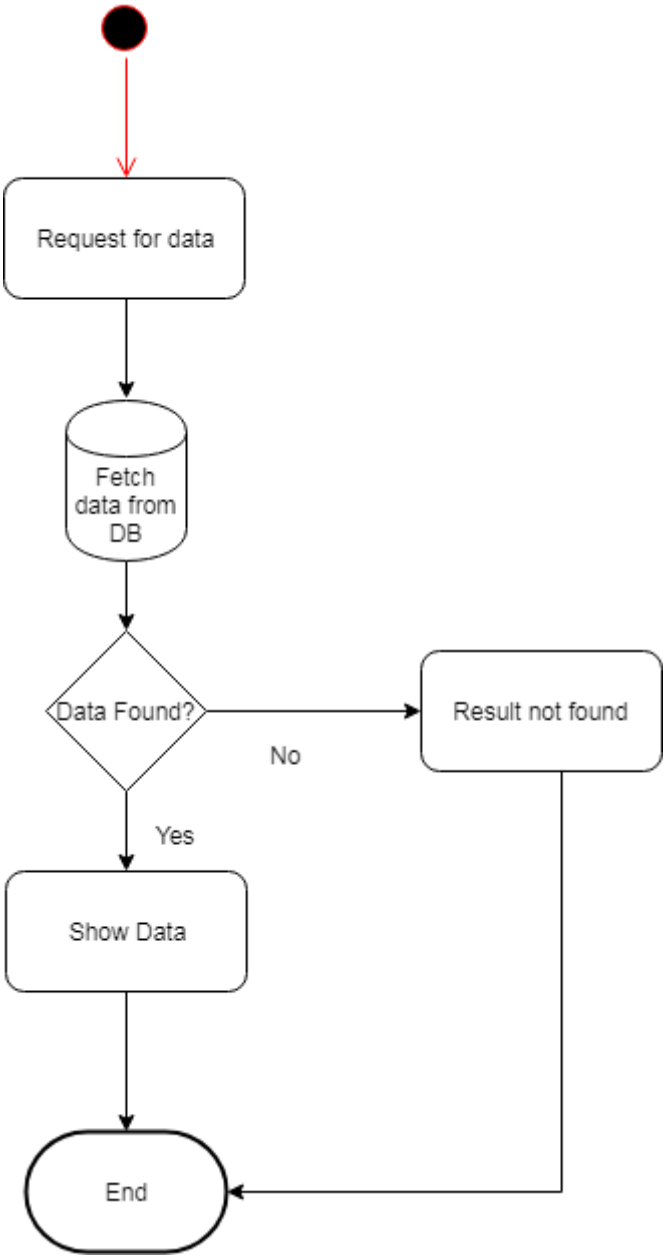

Figure 3.7: View Vehicle Fitness

3.2.7 Renew Registration

Vehicle registration has a specific time limit to expire. But before that, owner need to apply for registration renew. Because vehicle cannot be running without registration on road. Now I will show the activity diagram of how owner will renew the registration of his own vehicle of their car through using our application.

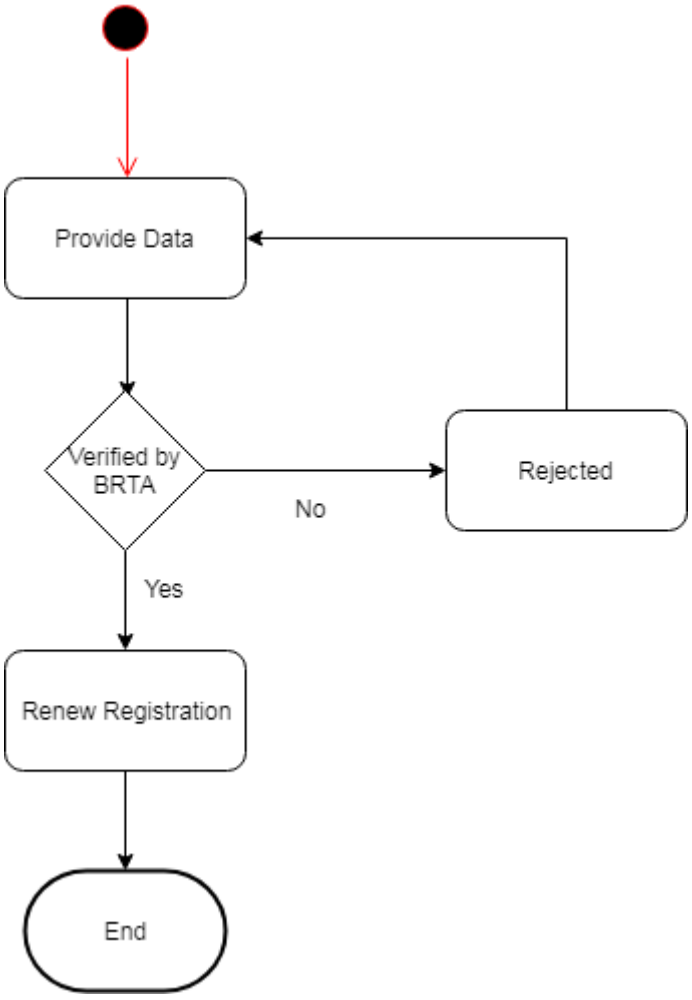

Figure 3.8: Activity Diagram for renew registration

3.2.8 Search & Hire Driver

Searching driver is one of the main feature of our application. Because we are going to develop such an application by which car owners can make an appointment for driver of his own car.

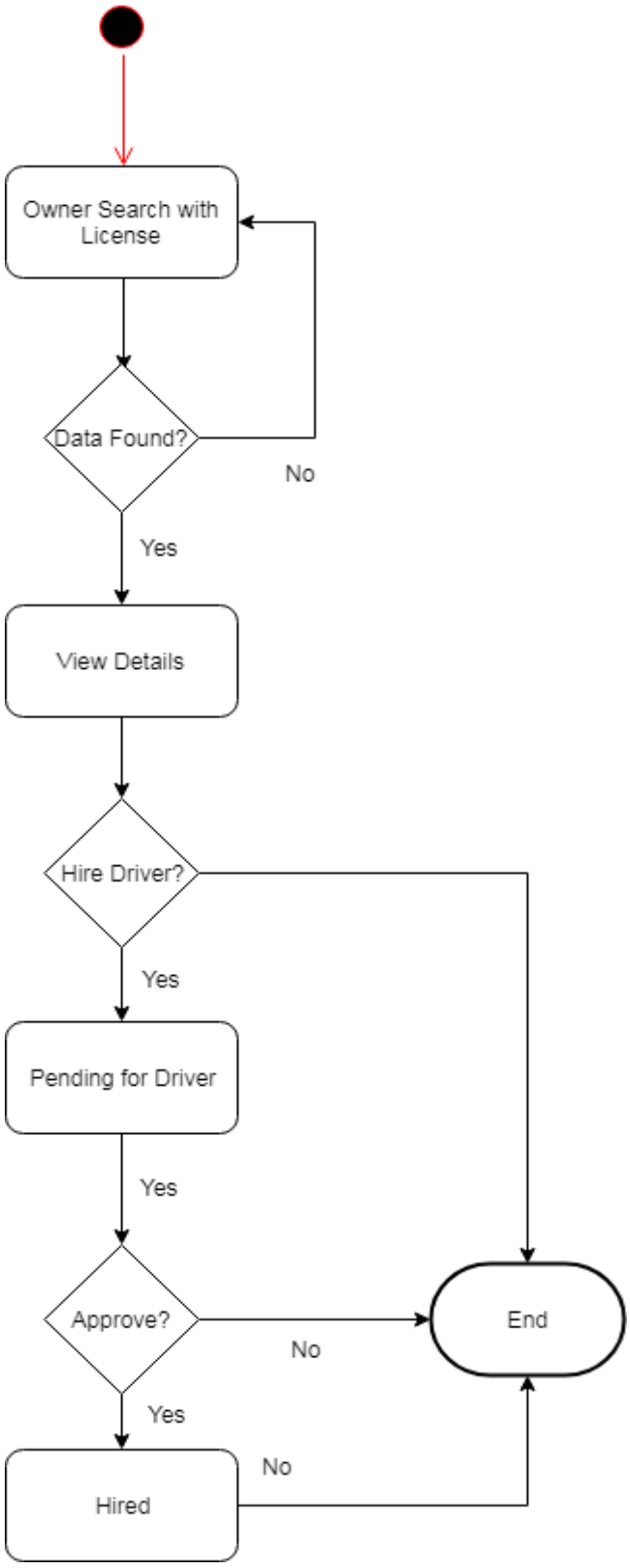

Figure 3.9: Search & Hire Driver

3.2.9 Assign Driver

After completing the hiring process, it is necessary to assign driver with car as early as possible. Now, I will provide the activity diagram of driver assignment below.

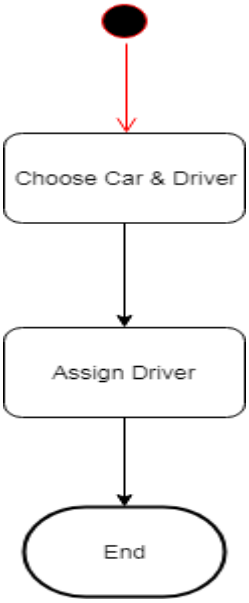

Figure 3.10: Activity Diagram of Driver Assignment

3.2.10 Approve Users

Approving users are one of the main concern of BRTA. There are some types of user. Like: Car owner, Driver etc.

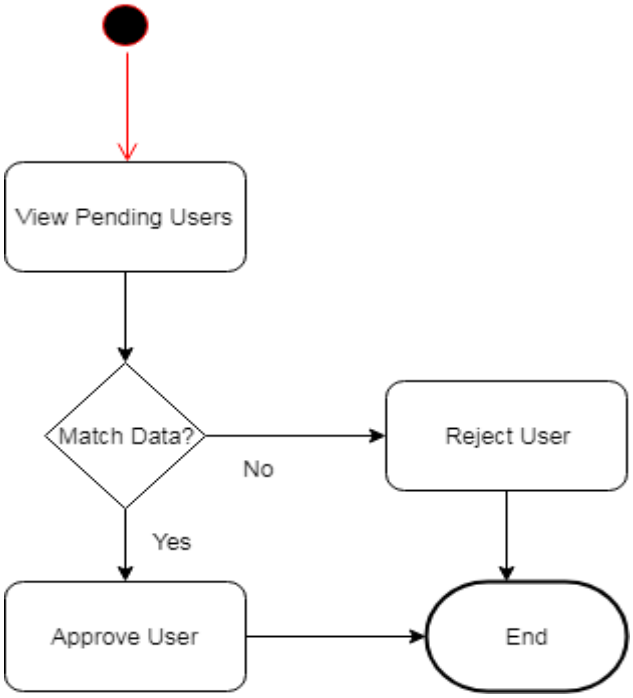

Figure 3.11: User Approval

3.2.11 Approve Fitness

BRTA is responsible to provide vehicle fitness. Now, I will show the activity diagram of fitness approval from BRTA.

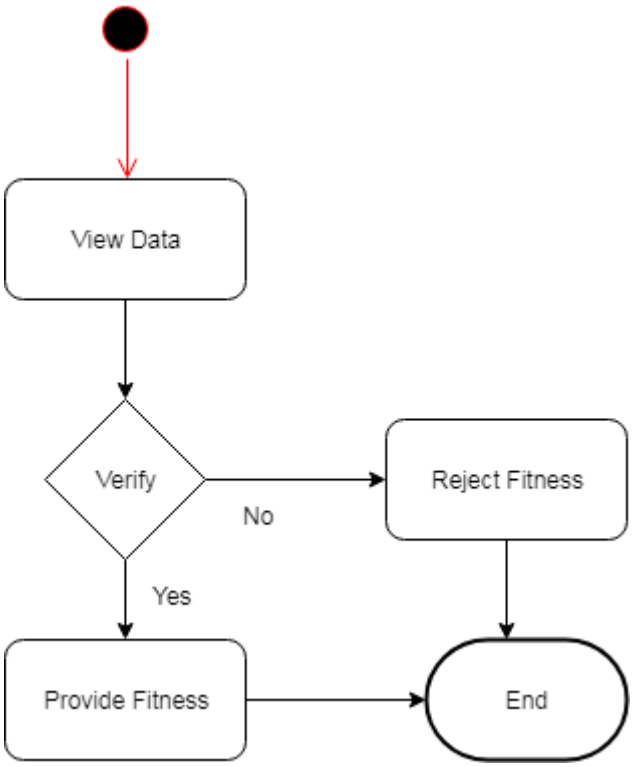

Figure 3.12: Activity Diagram of Fitness Approval

3.2.12 Traffic View Vehicles

In this application, traffic police play a very important role. Because they need to check related papers of every single vehicle. Based on those information traffic police may impose any cases or apply any demerit points to the driver as required. Now I will explain the whole process within a single activity diagram.

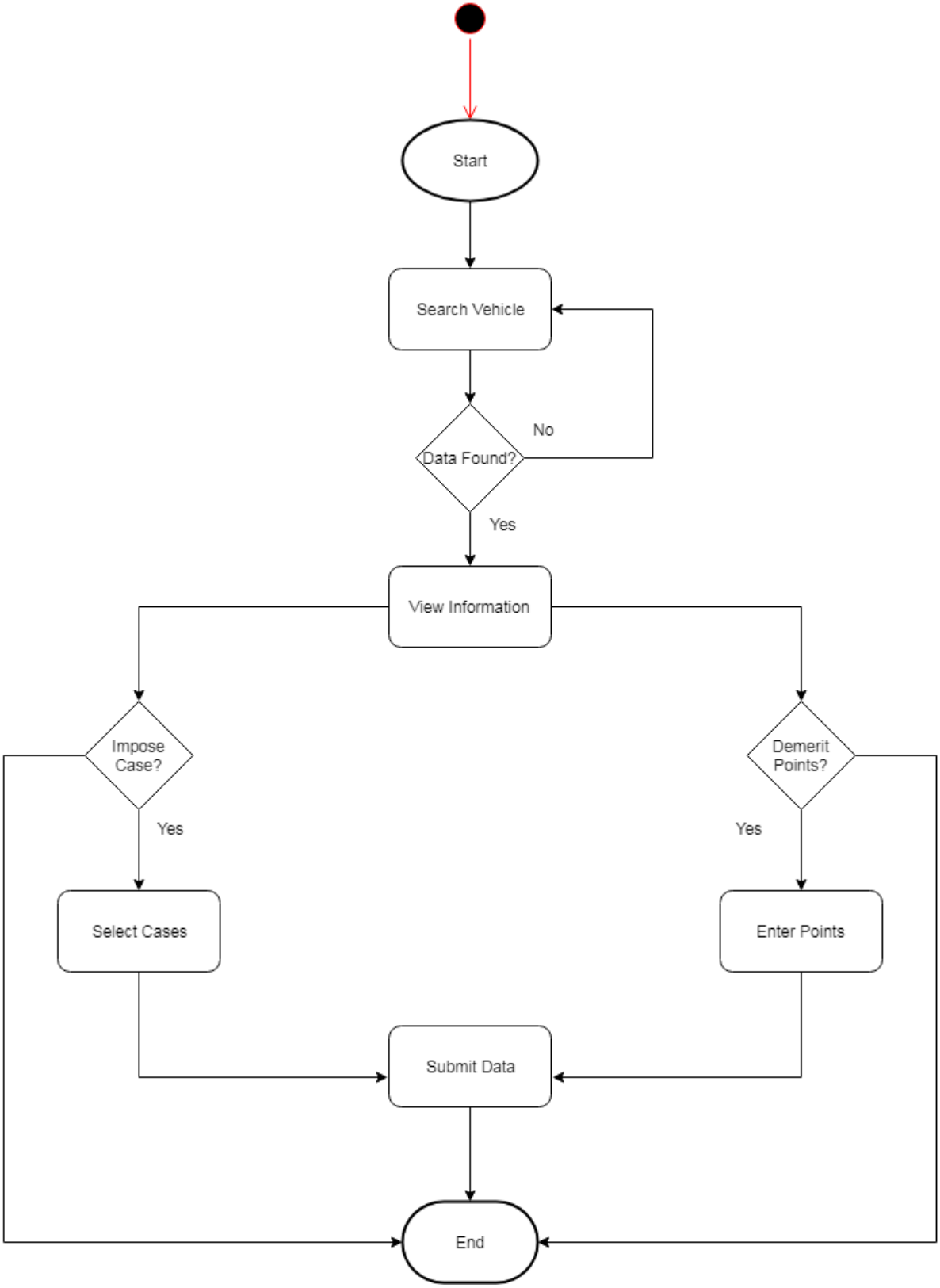

Figure 3.13: Traffic View Vehicles

3.3 Sequence Diagrams

Mainly sequence diagrams understand us how the data will be followed in any application. Now we are going to show some sequence diagrams.

3.3.1 Add Vehicle:

Vehicle will be added by car owner.

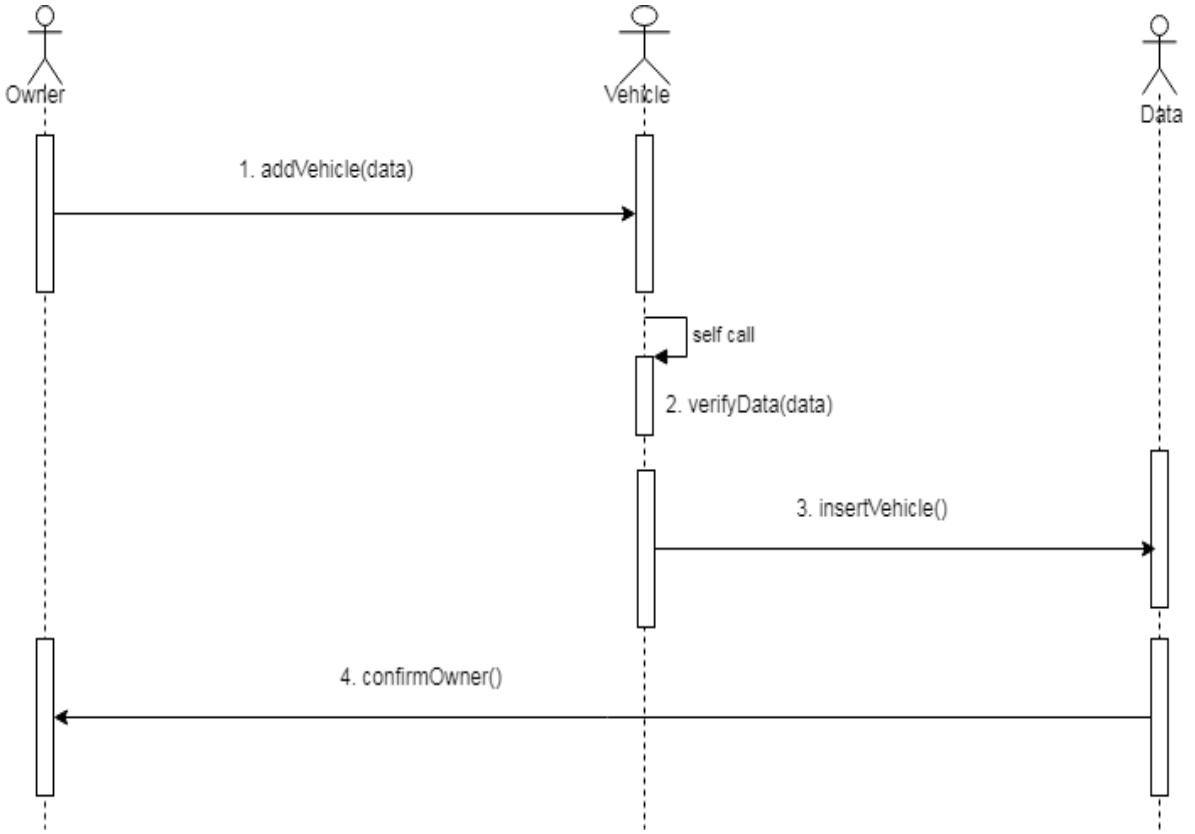

Figure 3.14: Sequence Diagram for Vehicle Add

3.3.2 View Vehicles

Owner need to view their own vehicles.

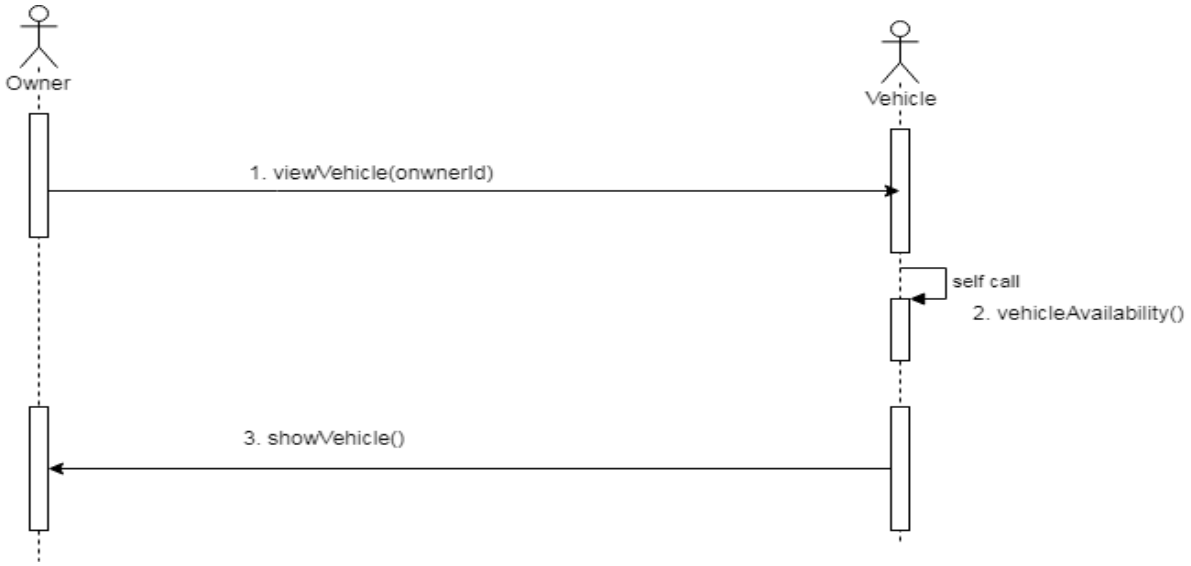

Figure 3.15: Sequence Diagram for View Vehicle

3.3.3 Apply Insurance

Vehicle owner apply for insurance after vehicle approval. Sequence diagram is given below.

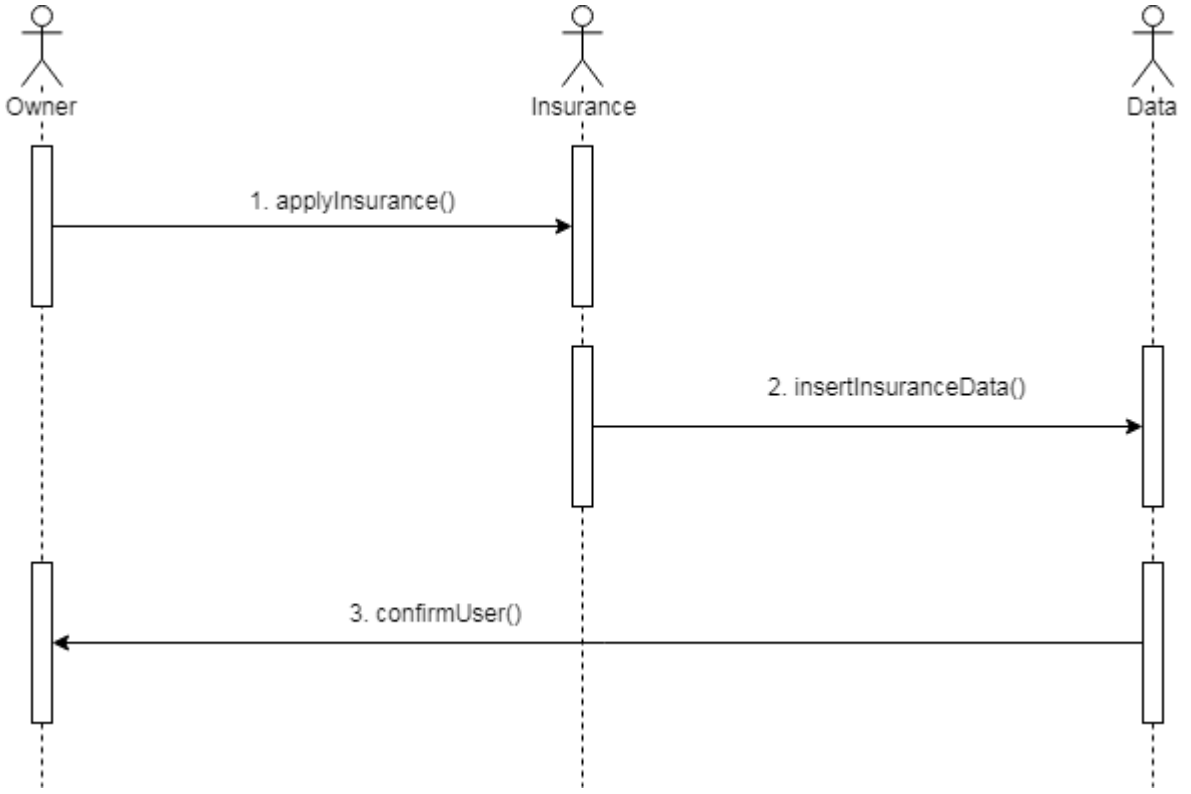

Figure 3.16: Sequence Diagram for Apply Insurance

3.3.4 View Vehicle Insurance

Owner need to view their insurance status.

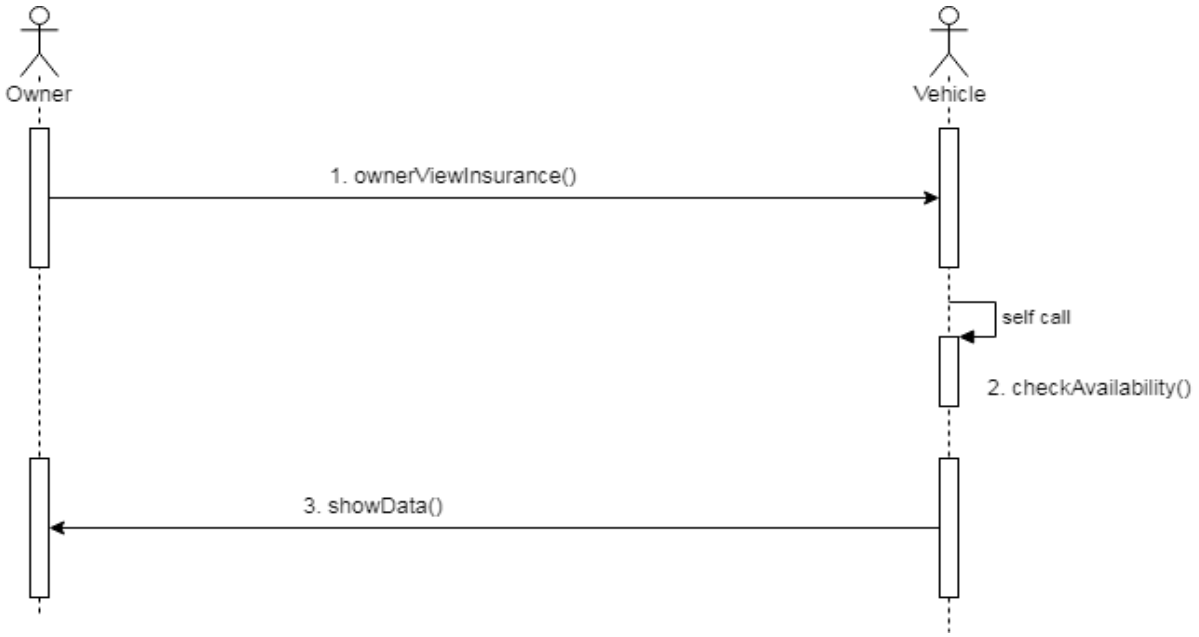

Figure 3.17: Sequence Diagram for View Vehicle Insurance

3.3.5 Apply Fitness

Owner may need to apply for vehicle fitness.

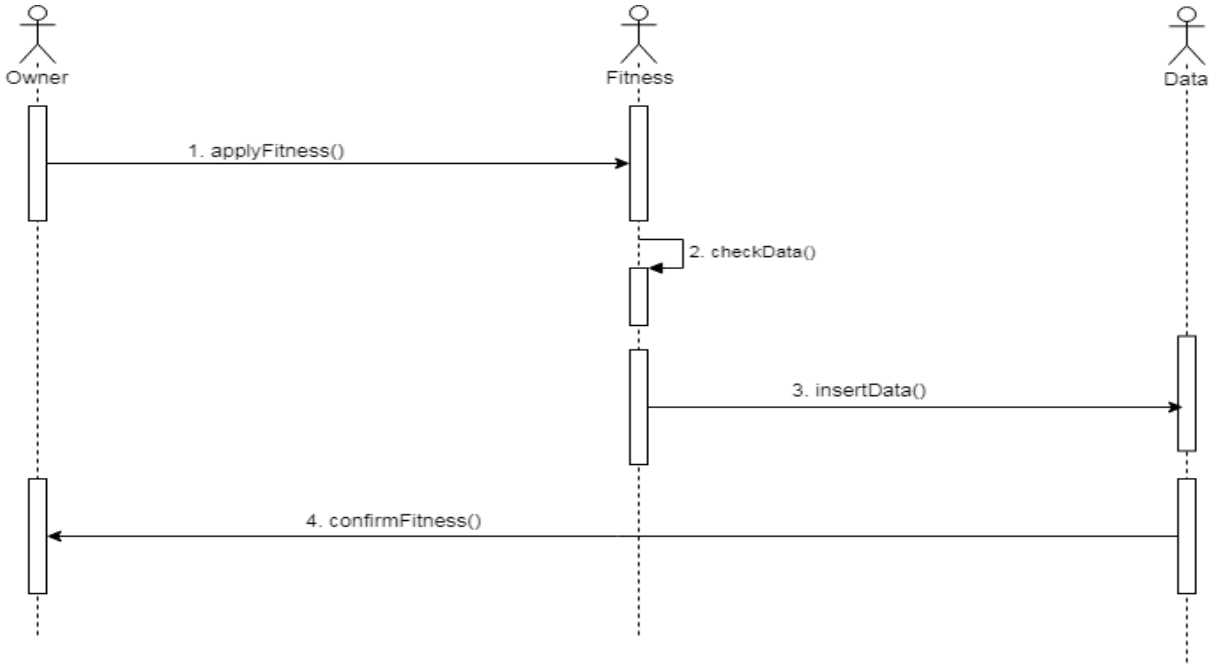

Figure 3.18: Sequence Diagram for Apply Fitness

3.3.6 View Vehicle Fitness

Owner may need to view vehicle fitness.

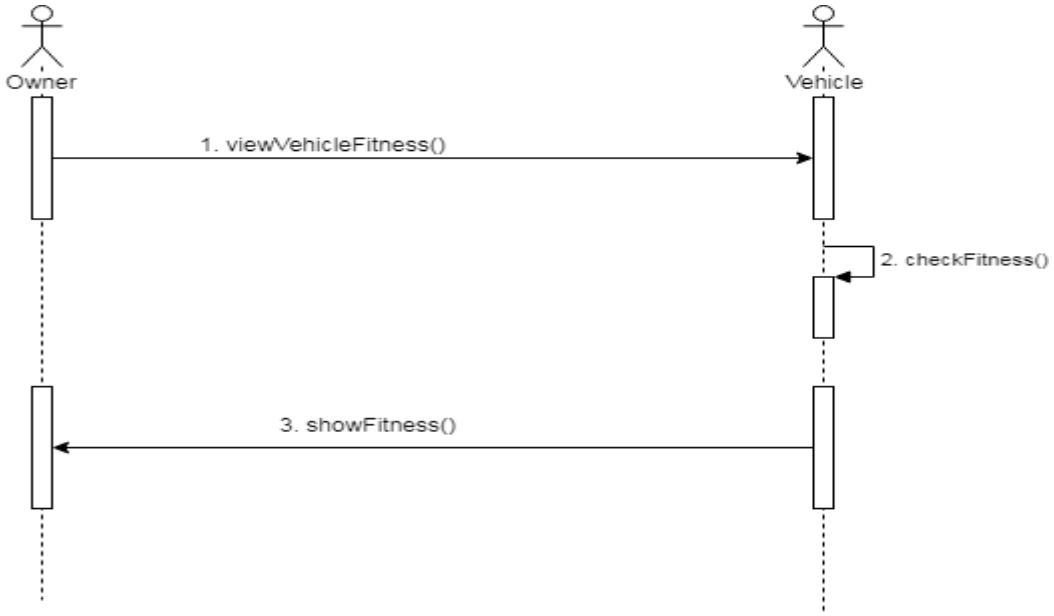

Figure 3.19: Sequence Diagram for View Vehicle Fitness

3.3.7 Renew Registration

Owner may need to renew vehicle registration. Because without registration vehicle cannot run on road. Now, I am going to provide the sequence diagram for renewal of registration.

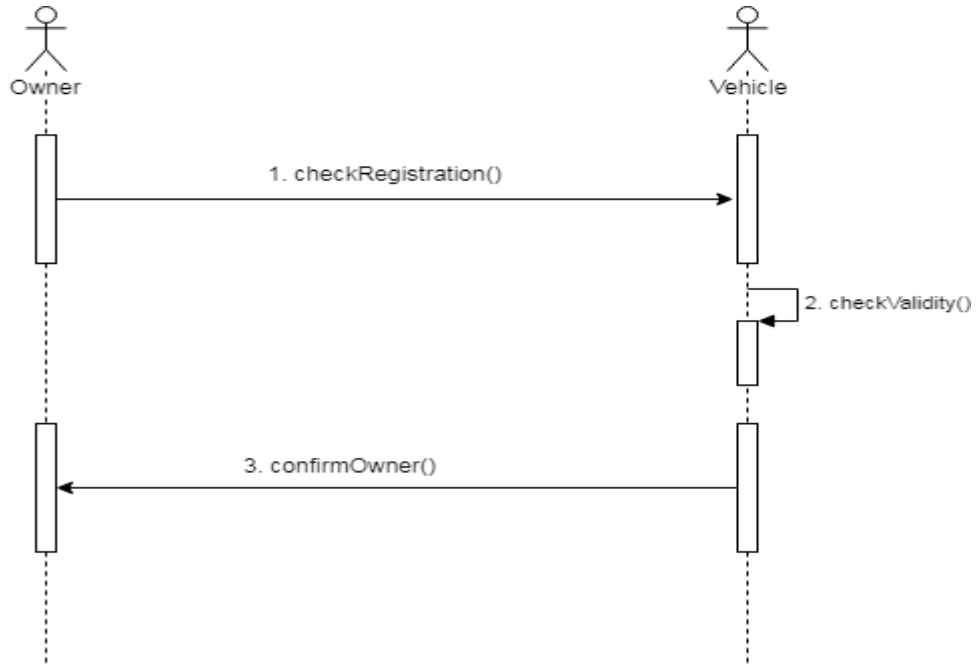

Figure 3.20: Sequence Diagram for Renew Registration

3.3.8 Search Driver

Owner may need to search driver for car.

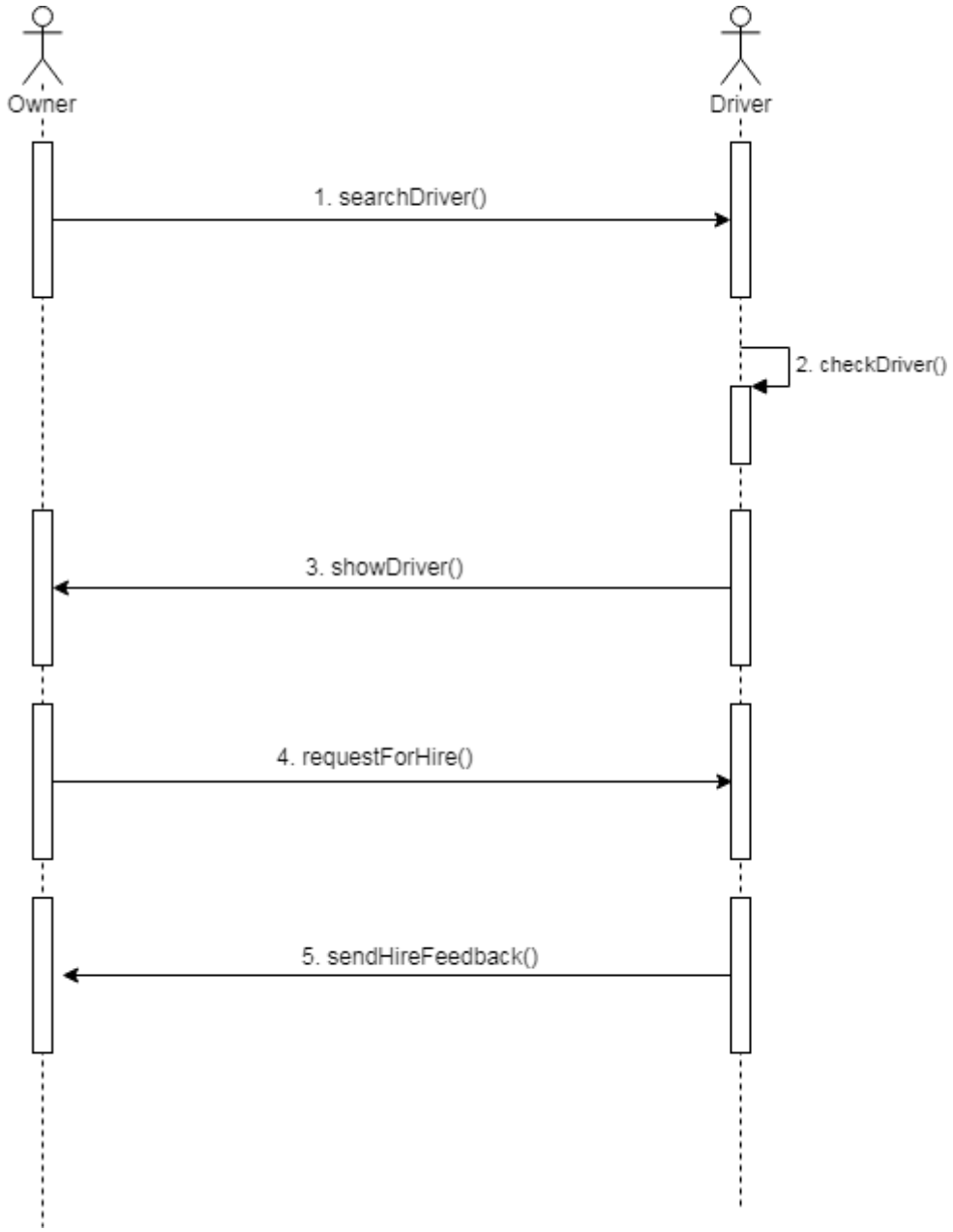

Figure 3.21: Sequence Diagram for Search Driver

3.3.9 Apply Driving License

Driving license is very important for drivers. Sometimes, car owners can also drive their own vehicles. And this is why they also need driving license. Now, I will provide the sequence diagram for applying driving license.

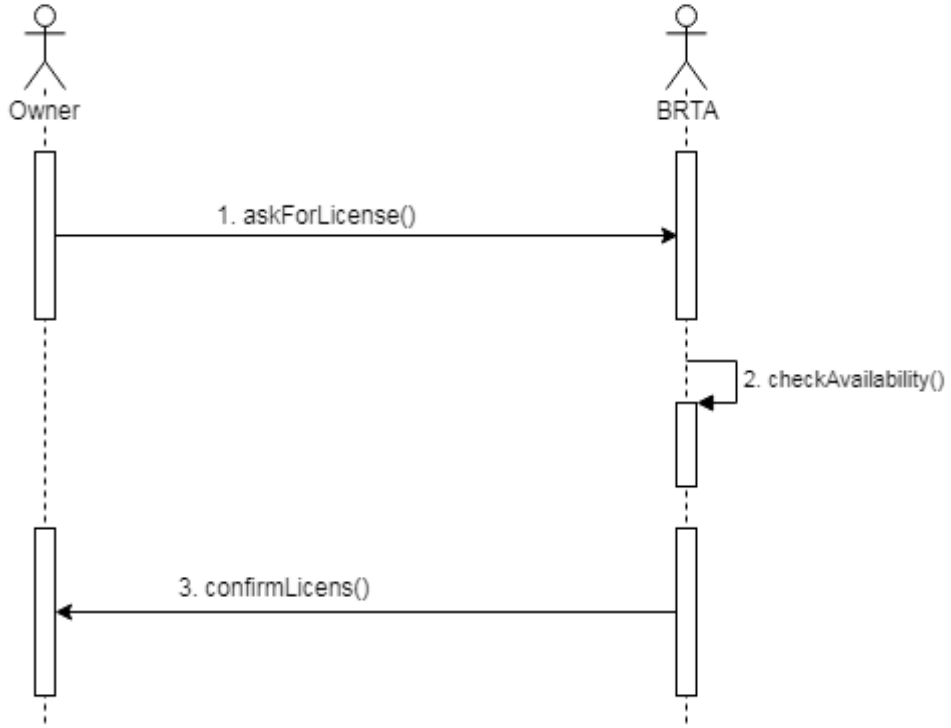

Figure 3.22: Sequence Diagram for Apply Driving License

3.3.10 View Car Cases

Owner may need to view their own car cases.

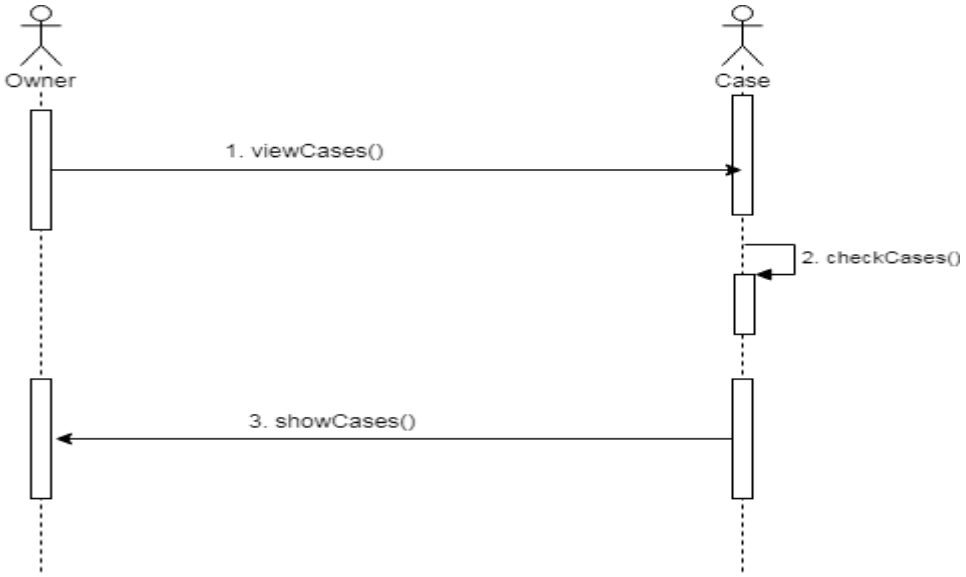

Figure 3.23: Sequence Diagram for View Car Cases

3.3.11 View Job History

Job history can be seen by driver or owner.

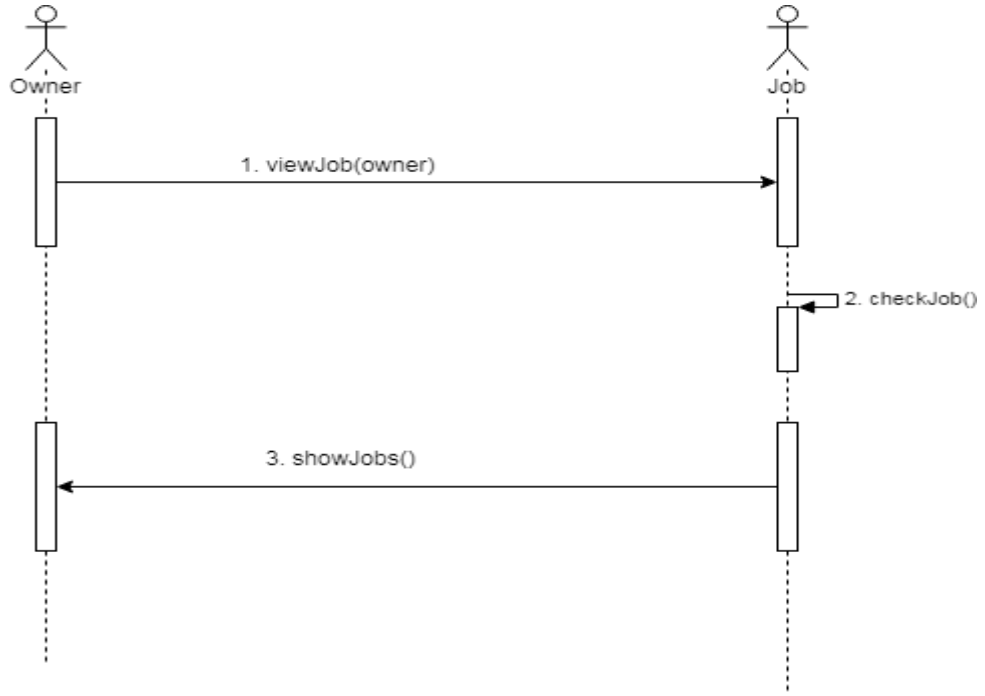

Figure 3.24: Sequence Diagram for View Job History

3.3.12 Approve Car Owner

BRTA approve car owner as well as users.

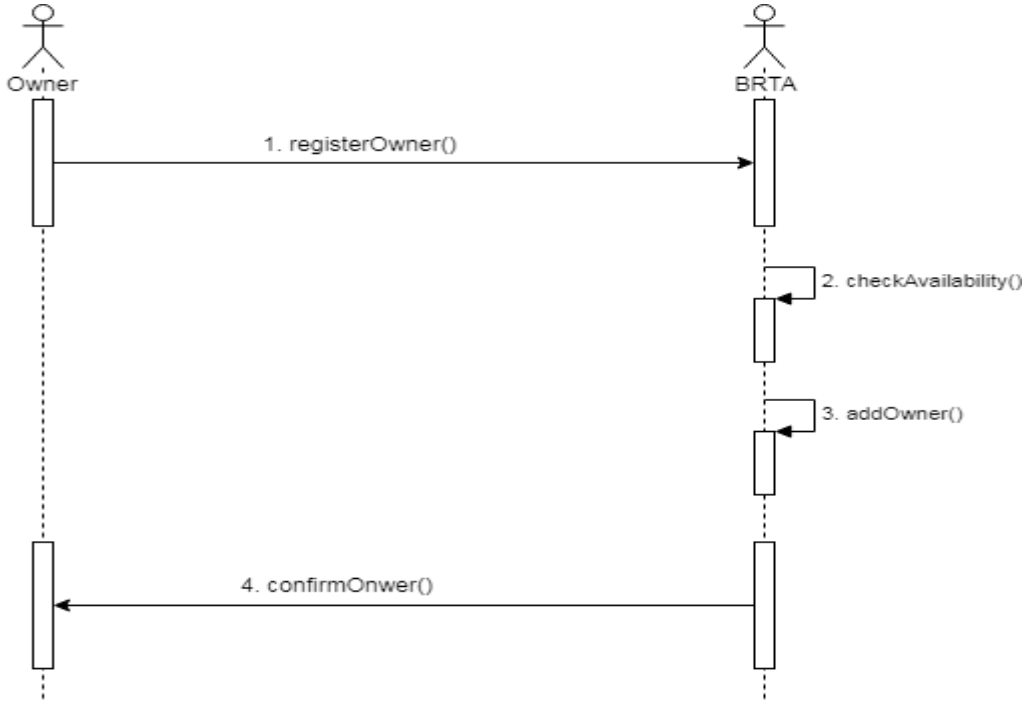

Figure 3.25: Sequence Diagram for Approve Car Owner

3.3.13 Approve Driver

BRTA approve users after verifying their profile.

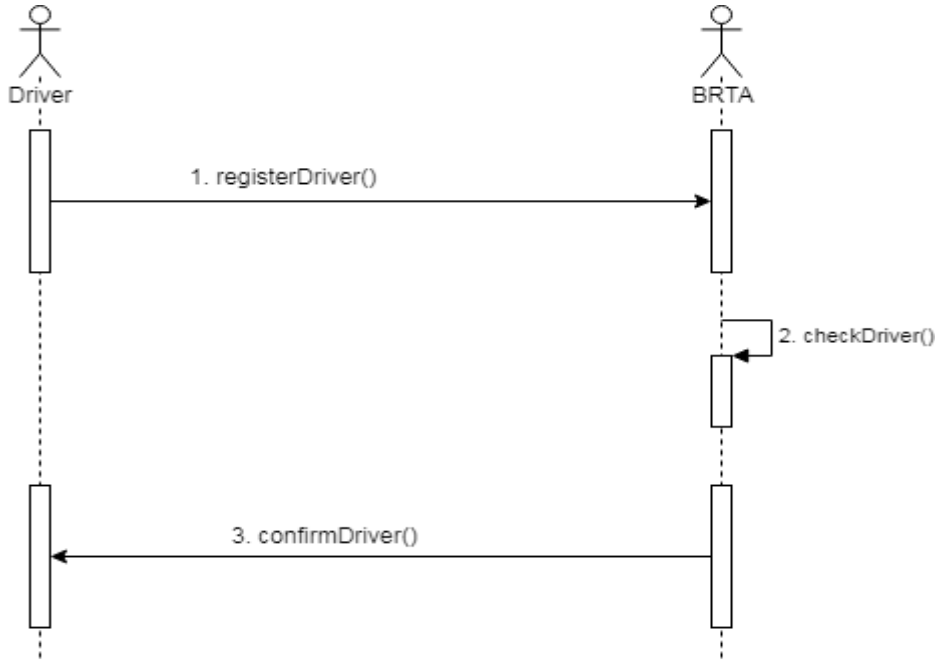

Figure 3.26: Sequence Diagram for Approve Driver

3.3.14 Approve Traffic

BRTA approve traffic police also.

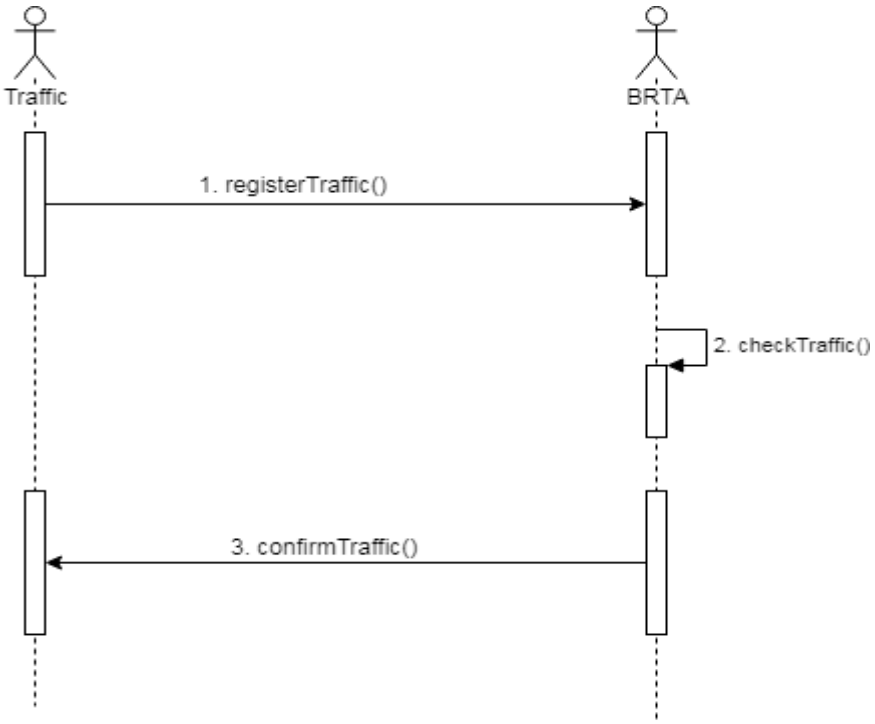

Figure 3.27: Sequence Diagram for Traffic Approval

3.3.15 Approve Vehicles

BRTA will approve vehicles.

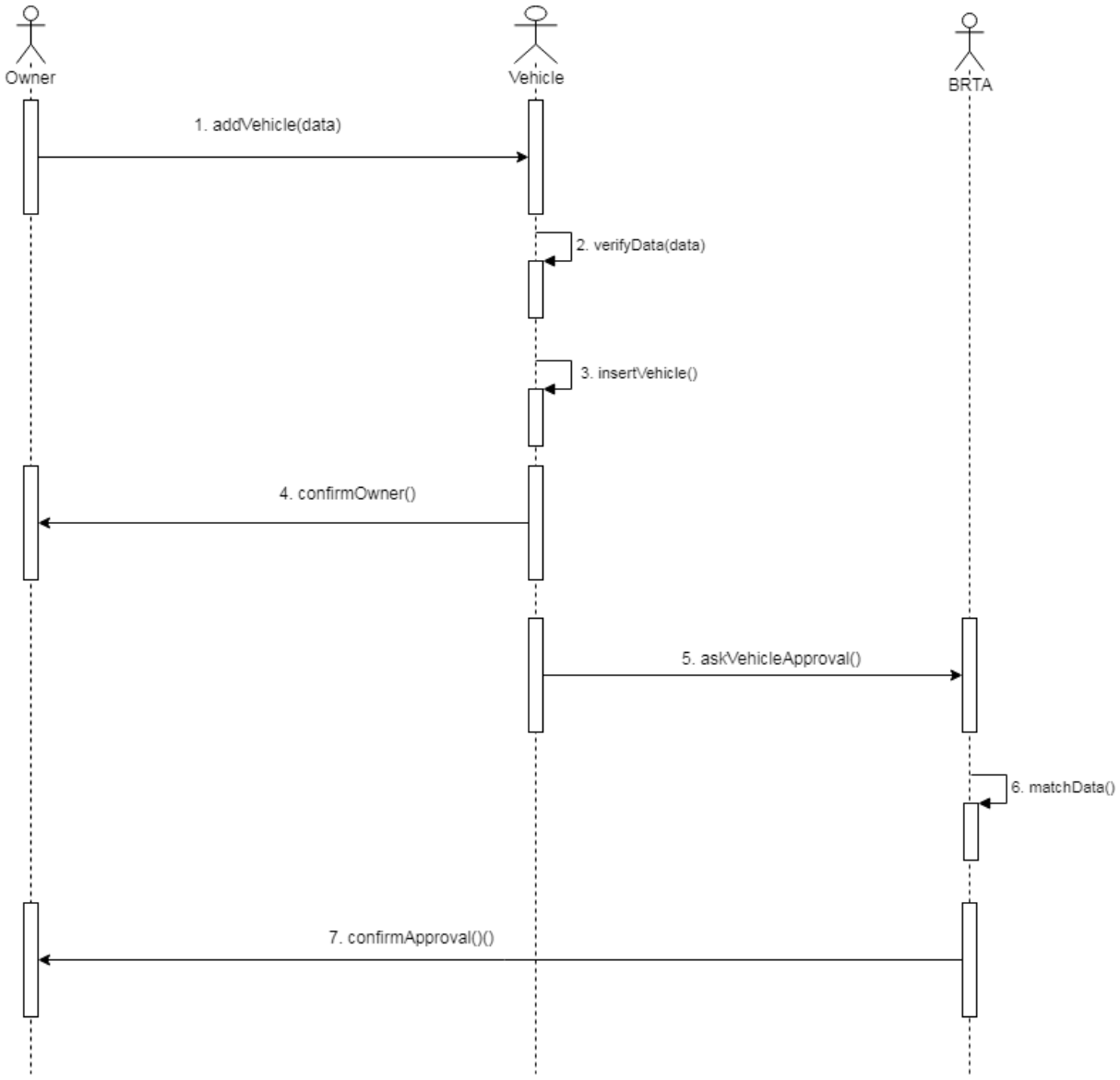

Figure 3.28: Sequence Diagram for Vehicle Approve

3.3.16 Approve Fitness

Approving vehicle fitness is one of the main responsibility for BRTA. Now I will provide the sequence diagram below.

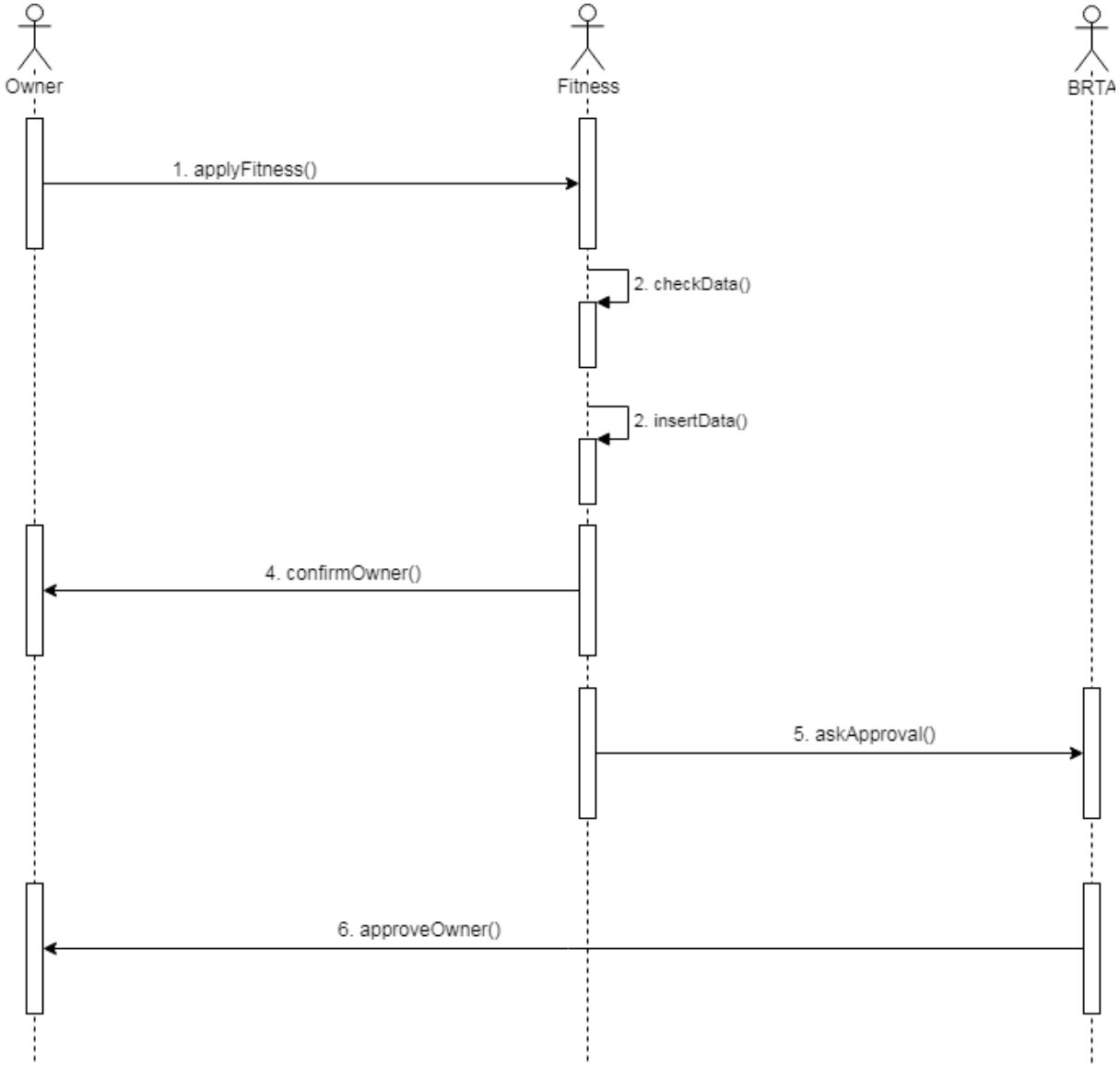

Figure 3.29: Sequence Diagram for Approve Fitness

3.3.17 Approve Driving License

BRTA will approve the driving license.

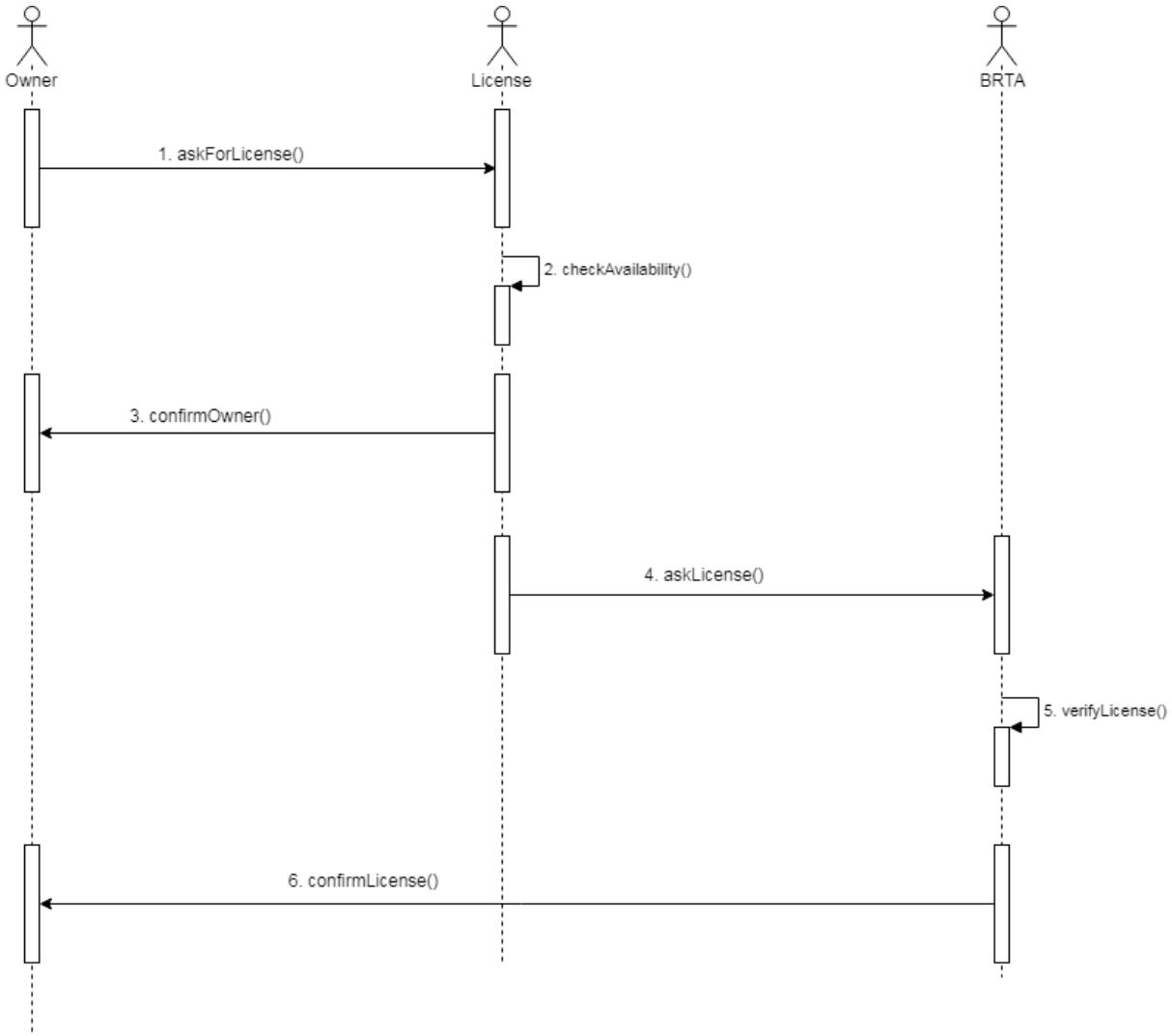

Figure 3.30: Sequence Diagram for Approve Driving License

3.3.18 View Job Request

Job requests might be seen by owner or driver.

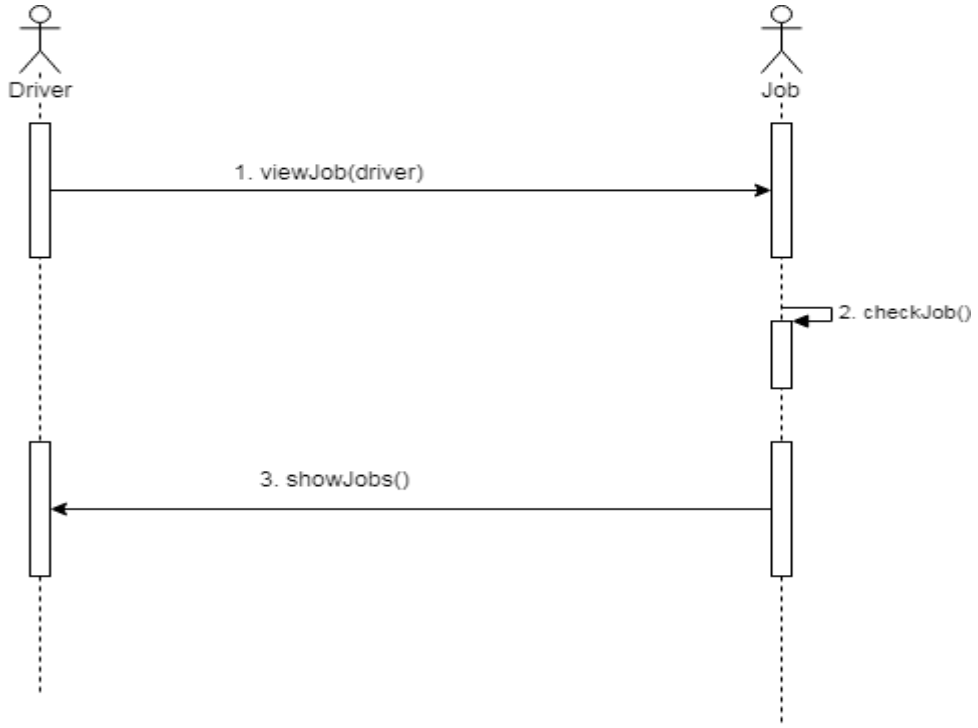

Figure 3.31: Sequence Diagram for View Job Request

3.3.19 Apply Driving License

Driver may need to apply for driving license.

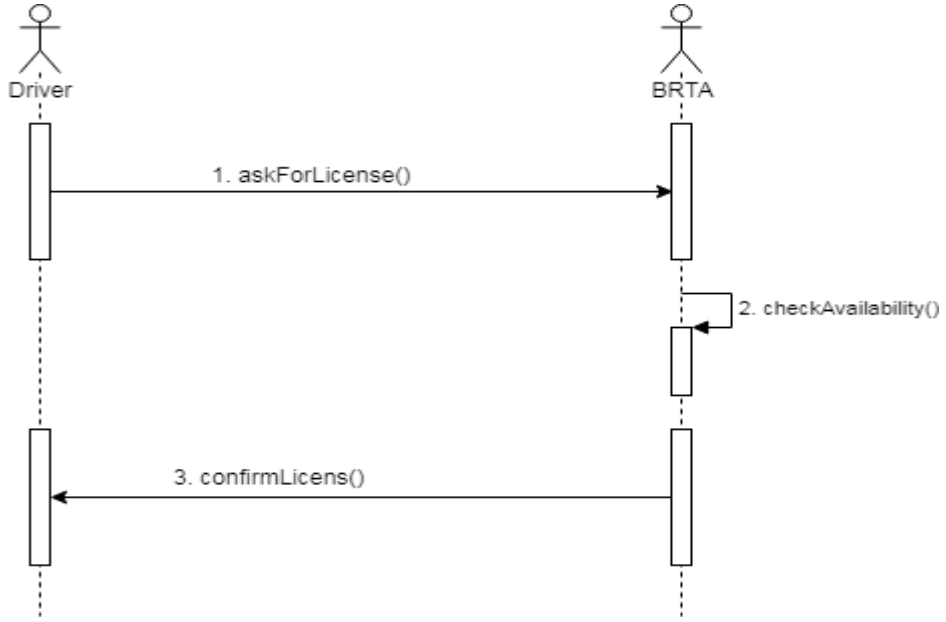

Figure 3.32: Sequence Diagram for Apply Driving License

3.3.20 View Car Details

Owner may need to view car details.

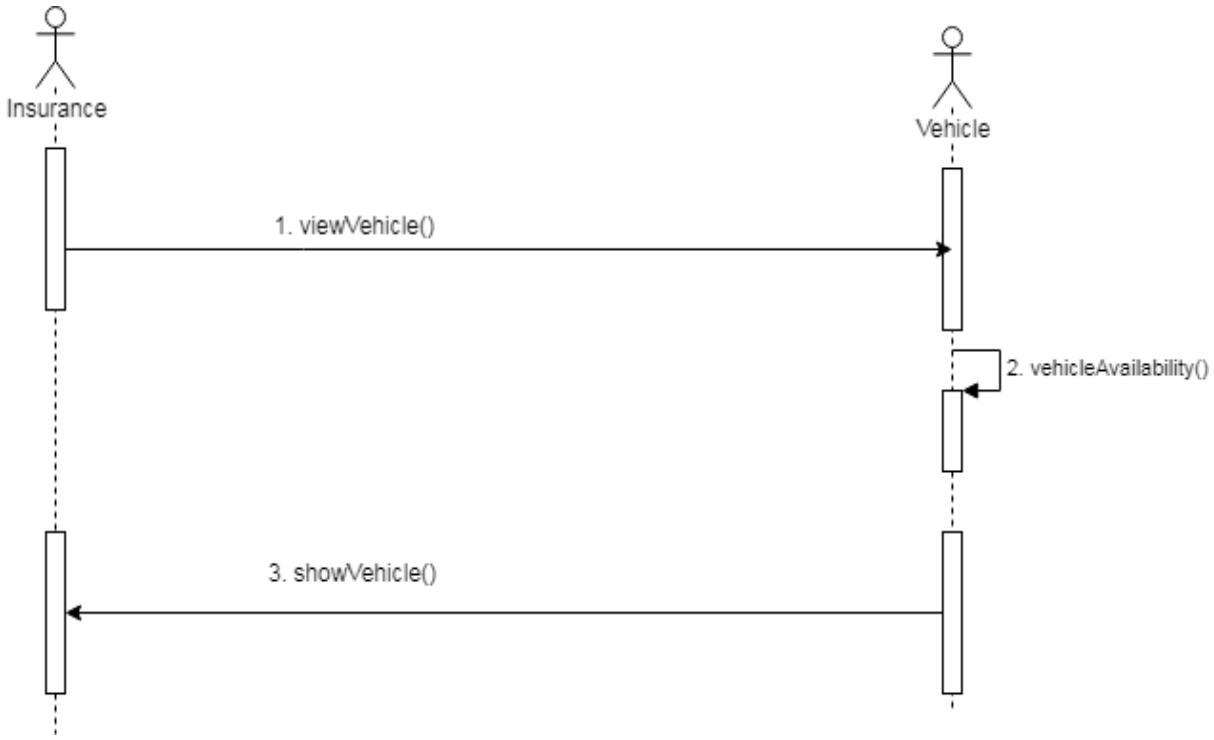

Figure 3.33: Sequence Diagram for View Car Details

3.3.21 Traffic Search Vehicles

Traffic need to search vehicles for checking. Traffic police also perform some other activities. Like: impose case, give demerit points etc. Now I will provide the sequence diagram below.

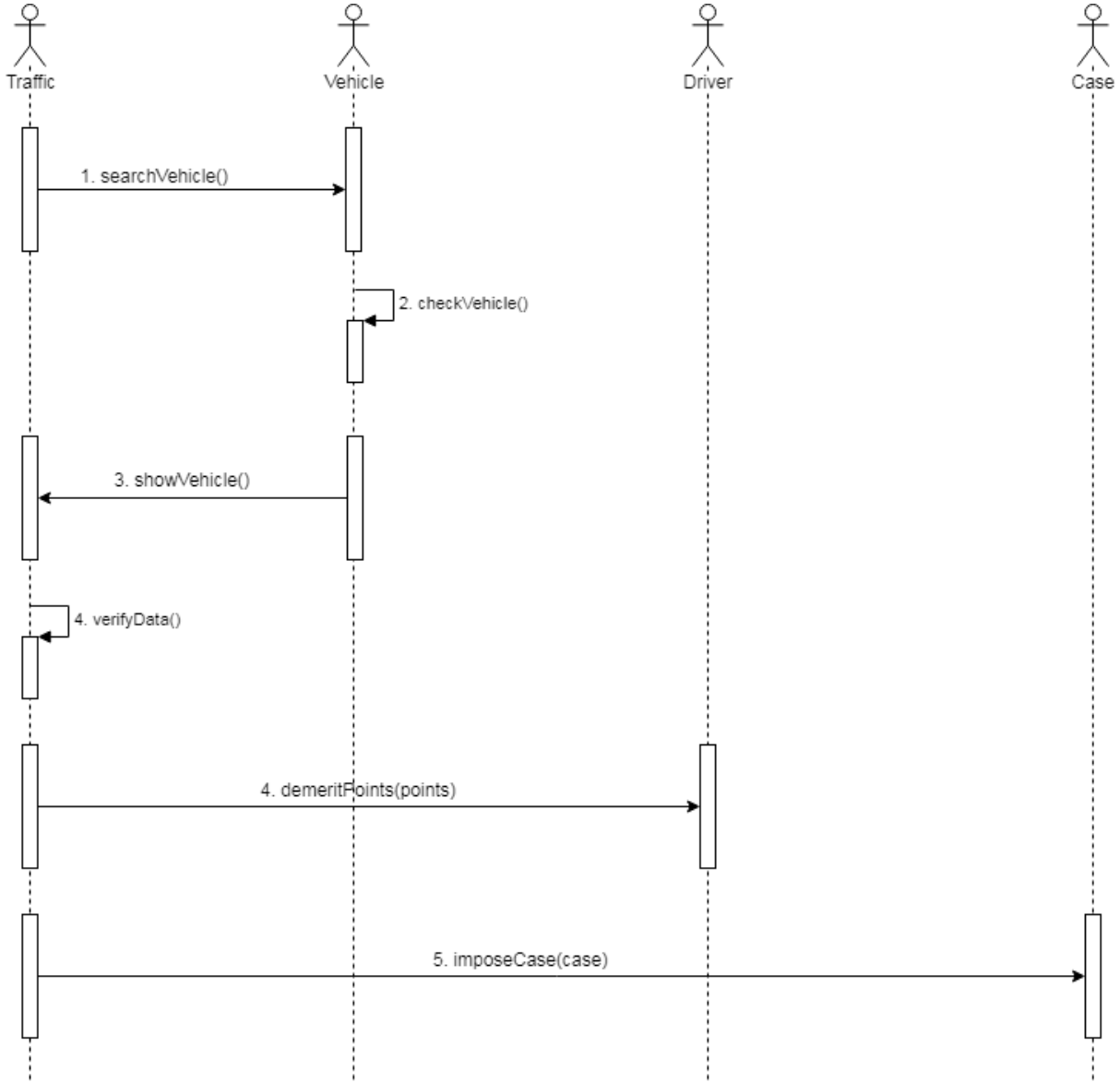

Figure 3.34: Sequence Diagram for Traffic Search Vehicles

Chapter 4
System Design Specification

4.1 Development tools and technology

Software development tools are used to develop software. There are different kinds of tools for software developers to make the process of software development very smooth. But now I will mention some of tools that I am using to develop my project.

4.1.1 User Interface Technology

First of all, after landing any application, interface of that software is appeared to the user. So, the importance of user interface is very high. For success of any software application, a good looking user interface plays a vital role. User interface includes using good image, graphics, typography, stylesheets, scripting etc.

4.1.1.1 CSS framework or Twitter Bootstrap

After completing markup, cascading style sheets are designed. It generally explains how HTML elements will display. There are three ways to write stylesheet. One internal CSS, another is external CSS. And last one is inline CSS. But most of time external CSS is used. Because, by using external CSS, all CSS data can be kept in different files. But nowadays CSS framework seems to be very popular. In our application, I have used Twitter Bootstrap framework. This framework is developed mainly for CSS and JavaScript. It is a free and open source front-end framework. This framework is highly used for designing website and web application also. This framework supports almost every browser. Like Google Chrome, Mozilla Firefox, Opera, Safari, Internet Explorer etc. Bootstrap also provides media query which features responsive layout for different devices with different screen size. Bootstrap provides a set of some files which contains stylesheets which gives basic definition.

Bootstrap also provides some JavaScript components also. There are some built in components like JQuery UI. By using Bootstrap framework, we get both CSS and JavaScript facilities with a single platform. But before start designing an application interface with Bootstrap, one may have some basic knowledge about this framework. It will increase the efficiency.

4.1.1.2 JQuery UI

JQuery UI is a name of library which uses JavaScript as core programming language. It simplifies codes of a programming language named JavaScript. Generally, it interacts with Graphical User Interface (GUI). It also provides visual effects with animation. It can also override cascading style sheets. It also provides AJAX functionality which stands for Asynchronous JavaScript and XML. It is also a subset of JavaScript. By using AJAX no page reloading is required. It is also compatible with any browser like Google Chrome, Mozilla Firefox, Opera, Safari, Internet Explorer etc.

4.1.1.3 Programming Language

For developing any application system minimum one programming language is essential. In my application, there are two different programming language is used. One is for front-end side. And another is for server side. The front-end language that I have used to my application is JavaScript. And the server side programming language name is PHP which stands for Hypertext Preprocessor. Both of them are open source general purpose scripting language.

4.1.2 Implemented tools and platform

As I have said before, there are some tools and technologies that need to be used for developing software. It is very important to determine which tools and platforms are the best match of my requirements. After making a proper decision, one need to start using them.

4.1.2.1 Integrated Development Environment

IDE stands for Integrated Development Environment. Programmers write code on IDE. After that IDE provide the feature to execute the source code. For developing my web application, I have used two IDE. Because my project has two versions. One is for web version, and another is for mobile users. To develop my web version, I have used phpStromes which is powered by JetBrains company. It is a commercial IDE for cross platform environment. It is able to suggest code to the programmers also.

But for my android version I have used Android Studio powered by Google Inc. Android Studio is maintained by Google Inc. And nowadays almost every mobile engineer uses this IDE to make their apps on android platform.

4.1.2.2 Web Server

We have used apache server. It is a free and open source software to use. It can be used on cross platform. It supports a wide range of features and most of them are already implemented as compiled modules. This module can extend the main features or core functionality.

4.1.2.3 Database Server

For developing our whole project, we have followed Relational Database Management System or RDBMS. And we find that MySql provides the feature of RDBMS. So we should not have any issue to use MySql database. It is also very easy to use. It can also ensure the security, scalability, high performance and many things.

4.2 Class Diagram

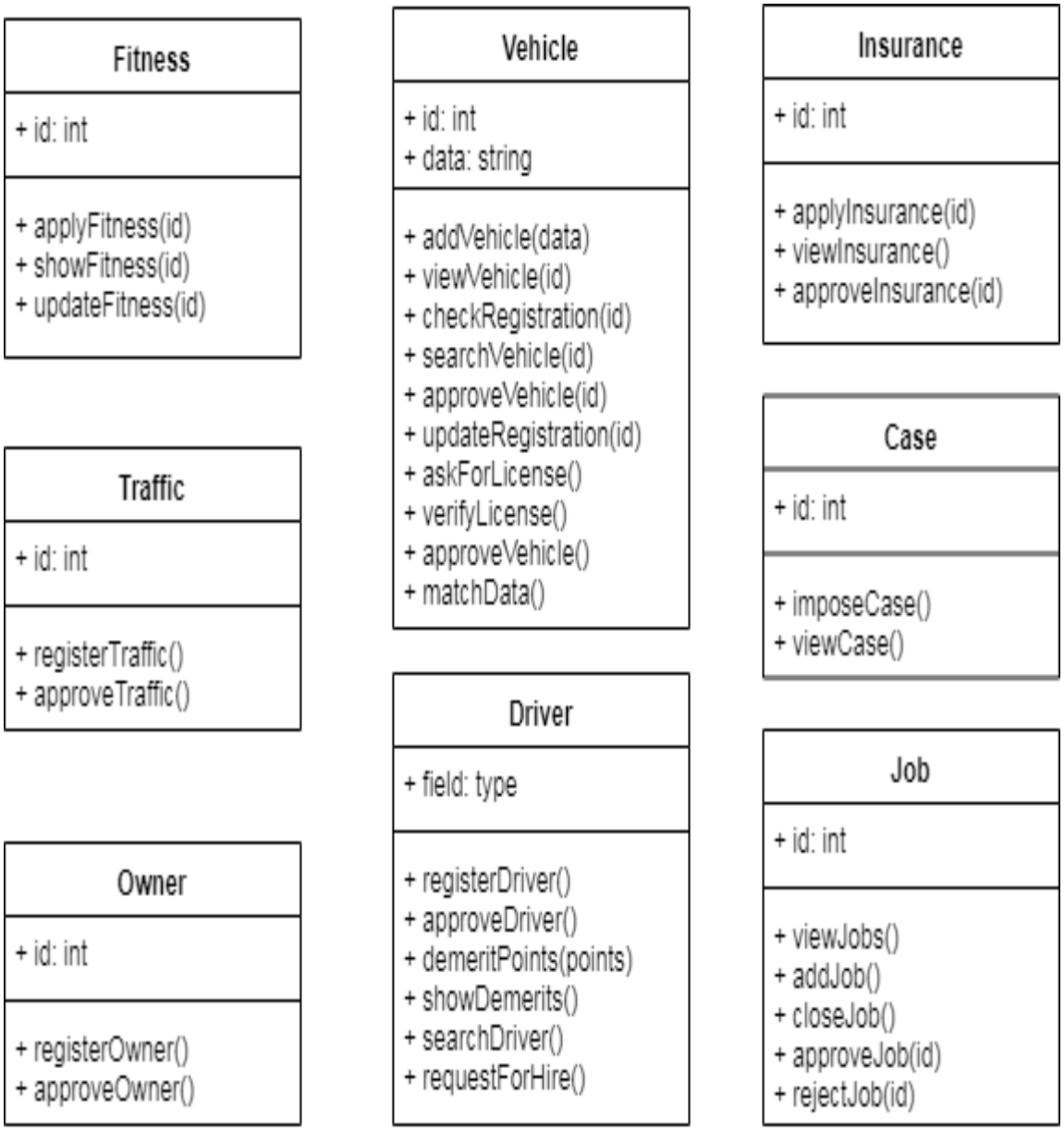

Figure 4.1: Class Diagram

4.3 Database Design Diagram

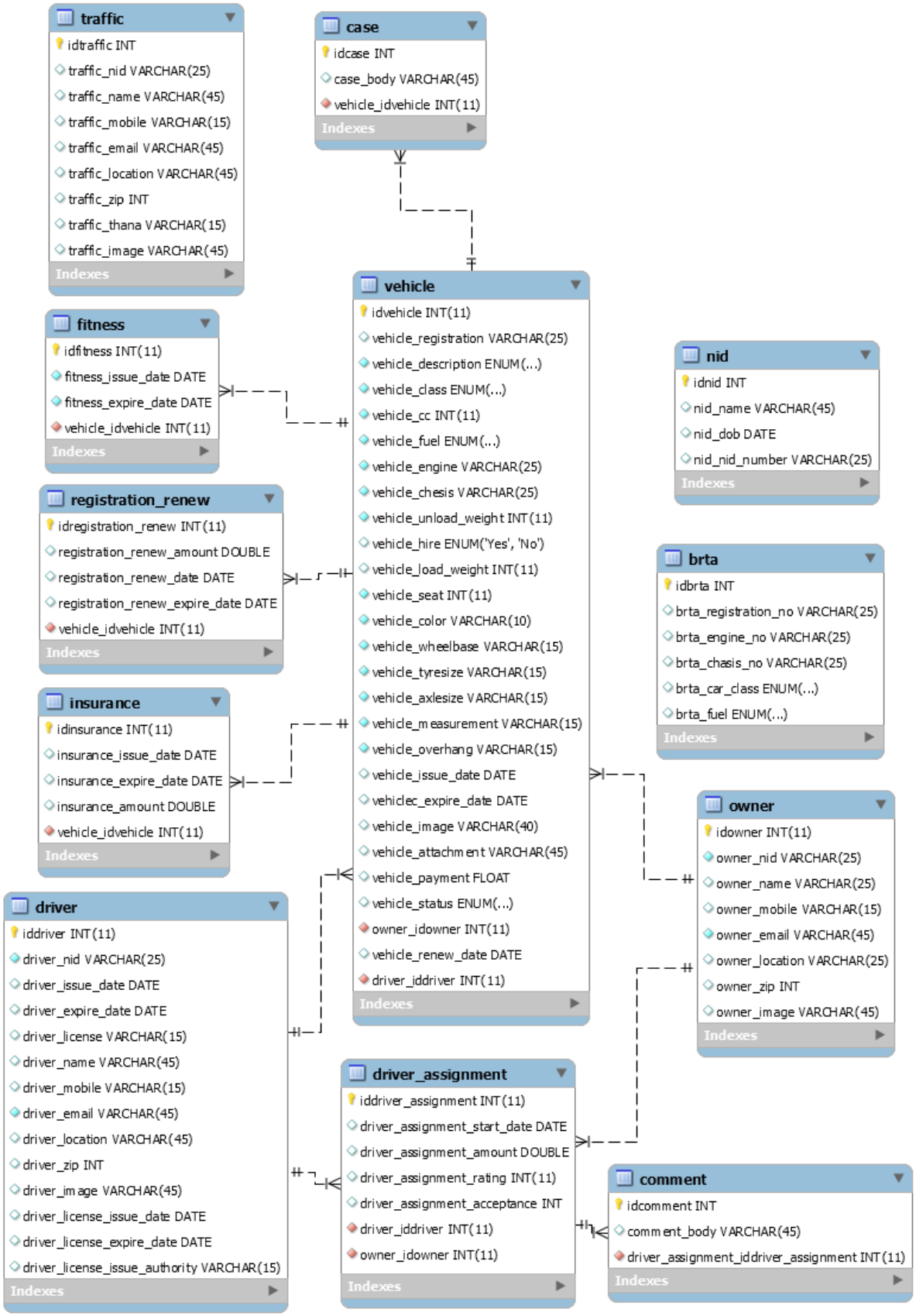

Figure 4.2: Database Diagram

Chapter 5
System Test

5.1 Testing Features

Feature testing can be considered as making change to add or modify the new functionality to the existing project. To test the features and functionality, a new test set is to be written for testing purpose. Almost every feature and functionality have different characteristics. Those are designed to make the application more useful, intuitive, reliable, secured, scalable, effective and efficient.

5.1.1 Features to be tested

Features	**Priority**	**Description**
Login	1	User must be authenticated by login
Logout	1	Session must be destroyed after logout
Insert vehicle data	2	Vehicle data must be inserted properly
Insert insurance data	2	Insurance data must be inserted properly
Insert fitness data	2	Fitness data must be inserted properly
Insert car registration	2	Registration data must be inserted for BRTA approval
Assign driver	3	Diver must be assigned only be the car owner by their registration number.
Registration	1	To become a member for any types of user, they need to be registered first.
Approve users	2	BRTA approve those users that are pending.
Impose cases	3	Traffic police can be able to impose cases.
Apply demerit	3	Traffic can give demerit to the drivers.
Technological Features		
Database	1	Database will be used at almost every operation. So this is why, this part must be controlled tightly.

Here, 1 = Low Priority, 2 = Medium Priority, 3 = High Priority

5.2 Testing Strategy

Testing strategy is to be considered as a general purpose of testing process. Testing object, testing function methods, total available resources are included to the testing strategy. It is also the indicator of test levels that are to be performed on the whole software development life cycle. Those strategies that are prepared by the quality assurance team should be reviewed by the developers of the application. After that it should be reviewed by the test team leads. Different kinds of testing strategies can be performed according to the type of application system that need to be tested.

5.2.1 Test approach

To complete the test process, testers must take some approach. There are mainly two test approach.

- **Automation testing:** Automation testing is a name of testing technique by which test engineers prepare some scripts according to test plan and after that they use suitable tools to perform testing of the software. Nowadays, almost every software company follow the approach of automation testing.
- **Manual testing:** Manual testing is also a name of technique of testing by searching out the bugs or vulnerability in an application. In this process, test engineers manually test and execute the test cases without having any automation tools.

5.2.1.1 Black Box Testing

Black box testing is a software testing method by which test engineers test the software without having knowledge of the internal architecture of the application that need to be tested. It is also known as behavioral testing. Black box testing can be both functional or non-functional. It ignores the internal mechanism of a system. We have decided to perform the equivalent class partitioning and Boundary value analysis techniques to implement.

5.2.1.2 Equivalent Class Partitioning

Equivalent class partitioning is also known as equivalent partitioning. In this technique input data is to be divided into groups. Those group of data are expected to perform as similar behavior. Each groups works as same as other groups also.

The main advantage of following the approach of equivalent class partitioning is to reduce the total number of test cases from infinite to finite. Another advantage is that it can be applied to all testing levels also.

For legal input value output will produce a meaning data. But for illegal input value, output will not produce meaningful data.

5.2.1.3 Boundary Value Analysis

Boundary value analysis is a name of software testing by which input data can be included within a boundary range. Following this strategy, test engineers firstly define the boundary value. After that they take a specific boundary and then write the test cases that will be go through the application for testing purpose. After completing those tasks, testers use test cases to test applications software.

5.2.1.4 White Box Testing

White box testing is also a name of testing approach which is also known as clear box testing, glass box testing, open box testing, transparent box testing, code based testing or structural testing. It is opposite to the black box testing. In black box testing, the internal architecture or algorithms is not known to the testers whether the whole software architecture is known to the testers while white box testing.

Testers can also predict the output of every test cases for white box testing. White box testing can be classified into some levels. Such as:

- Unit Testing
- Integration Testing
- System Testing

The main advantage of white box testing is that testing is more throughout and the testing can be started from the very beginning stage.

5.2.2 Pass / Fail Criteria

Pass or fail criteria will be set by the test engineers. They will prepare the pass / fail criteria on the basis of which input data are worked and which are not works well. Those data that are worked well will considered as pass criteria. And rest of input data will be considered as fail criteria.

Now I will give the pass / fail criteria below.

- System crash will not be considered as pass case.
- If any criteria pass 100% times, then it will be considered as pass criteria only.
- If data can’t be displayed to the application properly, then it is also to be considered as fail criteria.

5.3 Testing Schedule

Test Phase	**Time**
Testing plan create	1 week
Test specification	2 week
Unit testing	During development time
Component test	1 week
Test Phase	**Time**
Integration testing	1 week
Validating use cases	1 week
Testing user interfaces	1 week
Load testing	1 week
Performance testing	1 week
Release to production	1 week

5.4 Trace Ability Matrix

Project Manager			**Business Analyst Lead**		
QA Lead			**Target Implementation Date**		
BR#	**Category / Functionality / Activity**	**Requirement Description**	**Use Case Reference**	**Test Case Reference**	**Comments**
BR-1	Functional	Add vehicle	Use case 3.1.1	Test case 5.6.3	
BR-2	Functional	Add car insurance	Use case 3.1.3	Test case 5.6.4	
BR-3	Functional	Search vehicle	Use case 3.1.28	Test case 5.6.5	
BR-4	Functional	Approve user	Use case 3.1.13, 3.1.14, 3.1.15	Test case 5.6.7	
BR-5	Functional	Search driver	Use case 3.1.8	Test case 5.6.6	
BR-6	Functional	Assign driver	Use case 3.1.9	Test case 5.6.8	
BR-7	Functional	Car cases	Use case 3.1.30	Test case 5.6.9	
BR-8	Functional	Demerit Point	Use case 3.1.33	Test case 5.6.10	
BR-9	Non-functional	Reliability	N/A	N/A	
BR-10	Functional	Apply fitness	Use case 3.1.5	Test case 5.6.11	
BR-11	Functional	Approve license	Use case 3.1.18	Test case 5.6.12	
BR-12	Functional	Approve fitness	Use case 3.1.17	Test case 5.6.13	

5.5 Testing Environment

Testing environment means to prepare the environment with hardware and software so that test engineers can be able to execute test cases as required. Besides hardware and software usage, network configuration might be needed to execute test plans.

For making the environment for testing, some key area need to setup. Those are:

- Test data
- Database server
- Client's operating system
- Front end running environment
- Browser
- System and application
- Network
- Hardware with server operating system
- Documentation is also required. Like: user manuals, installation guides, configuration guides, documents etc.

5.6 Test Cases

A test case refers to some rules and regulations or conditions by which it can be determined whether a system can be able to meet the works or requirements under test cases properly. We know, there is a chance to have some fault or break holes in any application. This is very common scenario. And those issues are solved usually by software testing approaches. But if we don't care of those issues, then the full application development might be ruined. So proper testing must be needed. For testing our application, I have prepared some test cases. Now, I am going to provide them.

5.6.1 Log In

Test case #1			**Test case name:** Log in		
System: Smart Citizen, Safe Journey			**Subsystem:** Owner, Driver, Traffic ID		
Designed by: Shouvick Ahmed Naim			**Designed date:** 05-Dec-2018		
Executed by:			**Executed date:**		
Short description: The registered users need to login to the application. And before that our application will check the authentication and authorization.					
Pre-conditions: • Users are always redirected to the login page whether they have not authenticated by our application while entering into the dashboard. • Assume that, the phone is '01921289288' and password is 'password'					
Step	**Phone**	**Password**	**Expected result**	**Pass/Fail**	**Comment**
1	01719	420	Invalid		
2	01711		Password can't be blank		
3		143	Mobile can't be blank		
4	01921289288	Password	Successfully login to the application and redirected to the dashboard		
Post-conditions: Users including car owner, driver, traffic will successfully login to the application.					

5.6.2 Input field is required in all pages

Test case #2	**Test case name:** Input field is required in all pages			
System: Smart Citizen, Safe Journey	**Subsystem:** N/A			
Designed by: Shouvick Ahmed Naim	**Designed date:** 05-Dec-2018			
Executed by:	**Executed date:**			
Short description: Users including car owner, driver or traffic need to fill up all that fields which as marked as required.				
Pre-conditions: • User like car owner, driver need to login first to be authenticated by the application program. • Every required field must be filled up by that user.				
Step	**Action**	**Response**	**Pass/Fail**	**Comment**
1	All required fields are not filled yet.	Fields must not be empty.		
2	All input filed is filled up by the user.	Application will save those information.		
Post-conditions: Every information is saved to the database of the application program properly.				

5.6.3 Add vehicle

Test case #3		**Test case name:** Add vehicle		
System: Smart Citizen, Safe Journey		**Subsystem:** N/A		
Designed by: Shouvick Ahmed Naim		**Designed date:** 05-Dec-2018		
Executed by:		**Executed date:**		
Short description: Car owner need to add information of his/her own vehicle to our application which are already registered.				
Pre-conditions: • User must be authenticated by our application. • User type must be car owner. • User have a minimum single vehicle which have registration by BRTA				
Step	**Action**	**Response**	**Pass/Fail**	**Comment**
1	All data is not provided	Application push car owner to provide all required data to the application.		
2	Data provided properly	Data saved successfully for approval of BRTA		
Post-conditions: After providing vehicle data to the application, it will be in the pending list for approval from the BRTA authority.				

5.6.4 Add insurance

Test case #4		**Test case name:** Add insurance		
System: Smart Citizen, Safe Journey		**Subsystem:** N/A		
Designed by: Shouvick Ahmed Naim		**Designed date:** 05-Dec-2018		
Executed by:		**Executed date:**		
Short description: Car owner need to add information of his/her own vehicle's insurance to our application.				
Pre-conditions: • User must be authenticated by our application. • User type must be car owner. • User have a minimum single vehicle which have registration by BRTA				
Step	**Action**	**Response**	**Pass/Fail**	**Comment**
1	All data is not provided	Application push car owner to provide all required data to the application.		
2	Data provided properly	Data saved successfully for approval of insurance.		
Post-conditions: After providing vehicle insurance data to the application, it will be in the pending list for approval from the insurance authority.				

5.6.5 Search vehicle

Test case #5		**Test case name:** Search vehicle		
System: Smart Citizen, Safe Journey		**Subsystem:** N/A		
Designed by: Shouvick Ahmed Naim		**Designed date:** 05-Dec-2018		
Executed by:		**Executed date:**		
Short description: Traffic police need to search vehicles to check related papers including registration, license, fitness etc.				
Pre-conditions: • User must be authenticated by our application. • User type must be traffic police.				
Step	**Action**	**Response**	**Pass/Fail**	**Comment**
1	Registration number is incorrect	Application push traffic police to provide real data to the application.		
2	Registration number exists	Data will be shown to the traffic police with related information.		
Post-conditions: After providing registration number to the apps, it will retrieve data from the server and show them.				

5.6.6 Search driver

Test case #6		**Test case name:** Search driver		
System: Smart Citizen, Safe Journey		**Subsystem:** N/A		
Designed by: Shouvick Ahmed Naim		**Designed date:** 05-Dec-2018		
Executed by:		**Executed date:**		
Short description:				
Pre-conditions: • User must be authenticated by our application. • User type must be car owner.				
Step	**Action**	**Response**	**Pass/Fail**	**Comment**
1	Registration number is incorrect	Application ask vehicle owner to provide real data to the application.		
2	Registration number exists	Data will be shown to the traffic police with profile, scores and all other related information.		
Post-conditions: After providing registration number to the application, it will retrieve data from the server of that driver and show vehicle owner.				

5.6.7 Approve users

Test case #7		**Test case name:** Approve users		
System: Smart Citizen, Safe Journey		**Subsystem:** N/A		
Designed by: Shouvick Ahmed Naim		**Designed date:** 05-Dec-2018		
Executed by:		**Executed date:**		
Short description: BRTA approve those users those are pending after validating their information as well.				
Pre-conditions: • User must be authenticated by our application. • User type must be BRTA.				
Step	**Action**	**Response**	**Pass/Fail**	**Comment**
1	User is not approved yet.	User data will be shown on pending list.		
2	User approved by BRTA	User will be approved and they are not visible to the pending list of users.		
Post-conditions: After signing up to our application, user must be approved by BRTA and after that they can use application's features as well.				

5.6.8 Assign driver

Test case #8		**Test case name:** Assign driver		
System: Smart Citizen, Safe Journey		**Subsystem:** N/A		
Designed by: Shouvick Ahmed Naim		**Designed date:** 05-Dec-2018		
Executed by:		**Executed date:**		
Short description: Car owner may assign a driver for his registered vehicle.				
Pre-conditions: • User must be authenticated by our application. • User type must be car owner.				
Step	**Action**	**Response**	**Pass/Fail**	**Comment**
1	Owner send hire request	Driver will receive a hire request to his profile		
2	Hire request accepted by driver	Owner is prepare to assign that driver with a car.		
3	Hire request rejected by driver	Owner can't assign that driver with any of his vehicle.		
4	Owner assign driver with a car	Driver is already assigned to that vehicle.		
Post-conditions: After assign driver, he will provide service as per their agreement between car owner and driver.				

5.6.9 Car cases

Test case #9		**Test case name:** Car cases		
System: Smart Citizen, Safe Journey		**Subsystem:** N/A		
Designed by: Shouvick Ahmed Naim		**Designed date:** 05-Dec-2018		
Executed by:		**Executed date:**		
Short description: Traffic police may impose case to any vehicle in case of having any problem.				
Pre-conditions: • User must be authenticated by our application. • User type must be traffic.				
Step	**Action**	**Response**	**Pass/Fail**	**Comment**
1	Traffic impose cases	Case is saved to the application.		
2	Police doesn't impose any cases	No case are added to the vehicle then.		
Post-conditions: Car owner will be able to view the list of their vehicle's case				

5.6.10 Demerit points

Test case #10		**Test case name:** Demerit points		
System: Smart Citizen, Safe Journey		**Subsystem:** N/A		
Designed by: Shouvick Ahmed Naim		**Designed date:** 05-Dec-2018		
Executed by:		**Executed date:**		
Short description: Traffic police can be able to give demerit point to drivers				
Pre-conditions: • User must be authenticated by our application. • User type must be traffic police.				
Step	**Action**	**Response**	**Pass/Fail**	**Comment**
1	Points are not given	Points are not added to the driver profile then.		
2	Points are less than zero	Application ask traffic police to give points within range		
3	Points are more than ten	Application ask traffic police to give points within range		
4	Demerit points are given to the driver for breaking any rules.	Points are added to the driver profile.		
Post-conditions: After giving demerit points to the driver, they will be able to check their points from their own profile.				

5.6.11 Apply fitness

Test case #11		**Test case name:** Apply fitness		
System: Smart Citizen, Safe Journey		**Subsystem:** N/A		
Designed by: Shouvick Ahmed Naim		**Designed date:** 05-Dec-2018		
Executed by:		**Executed date:**		
Short description: Car owner can be able to apply fitness to BRTA.				
Pre-conditions: • User must be authenticated by our application. • User type must be car owner. • Owner have minimum a single car with registration.				
Step	**Action**	**Response**	**Pass/Fail**	**Comment**
1	Owner didn't apply for fitness	No action has occurred then.		
2	Owner already applied for fitness	Data has been saved to the database and pending for BRTA review		
Post-conditions: After applying for fitness, BRTA will approve that.				

5.6.12 Approve license

Test case #12		**Test case name:** Approve license		
System: Smart Citizen, Safe Journey		**Subsystem:** N/A		
Designed by: Shouvick Ahmed Naim		**Designed date:** 05-Dec-2018		
Executed by:		**Executed date:**		
Short description: BRTA will approve license after receiving request.				
Pre-conditions: • User must be authenticated by our application. • User type must be BRTA. • Minimum a single vehicles have to the pending list for license approval.				
Step	**Action**	**Response**	**Pass/Fail**	**Comment**
1	BRTA not approved car license.	No action has occurred then.		
2	BRTA approved pending vehicle license.	Data has been saved to the database.		
Post-conditions: After approving license, owner will be able to check that information. Also traffic police can verify license too.				

5.6.13 Approve fitness

Test case #13		**Test case name:** Approve fitness		
System: Smart Citizen, Safe Journey		**Subsystem:** N/A		
Designed by: Shouvick Ahmed Naim		**Designed date:** 05-Dec-2018		
Executed by:		**Executed date:**		
Short description: BRTA will approve fitness after receiving request.				
Pre-conditions: • User must be authenticated by our application. • User type must be BRTA. • Minimum a single vehicles have to the pending list for fitness approval.				
Step	**Action**	**Response**	**Pass/Fail**	**Comment**
1	BRTA not approved car fitness.	No action has occurred then.		
2	BRTA approved pending vehicle fitness.	Data has been saved to the database.		
Post-conditions: After approving fitness, owner will be able to check that information. Also traffic police can verify fitness too.				

Chapter 6
User Manual

6.1 Login Page

User need to login to our application for using this application. But before that they need to be authenticated by our application. First of all, they need to enter into the login page and fill up the required information. After that they will get access. Now I will provide the screenshot of login page below.

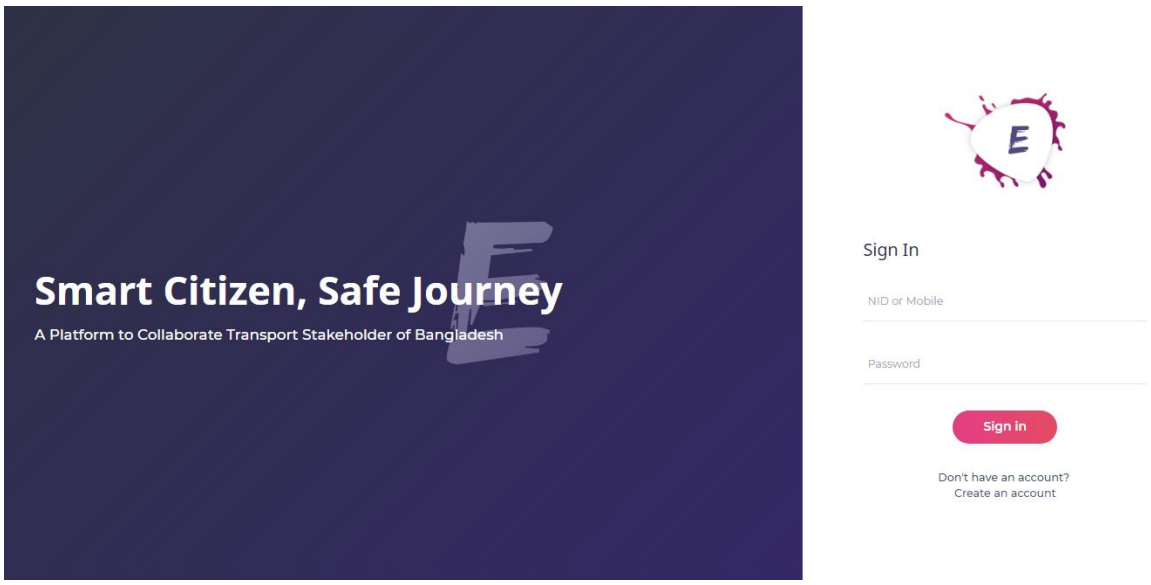

Figure 6.1: Login page

6.2 Registration page

User need to login first to get access to our application. But if the user has not signed up before then they need to register to our application first. For registration purpose, user need to go to the registration page. After that, they need to provide actual information which as required. After that, information will be pending for approval to BRTA. If BRTA approve the user ID, then he/she will be able to login to our application. Now I will provide the snapshot of the user registration page below.

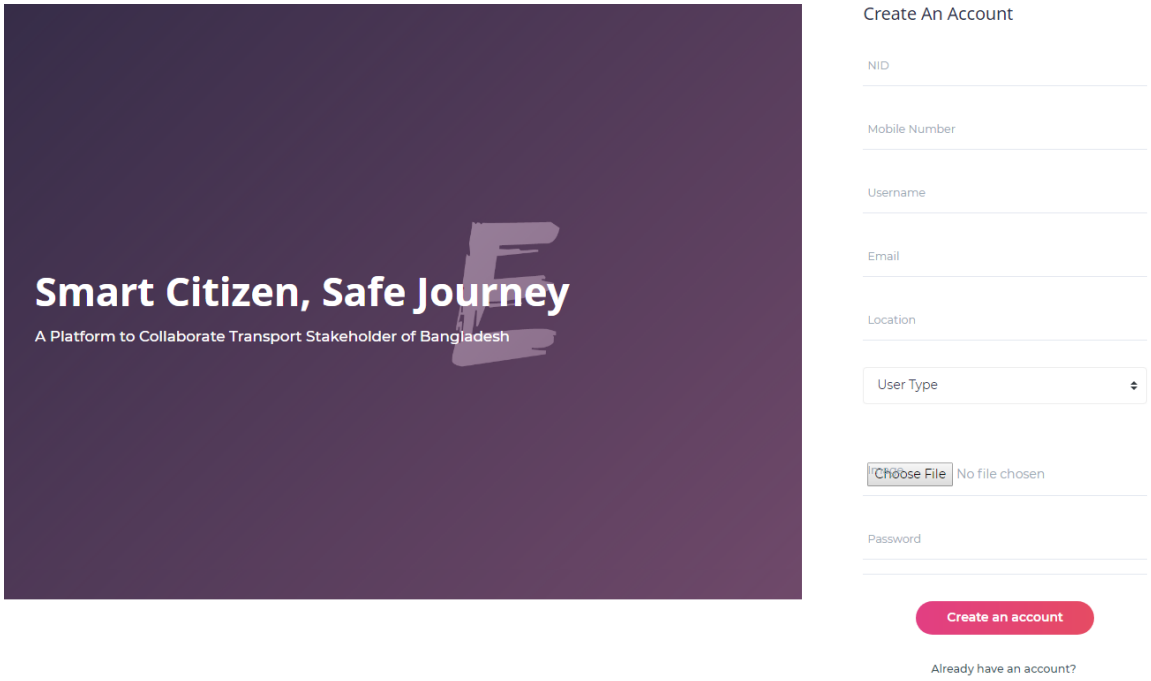

Figure 6.2: Registration page

6.3 Pending Users

After signing up, BRTA need to approve or reject user ID. For that reason, BRTA would login to the application. After that they check information which has already provided by the user with their national identity information. Now I will provide that page below.

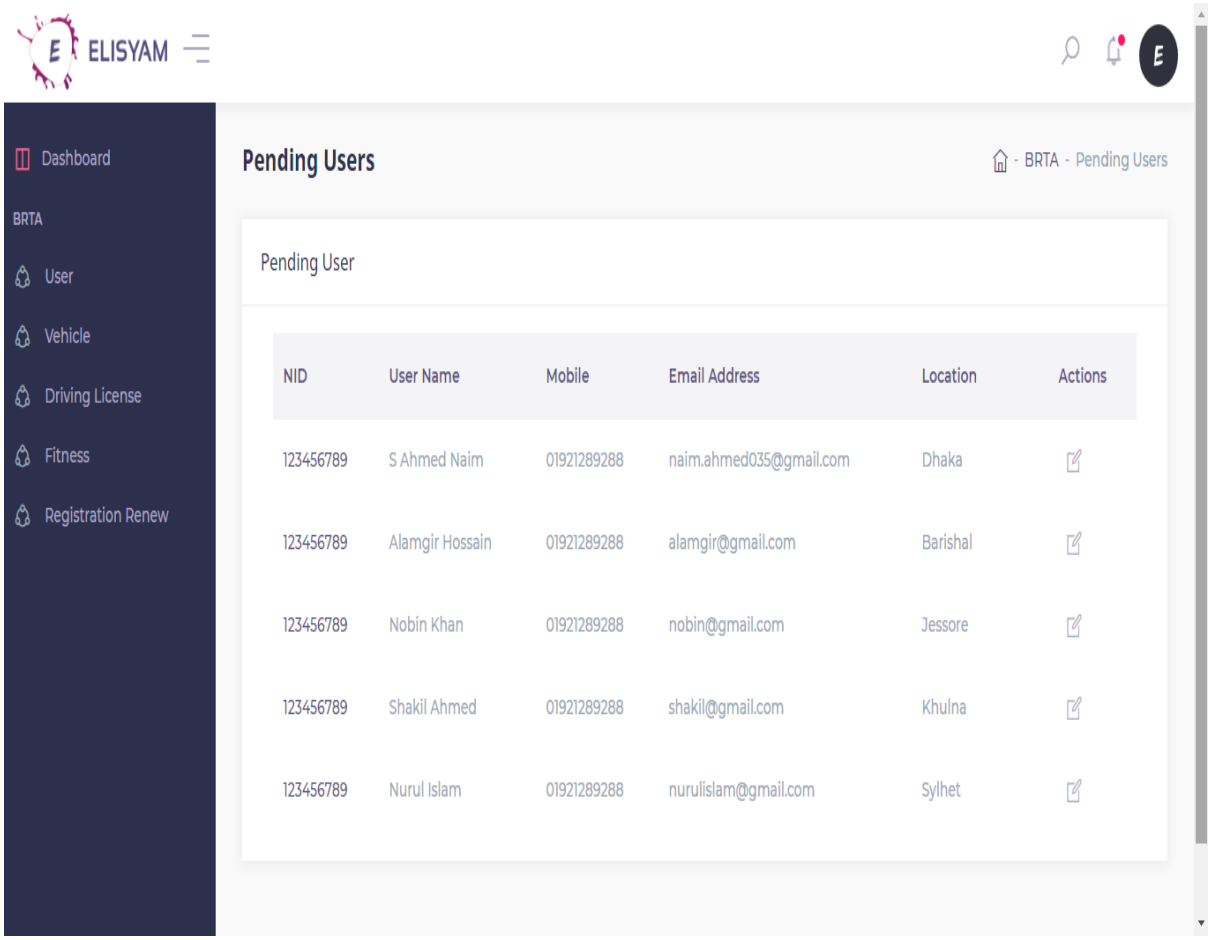

Figure 6.3: Pending users

6.4 Pending user details

Before approving user, BRTA need to verify the data. For that reason, BRTA see the details page. Now I will provide the details page below.

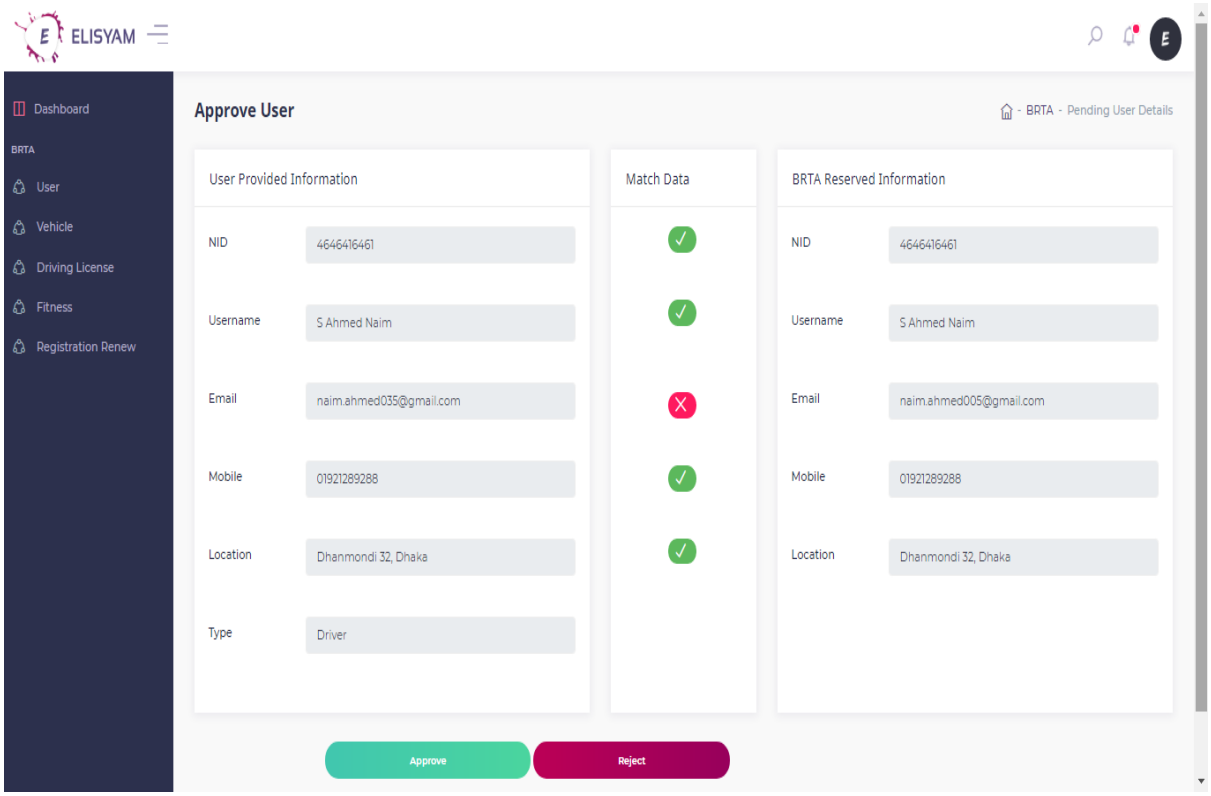

Figure 6.4: Pending user details

6.5 Pending vehicle

BRTA is also responsible to verify the pending vehicles. First of all, BRTA will get the pending vehicle list from their account. Now I will provide the screenshot below.

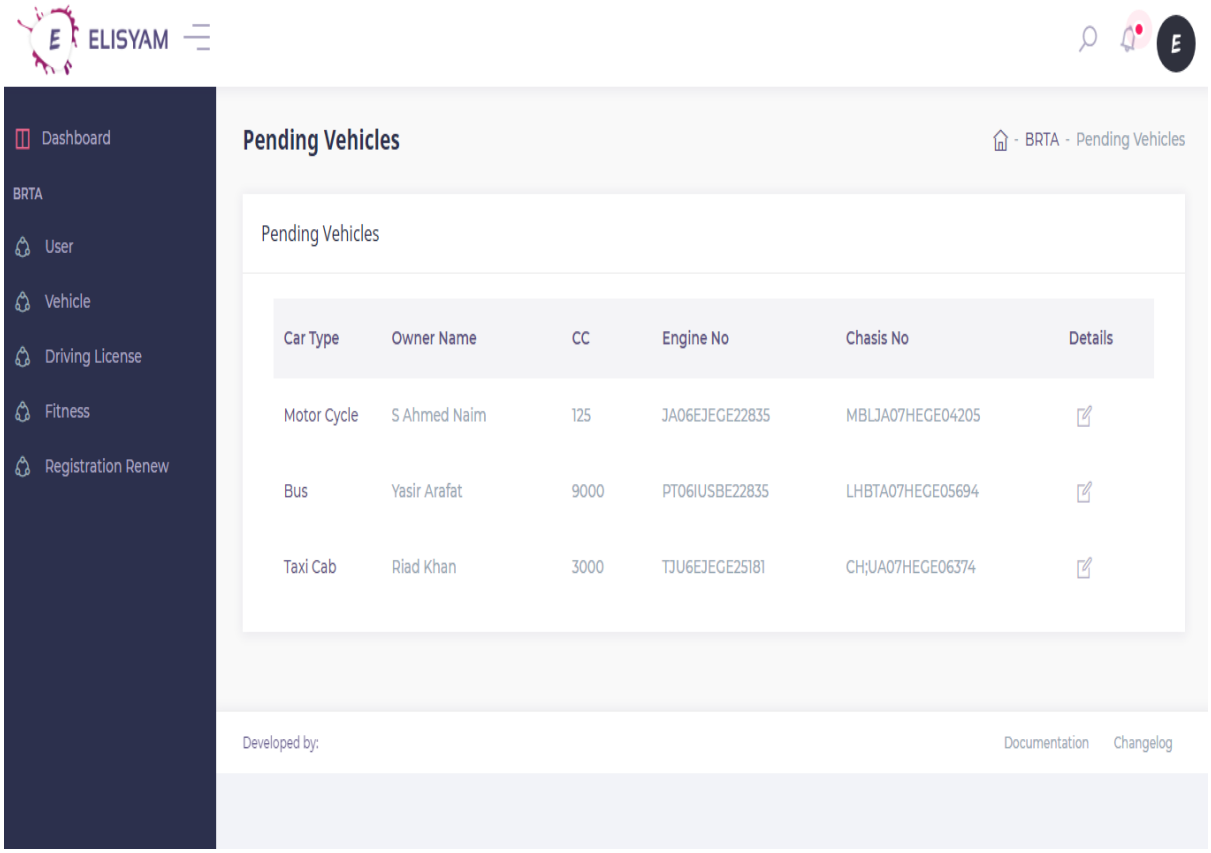

Figure 6.5: Pending vehicles

6.6 Pending vehicle details

BRTA would need to see the pending vehicle details. After seeing those information, BRTA will decide to give approval. Now I will show the details page below.

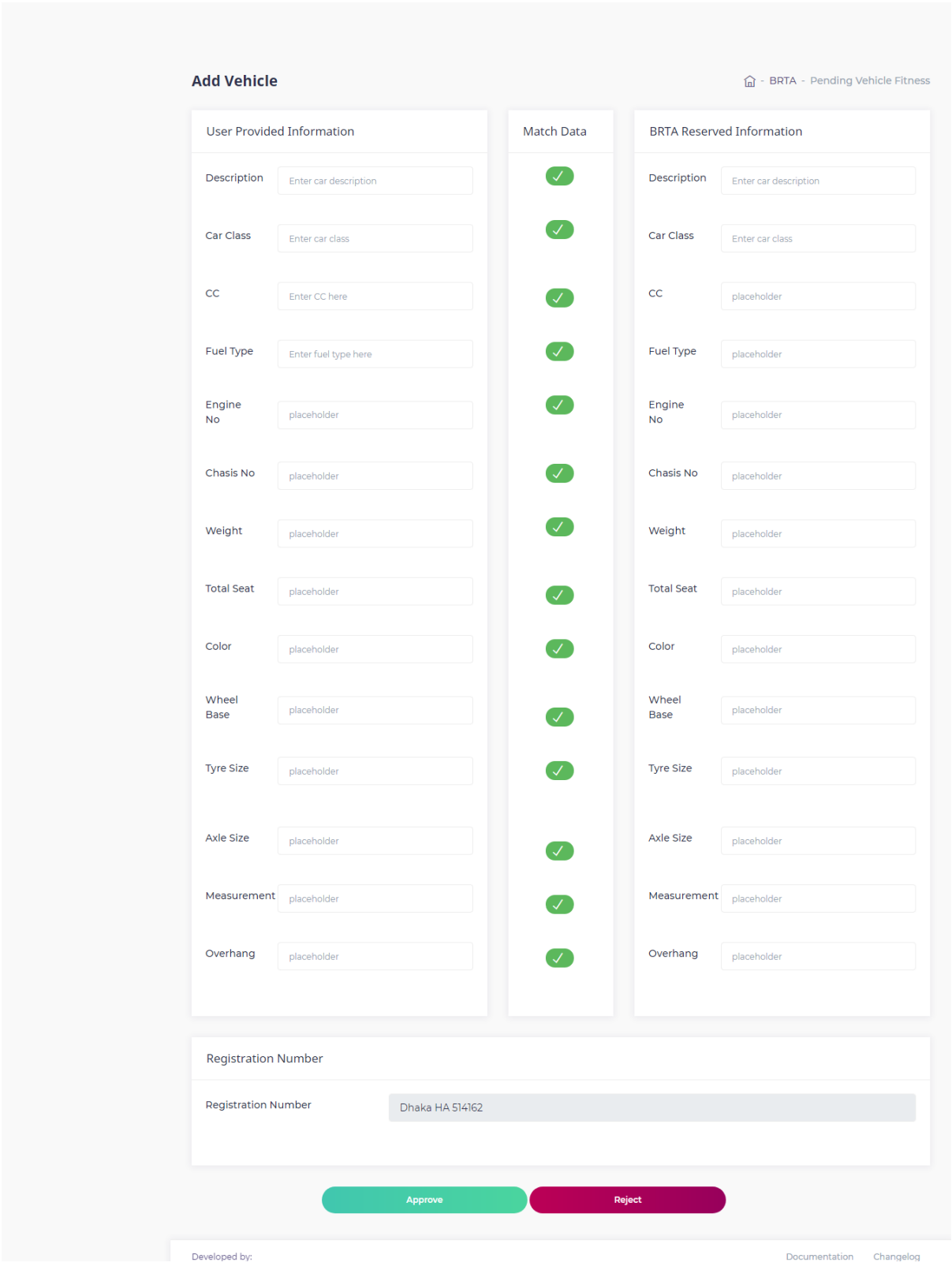

Figure 6.6: Pending vehicle details

6.7 Pending driving license

BRTA is also responsible to provide driving license. When user apply for driving license, then data will be visible to the BRTA profile. After that BRTA will decide to allow driving license. Now I will show the screenshot below.

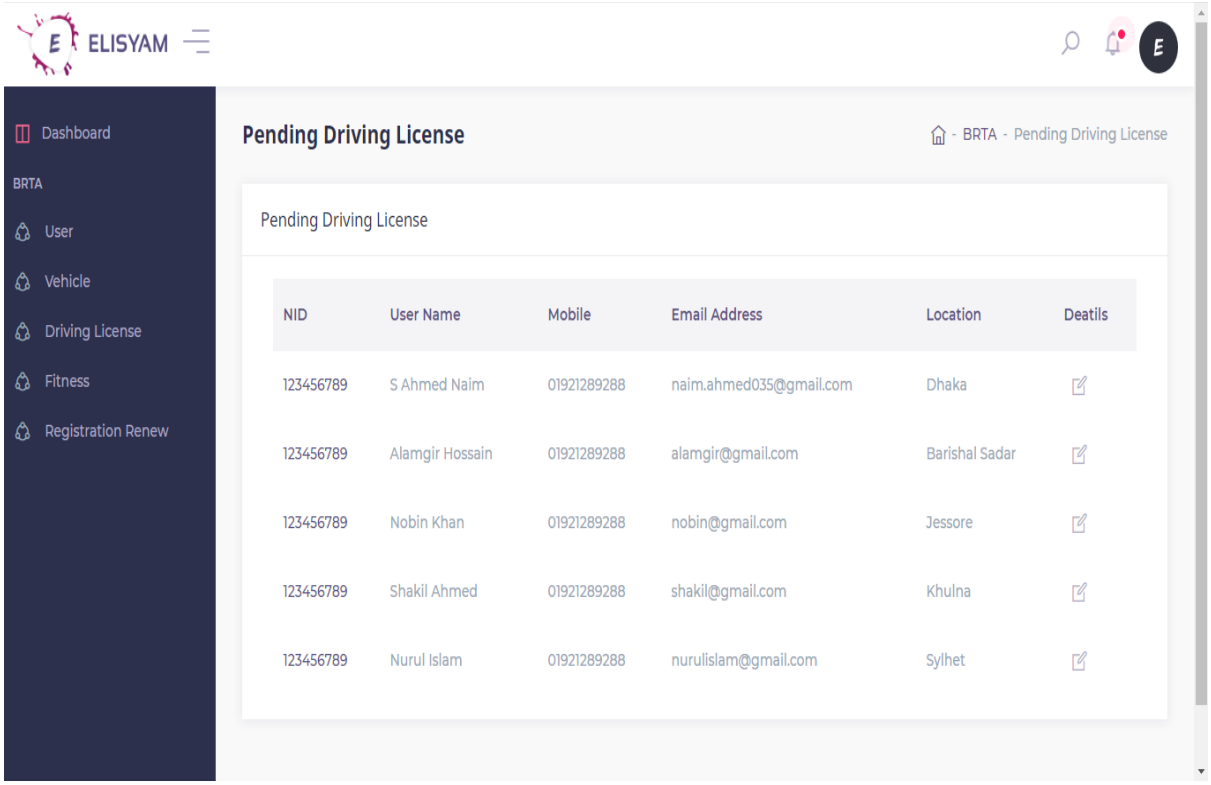

Figure 6.7: Pending driving license

6.8 Pending license details

BRTA need to see the details of drivers before approval driving license. For that reason, BRTA would need to go the details page. Now I will provide the details page below.

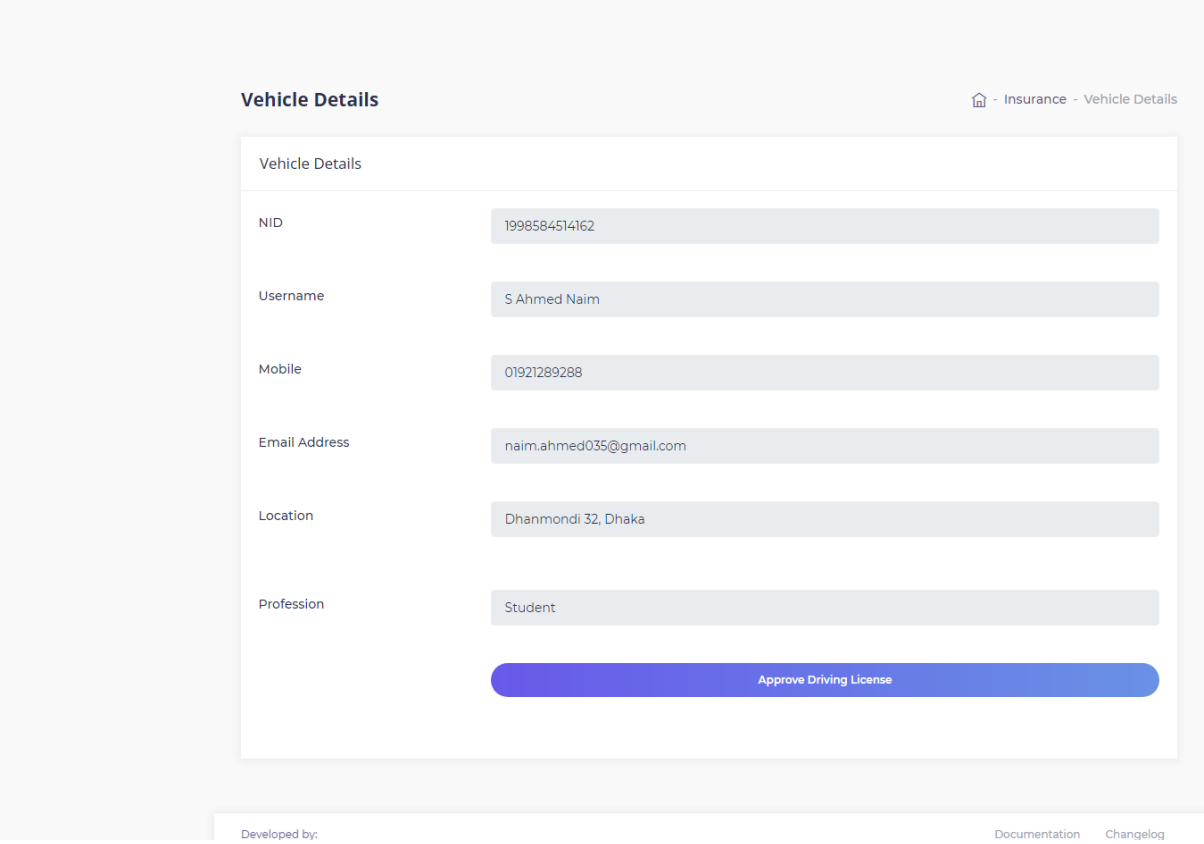

Figure 6.8: Pending driving license details

6.9 Pending fitness

BRTA will allow vehicles for fitness certificate. It is also to be said that, fitness can be renewed. BRTA see fitness data before approval. Now I will provide that page below.

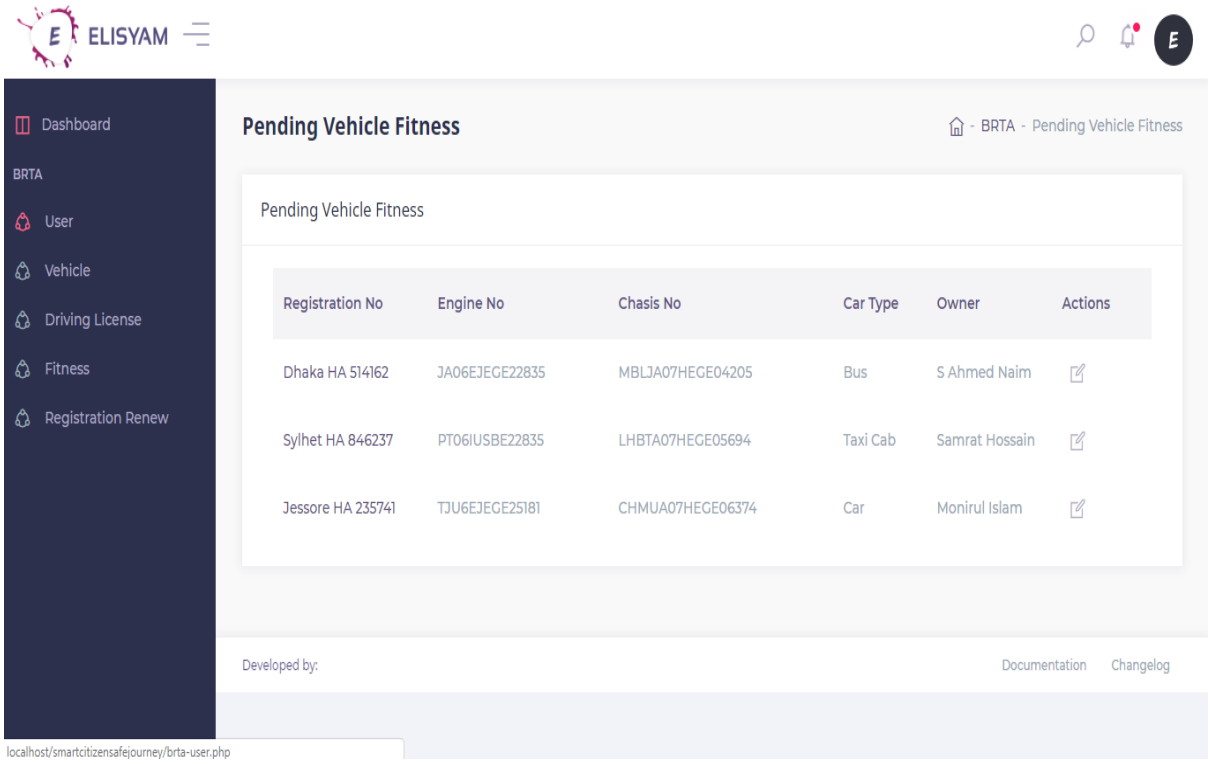

Figure 6.9: Pending fitness

6.10 Pending vehicle details

BRTA will make decision to provide fitness after seeing the vehicle details. For that reason, BRTA need to go to the vehicle details page. Now I will provide the vehicle details page below.

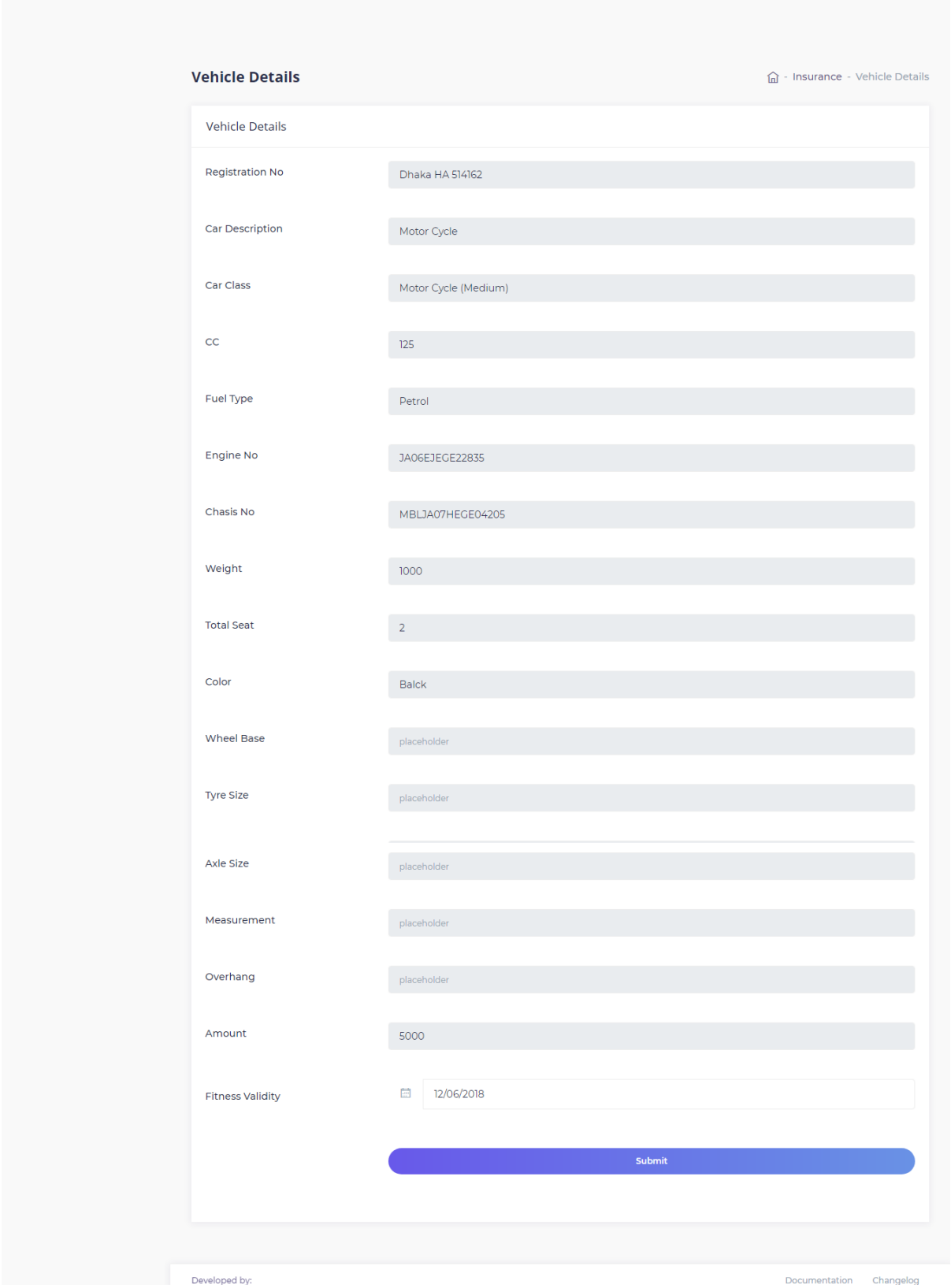

Figure 6.10: Pending vehicle details

6.11 Pending renewal list

Car owners apply for their vehicle renewal. And those data will be visible to BRTA. Now I will provide that page below.

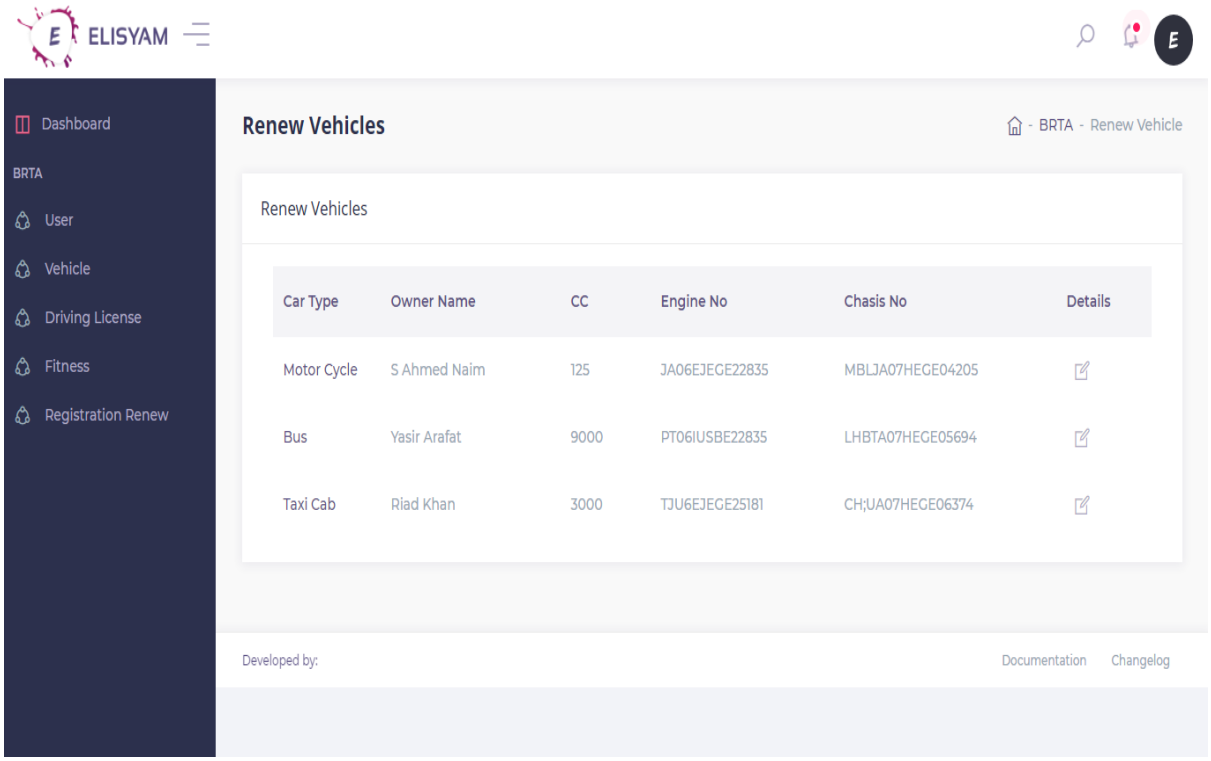

Figure 6.11: Pending renewal list

6.12 Pending renewal details

BRTA may need to see the details information for taking decision of which vehicles are pending for their registration renewal. For that reason, BRTA need to go to the details page. Now I will provide the details page below.

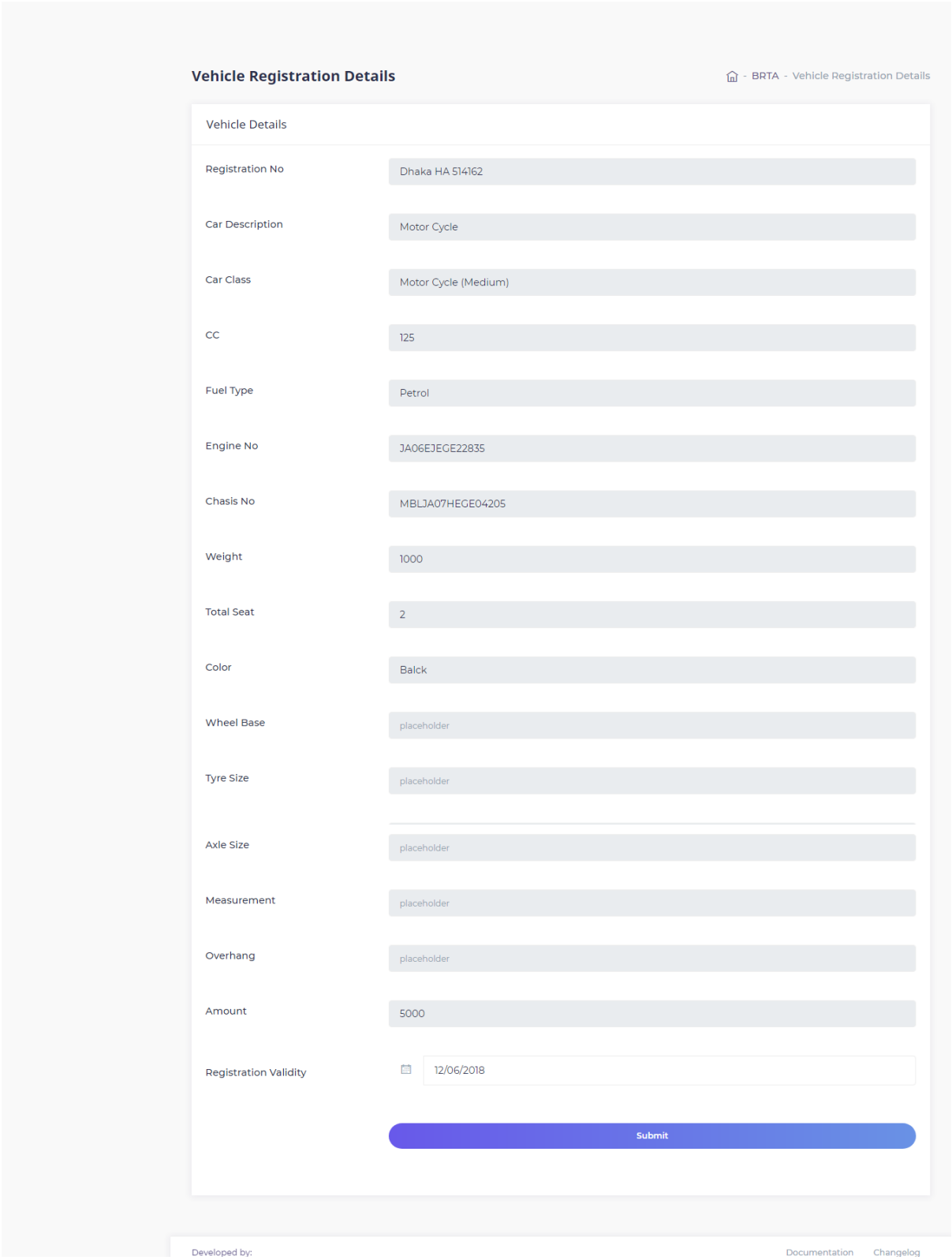

Figure 6.12: Pending renewal details page

6.13 Pending vehicle for insurance

Car owner need to apply for insurance. After that data will be visible to the insurance profile. Now I will provide the page below.

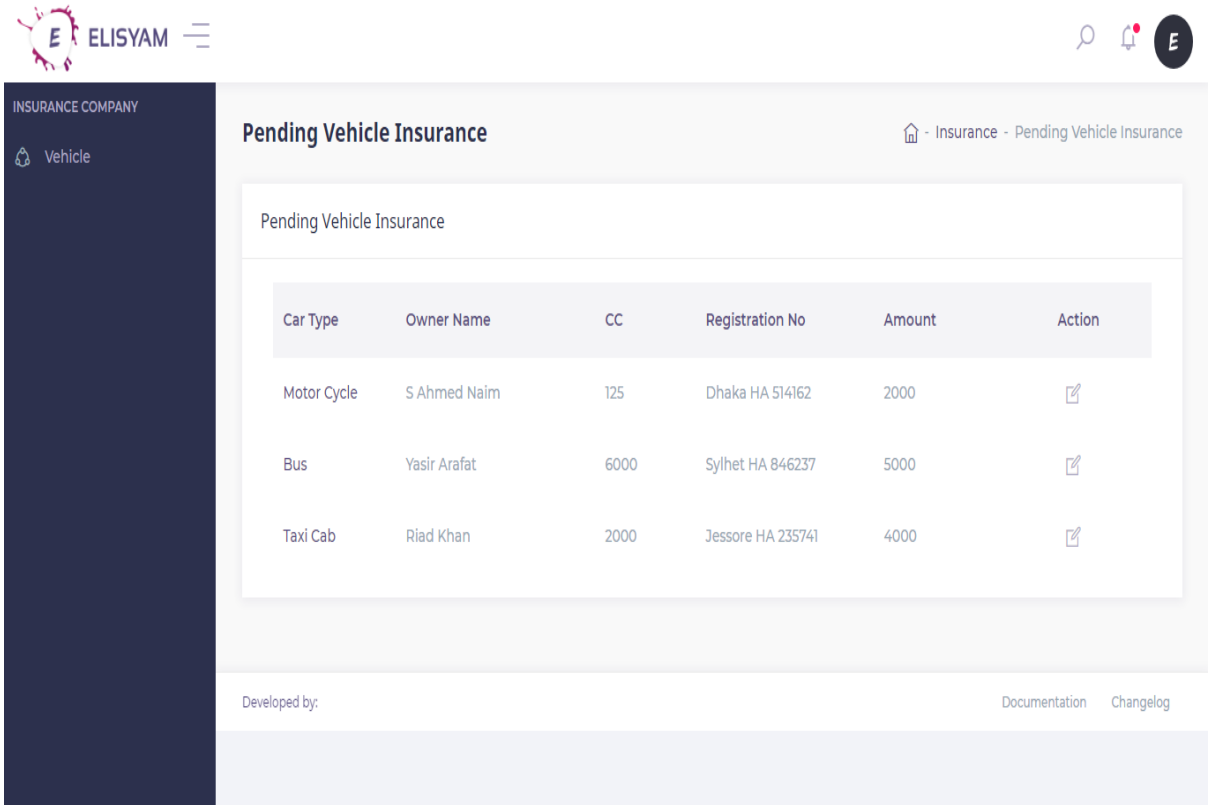

Figure 6.13: Pending vehicle for insurance

6.14 Vehicle details for insurance

Insurance company need to view details information related to vehicle. For that reason, they need to go to the details page. Now I will provide the details page for vehicle insurance is below.

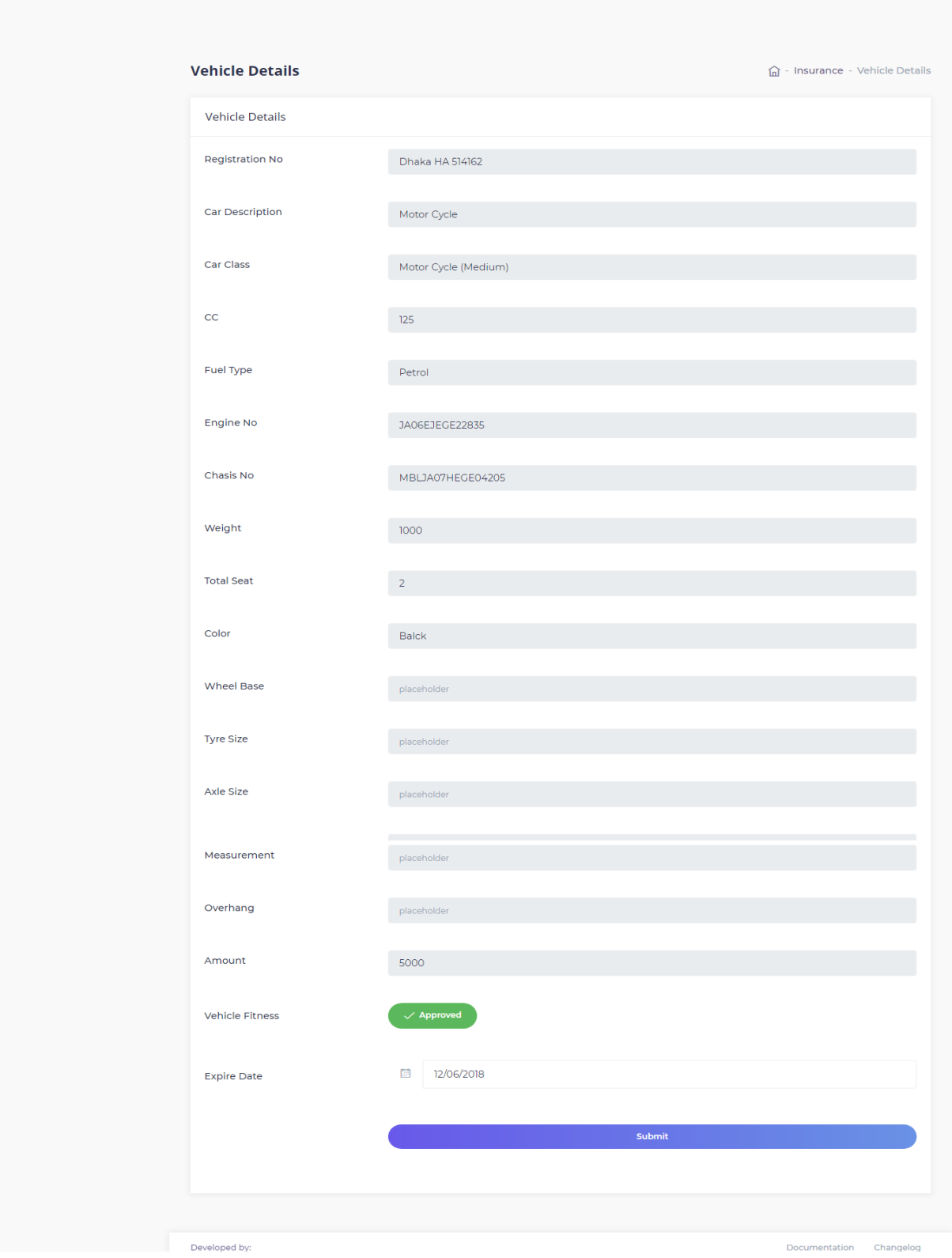

Figure 6.14: Vehicle details for insurance

6.15 Pending job request for drivers

When car owner sends hire request to the driver, then that will be visible to the driver's profile. Now I will provide that page below.

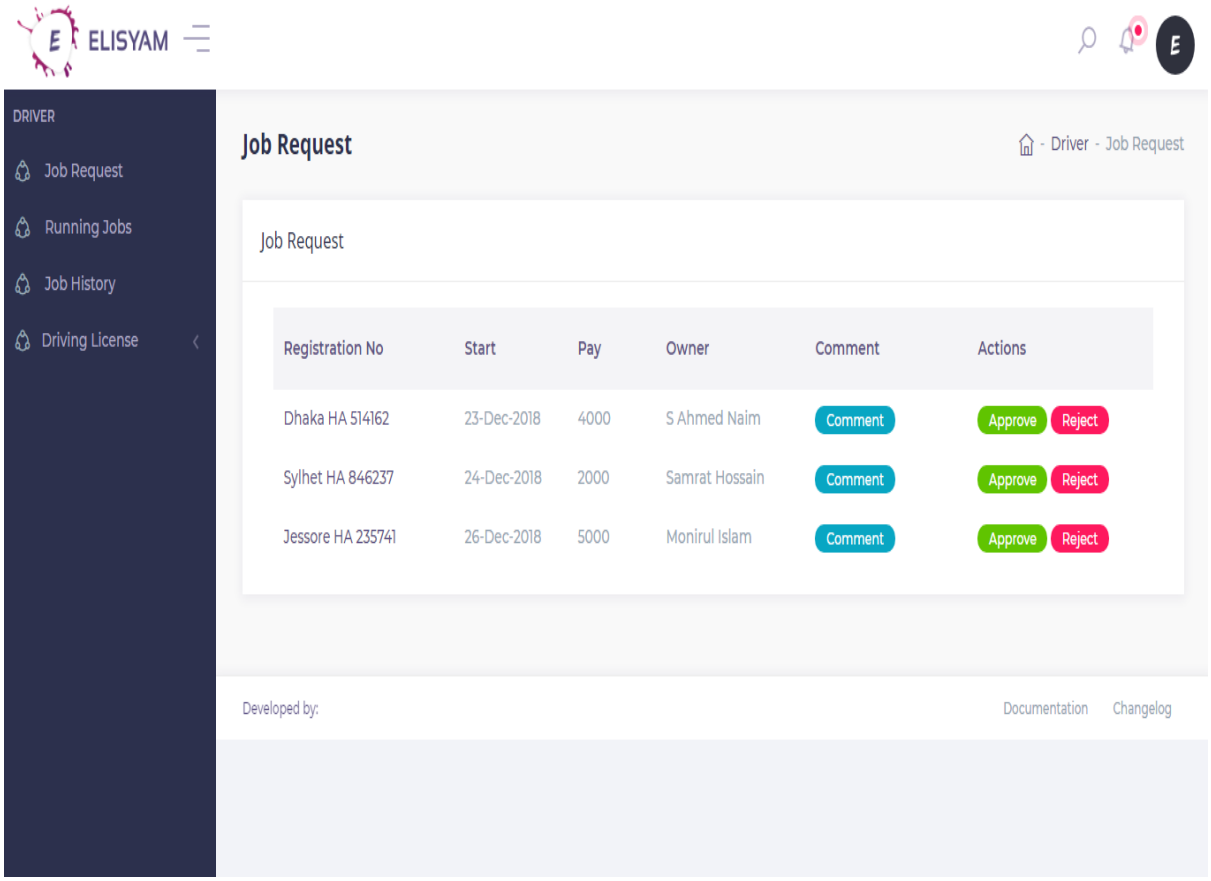

Figure 6.15: Pending job request for driver

6.16 Driver view running jobs

Driver will be able to see the running job list. Now I will provide the page below.

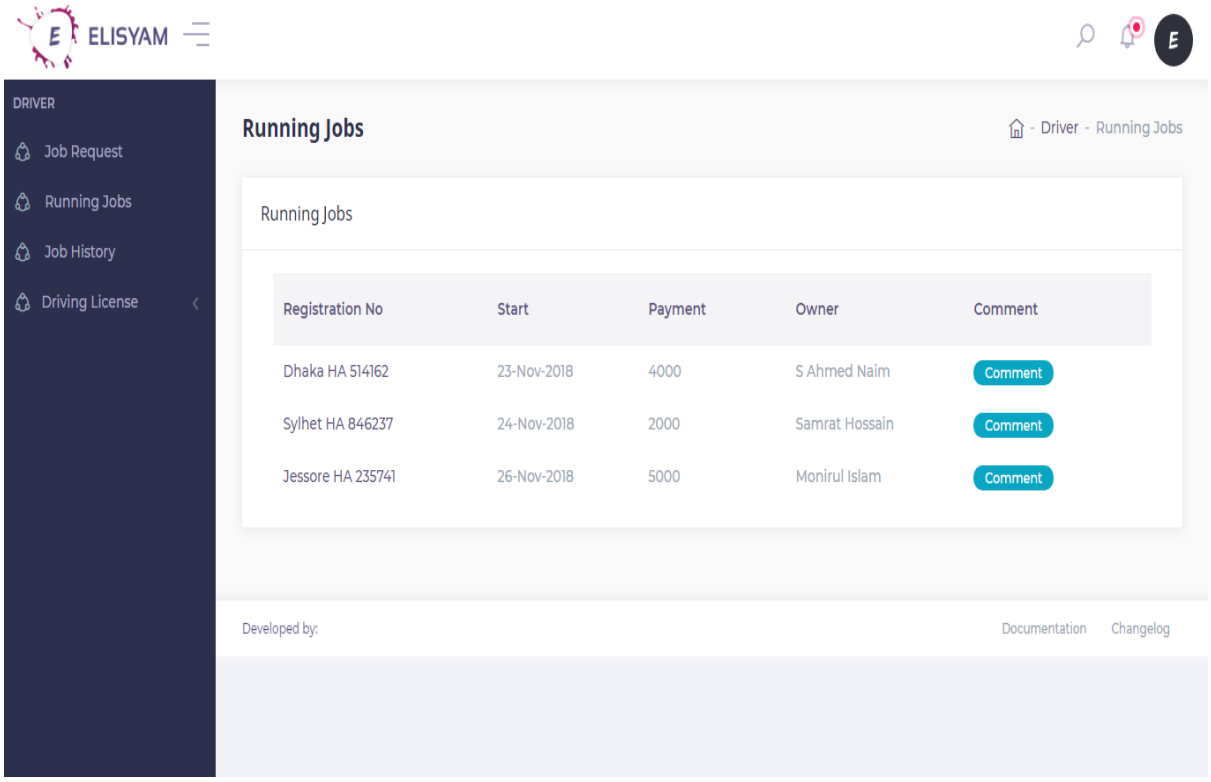

Figure 6.16: Driver view running jobs

6.17 Driver view job history

Driver is able to see their job history also. Now I will show that page below.

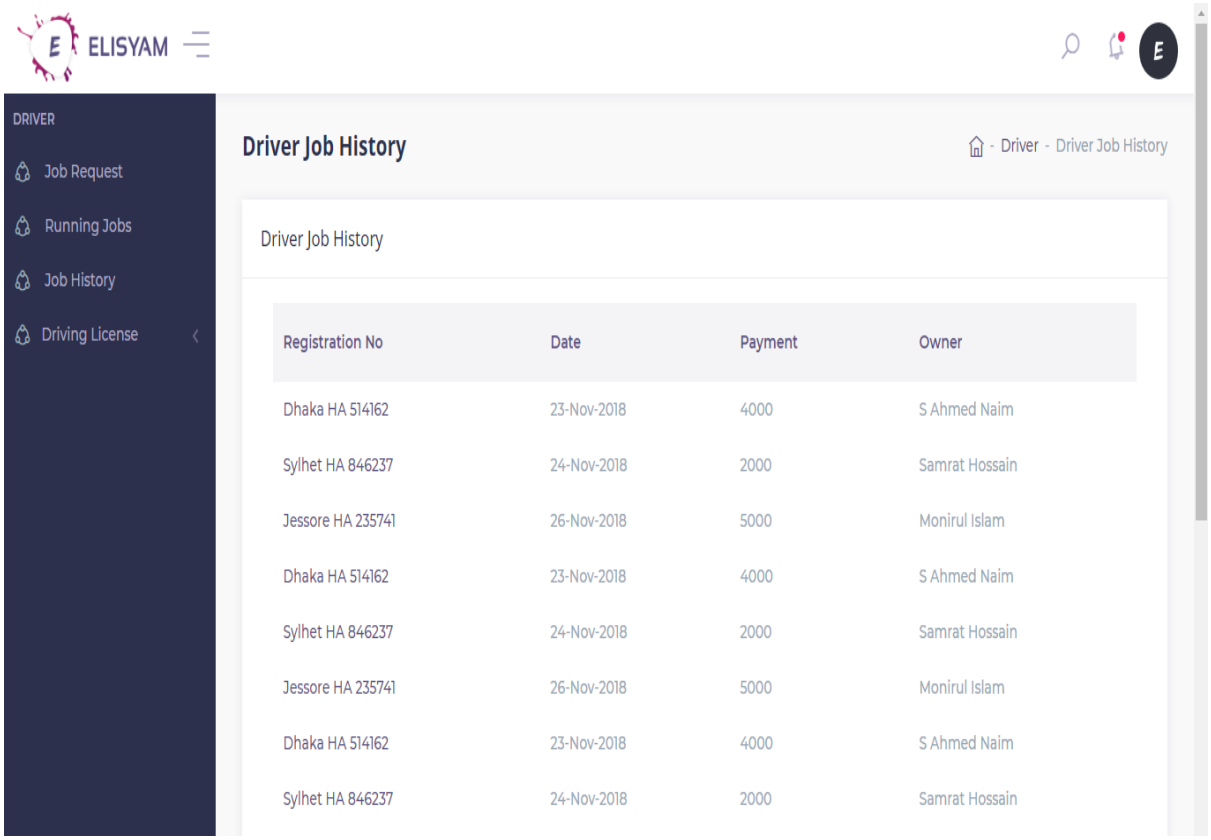

Figure 6.17: Driver view job history

6.18 Driver see driving license

Driver is able to view the driving license condition. Now I will provide the page below.

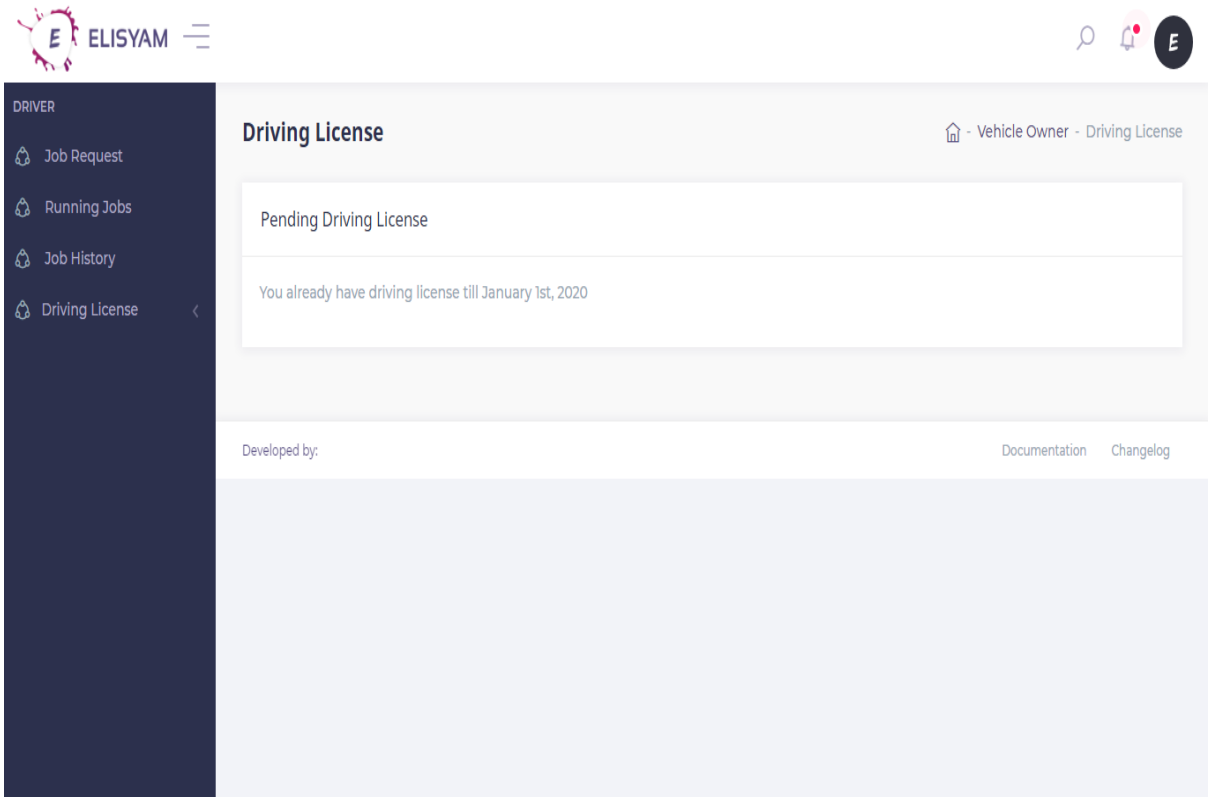

Figure 6.18: Driver see driving license condition

6.19 Owner add vehicle

Owner need to add vehicle data to our application for review to BRTA. For that reason, car owner need to go to the add vehicle page. Now I will provide that page below.

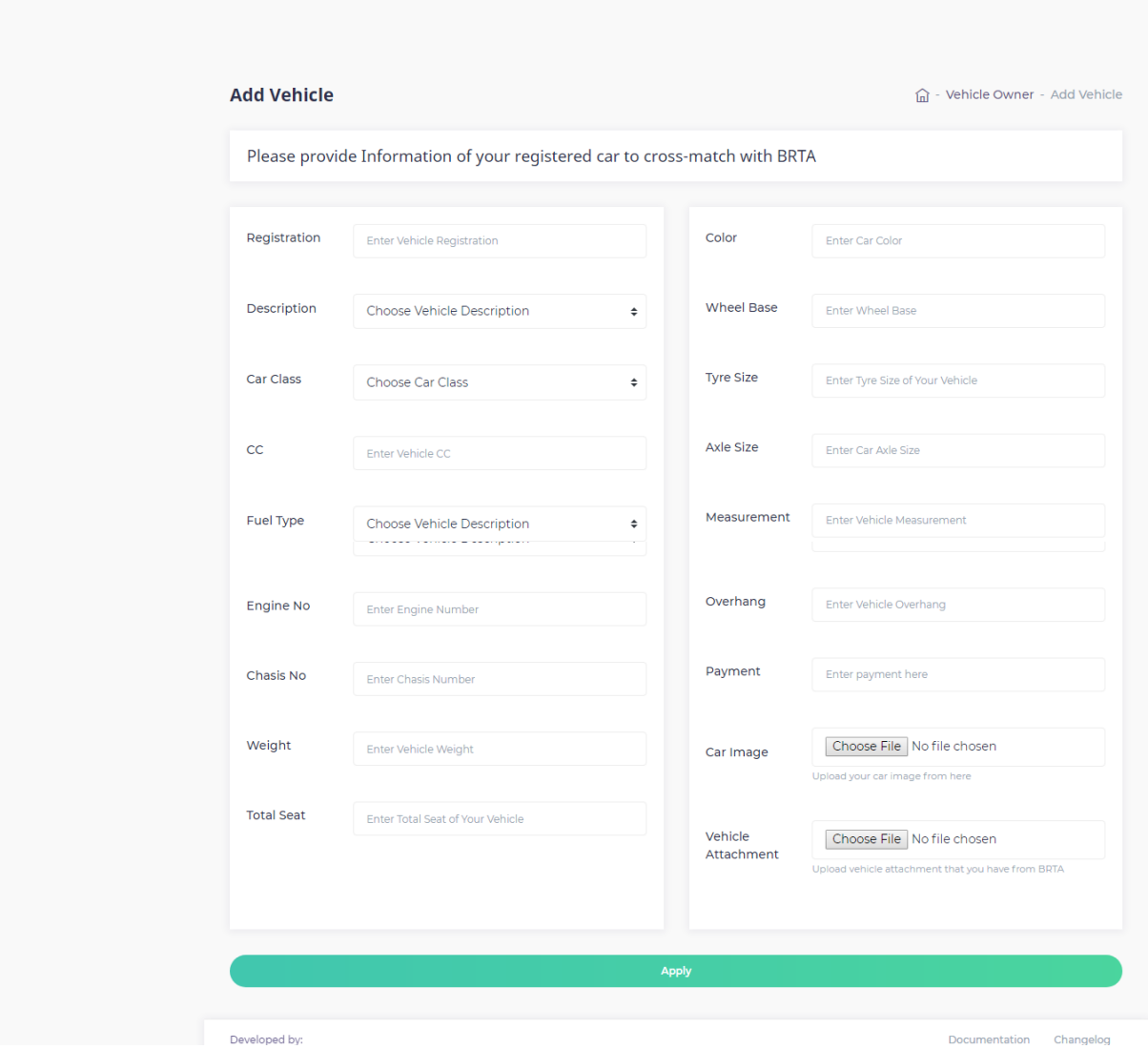

Figure 6.19: Owner add vehicle

6.20 Owner view vehicle

Owner can be able to view their vehicles list from their profile. Now I will provide that page below.

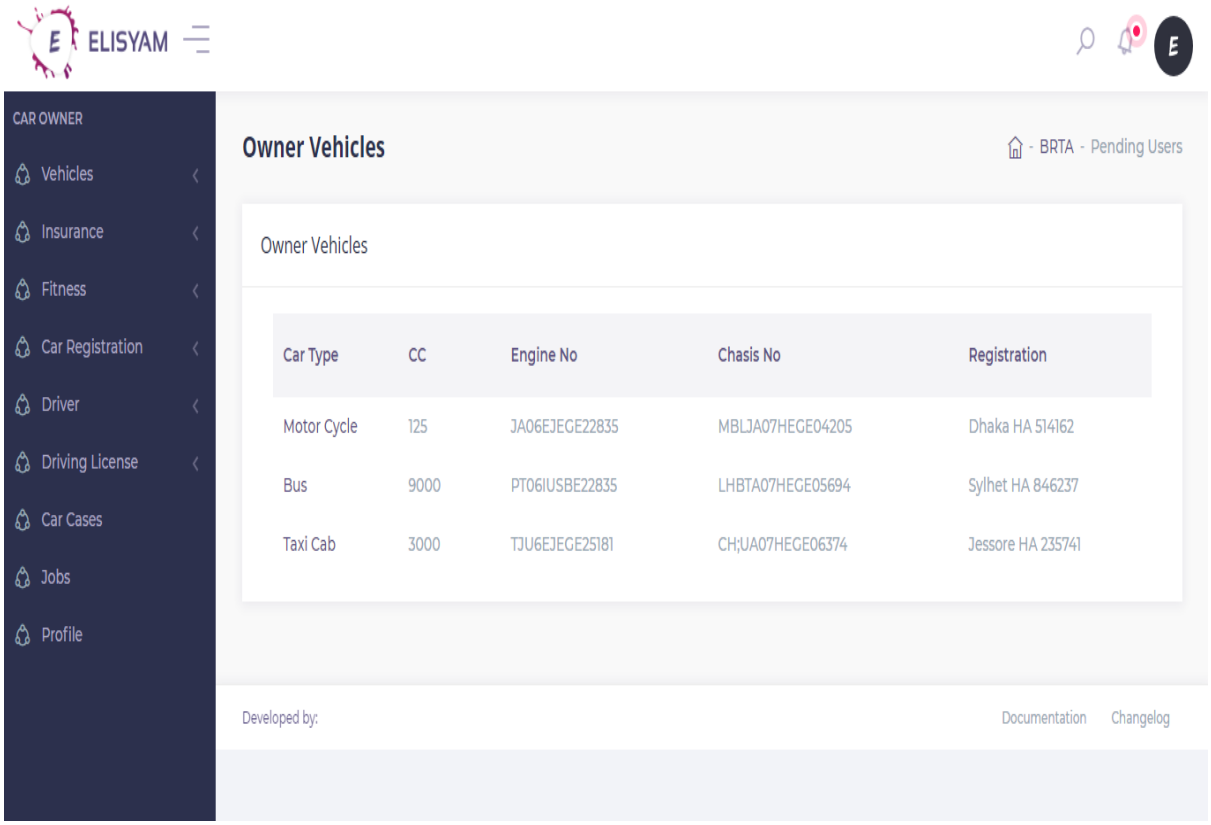

Figure 6.20: Owner view vehicle

6.21 Owner apply insurance

After approving vehicle and fitness, owner is able to apply fitness for each and every vehicle. For that reason, car owner need to go to the insurance apply page. That page is given below.

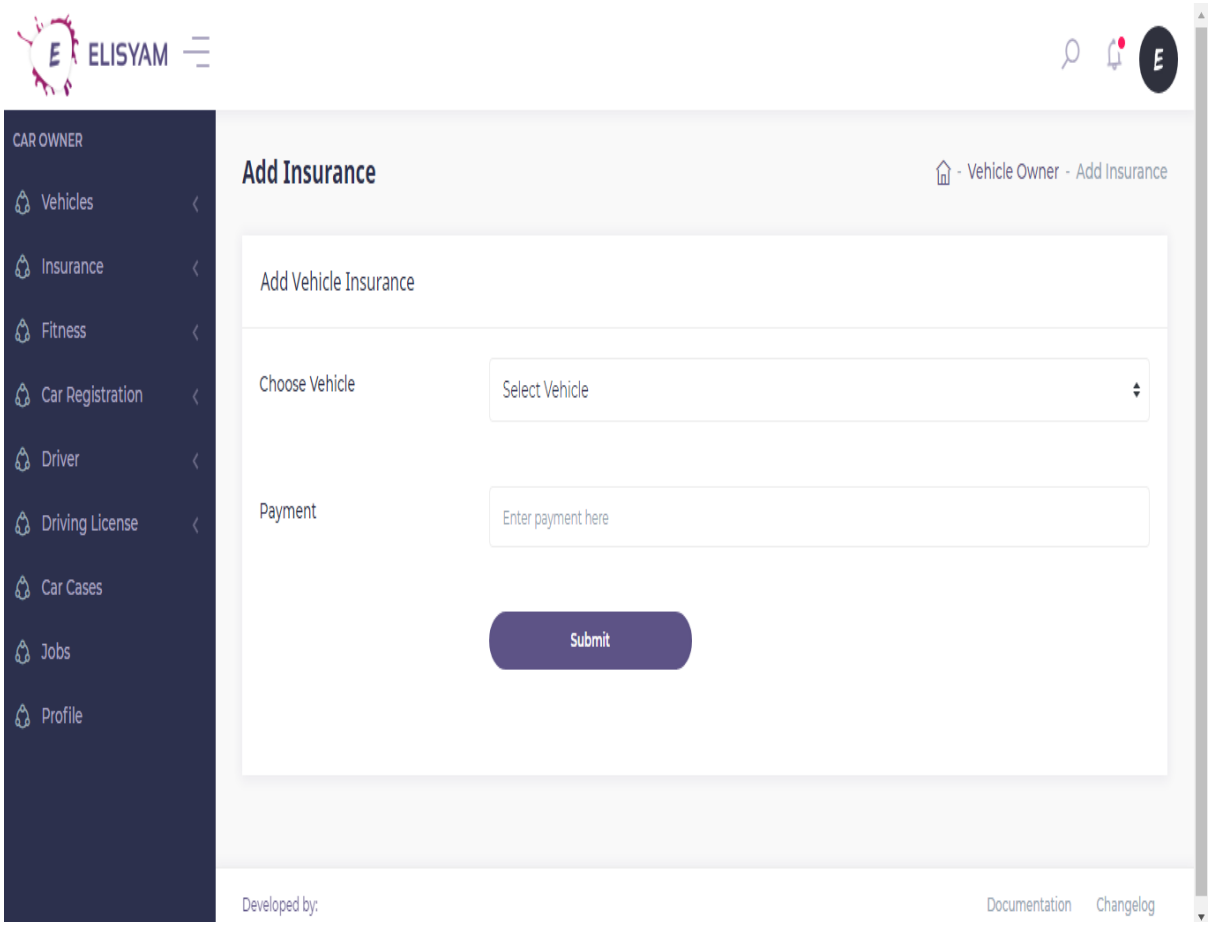

Figure 6.21: Owner apply insurance

6.22 Owner view insurance status

Owner can check their insurance status also. Now I will provide that page below.

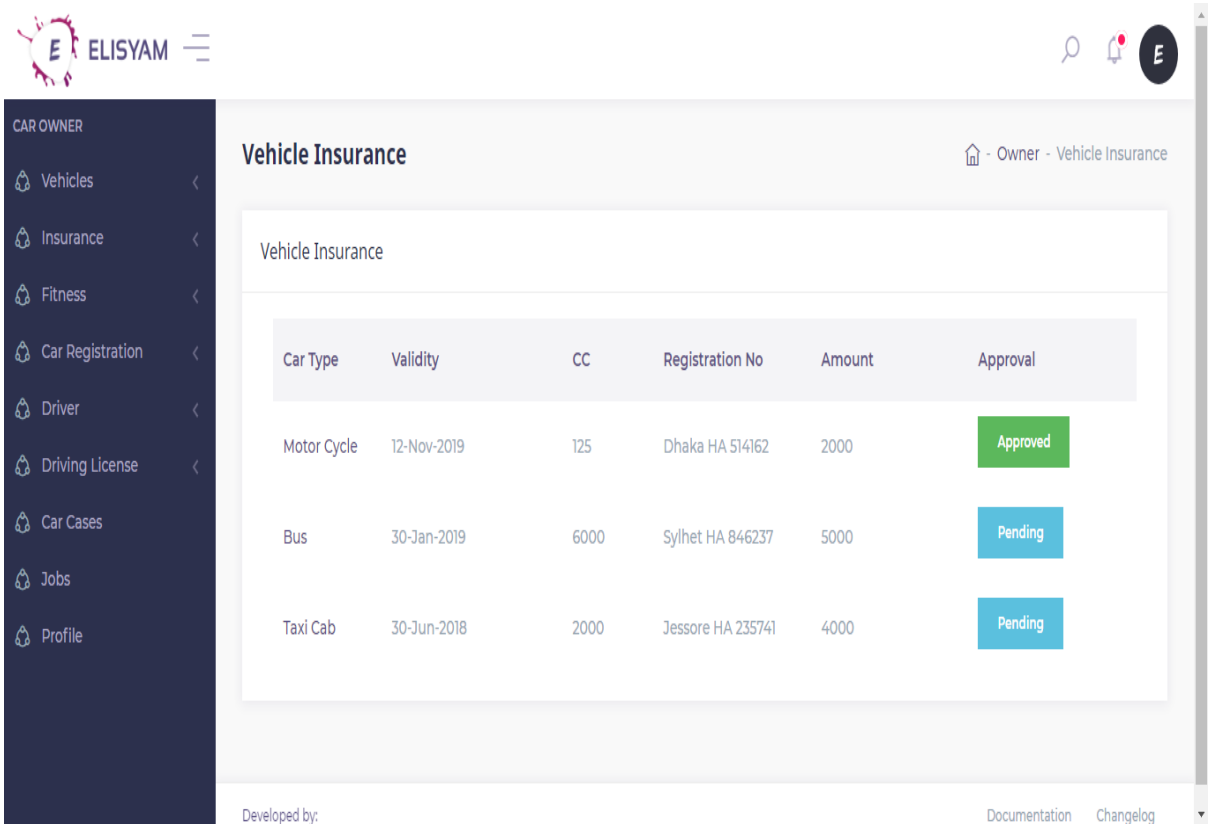

Figure 6.22: Owner view insurance status

6.23 Owner apply fitness

Owner need to apply for fitness to BRTA. But before that car owner need to go to the fitness apply page. Now I will provide that page below.

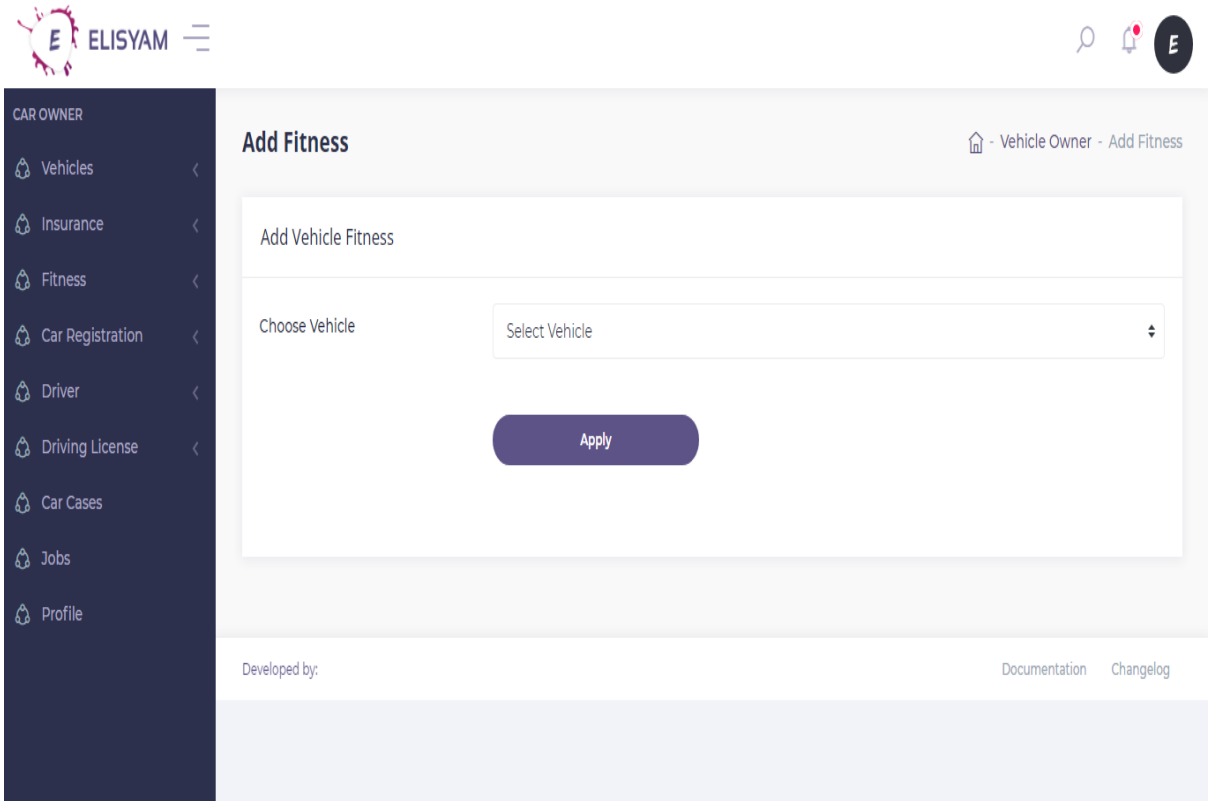

Figure 6.23: Owner apply fitness

6.24 Owner view fitness

Owner can be able to view their fitness status also. Now I will show the page below.

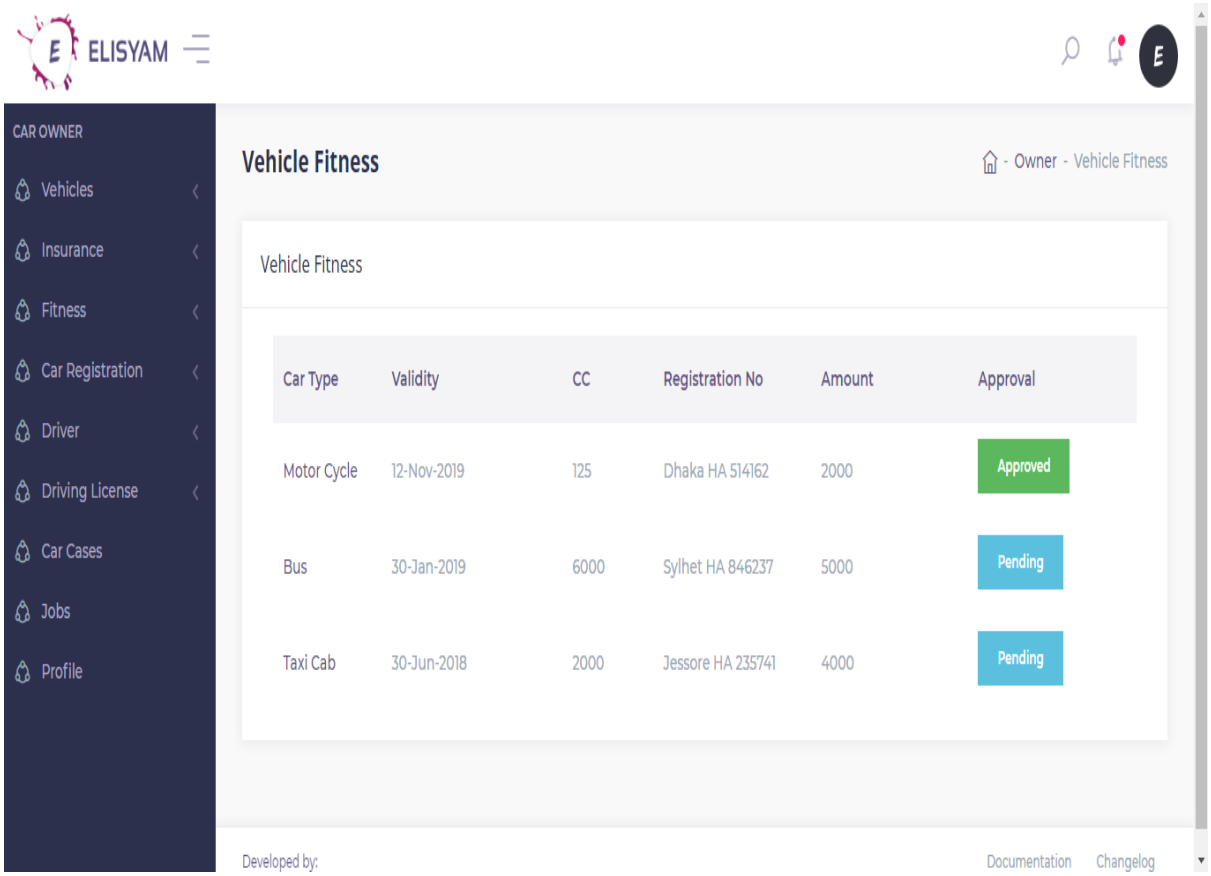

Figure 6.24: Owner view fitness status

6.25 Owner renew registration

Car owner need to renew registration of their own vehicles after a certain period of time. This is why they need to go to the registration renew page. Now I will provide the screenshot of that page below.

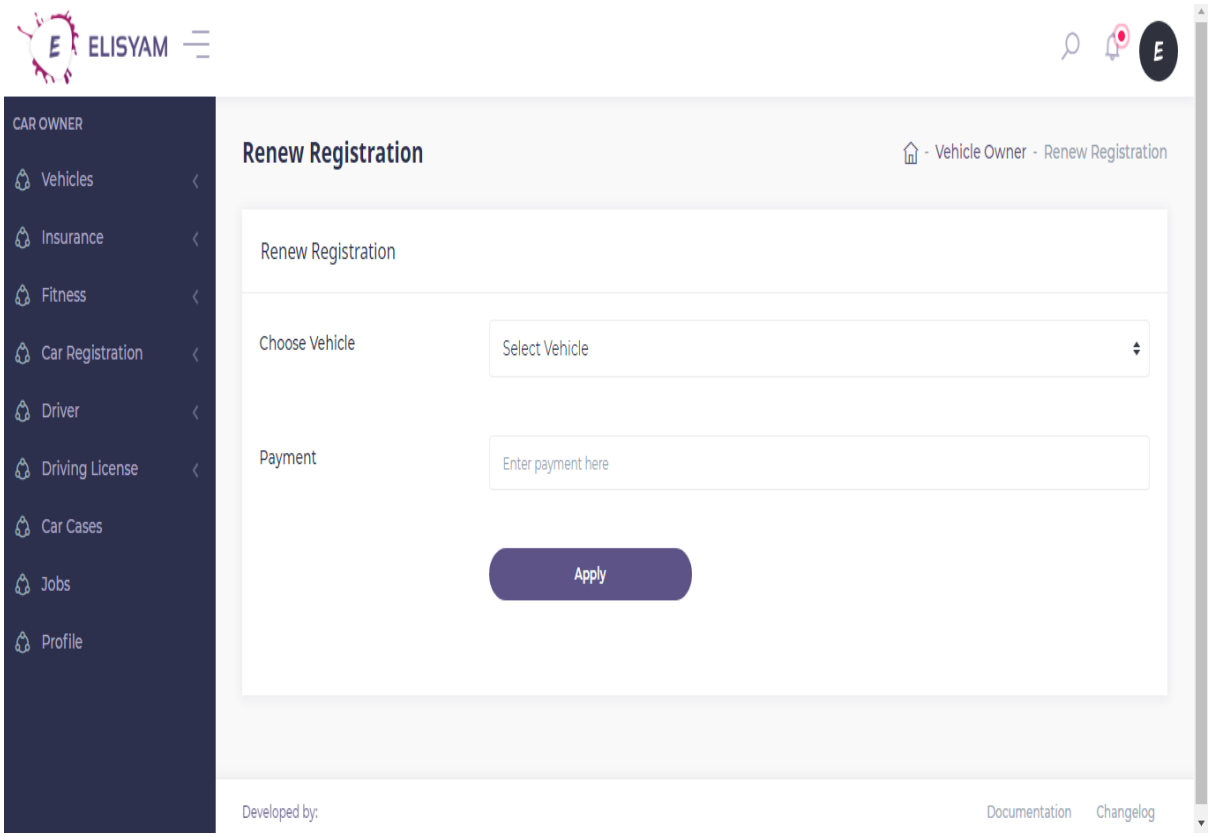

Figure 6.25: Owner renew registration

6.26 Owner search driver

Searching driver for car owner is one of the major feature of our application. Only car owner can have the ability to search driver for his/her vehicle. To hire a driver, owner must go to the specific page. After that, they would be able to search driver. Now I will show the page below.

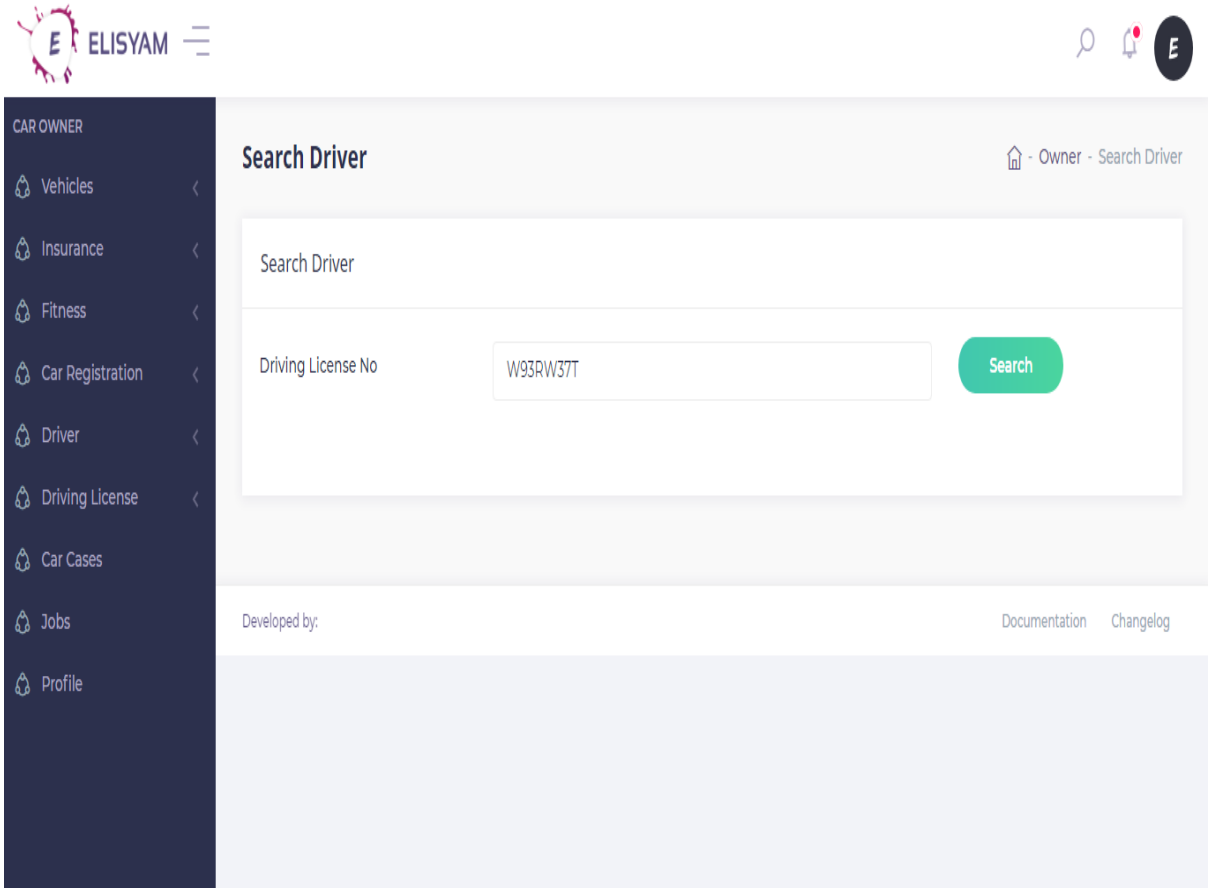

Figure 6.26: Owner search driver

6.27 Owner assign driver

After searching driver, owner may assign them for their vehicle. But before that, driver need to accept the request. Now, I will show the driver assignment page below.

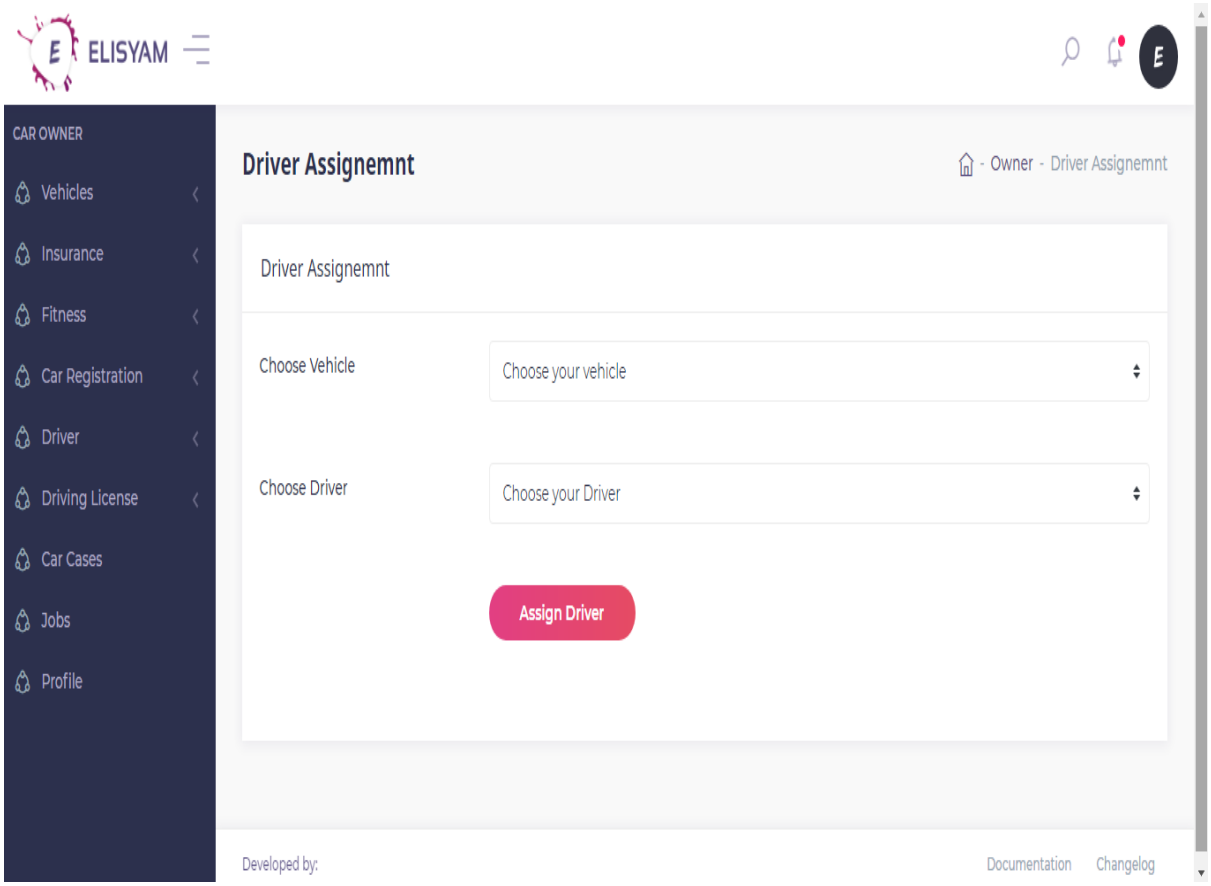

Figure 6.27: Owner assign driver

6.28 Owner apply for driving license

Owner can be able to drive their own car. But before that, owner must have the permit for driving. So this is why, they need to apply for driving license through our application. Now, I will show that page below.

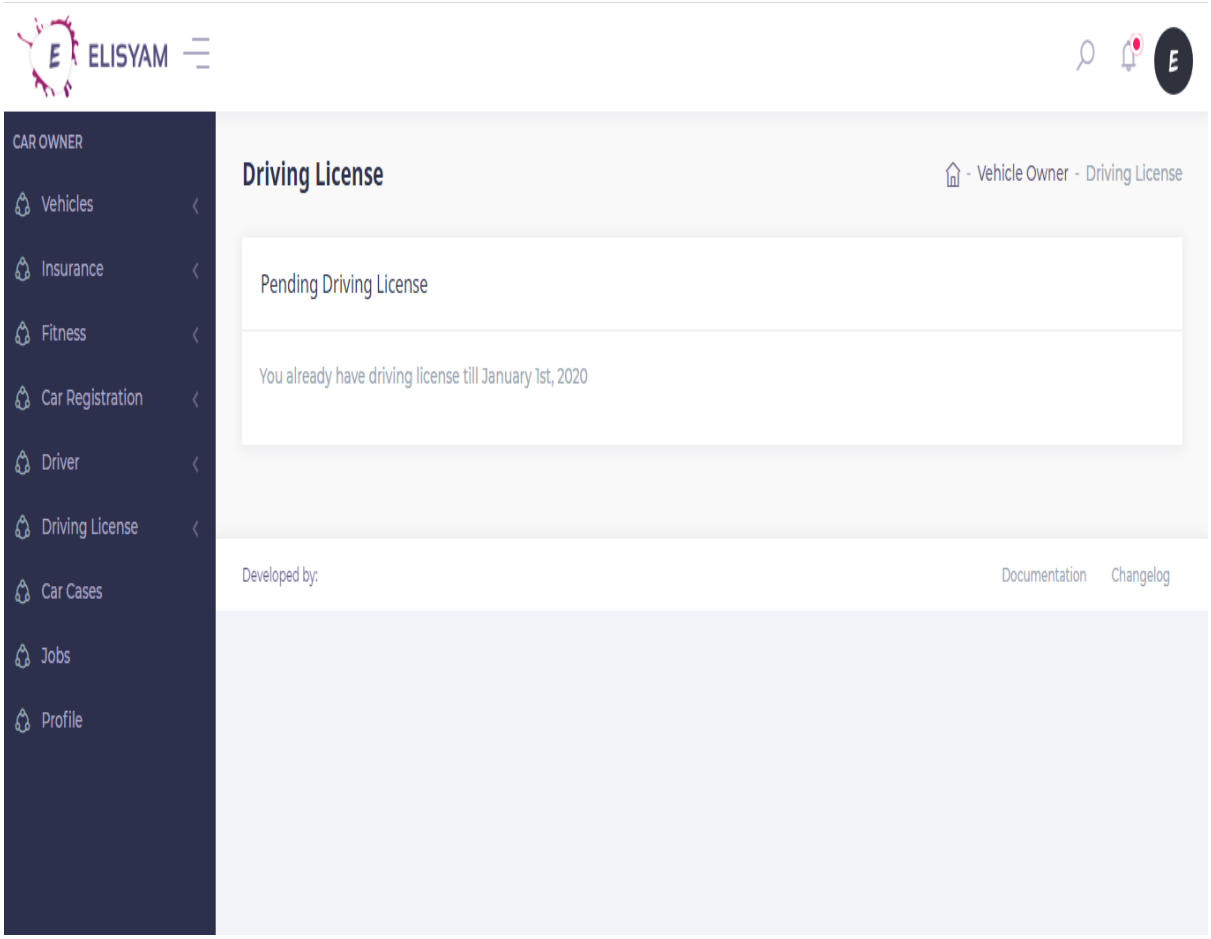

Figure 6.28: Owner apply driving license

6.29 Owner view jobs

Owner can be able to check jobs form this application also. Now I will show the page below.

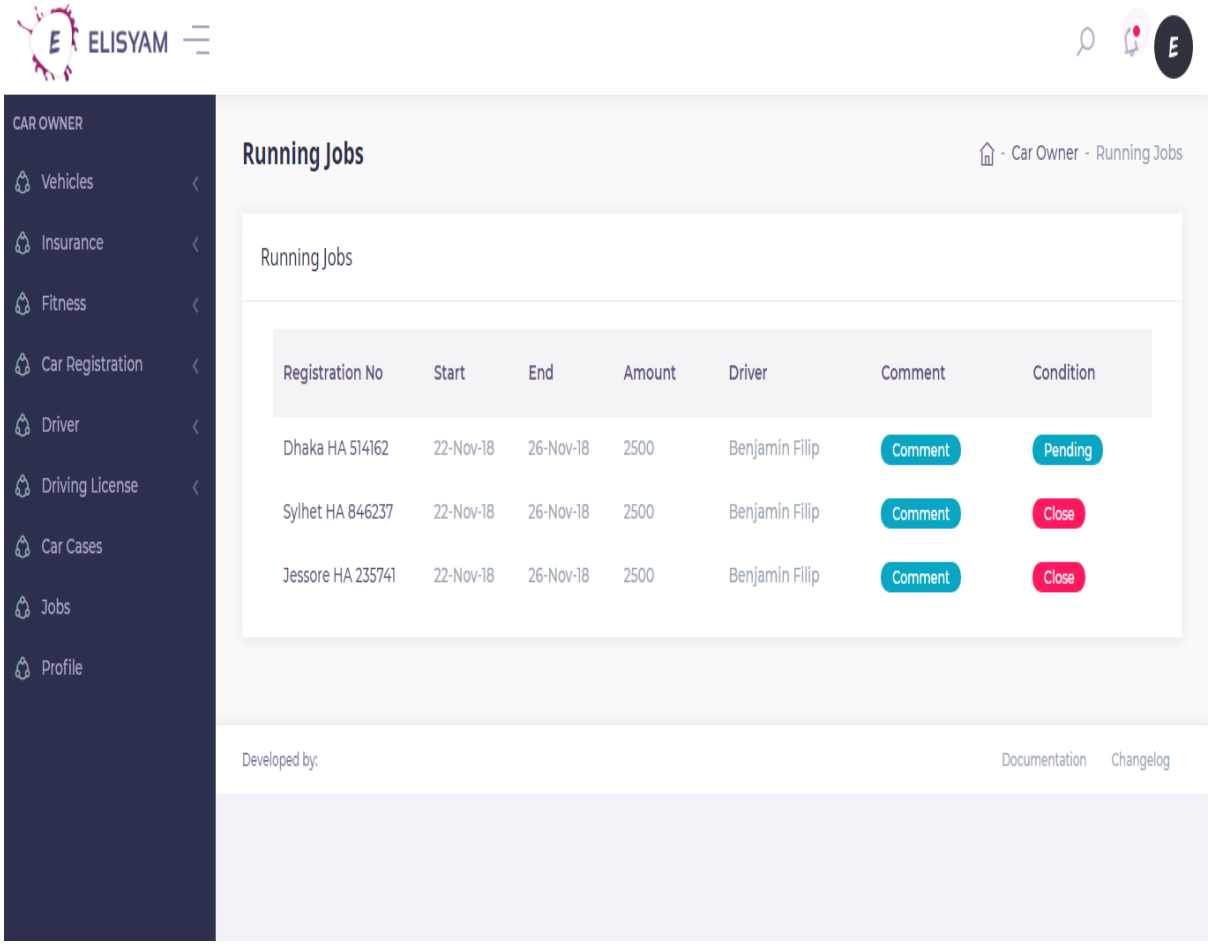

Figure 6.29: Owner view jobs

6.30 User view profile

Users like car owner, driver can be able to view their profile also. Now I will give the screenshot of user profile below.

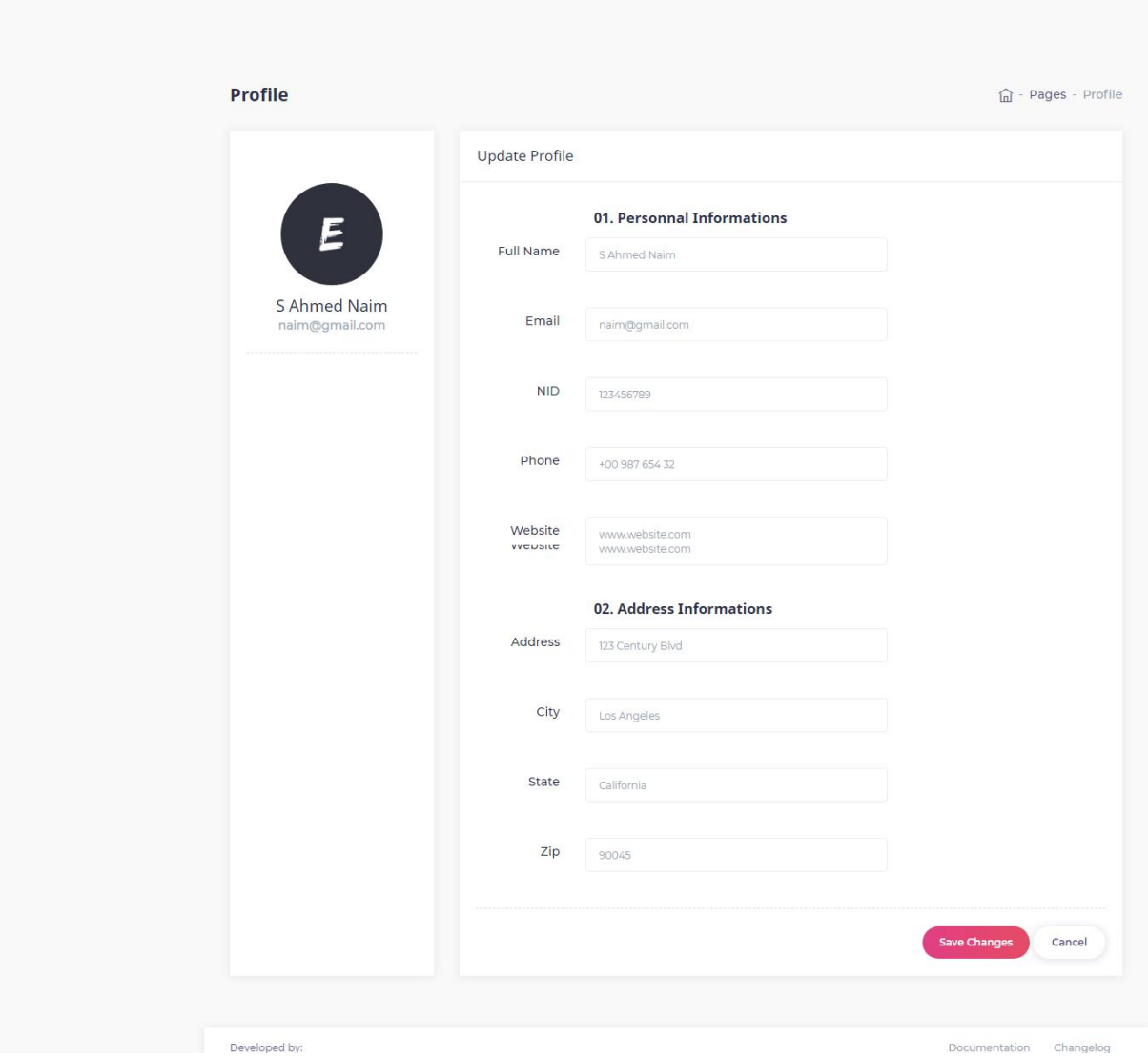

Figure 6.30: User profile

6.31 Traffic login

Traffic police have different app version. First of all, traffic police need to login to the mobile apps. Now, I will provide the login activity below.

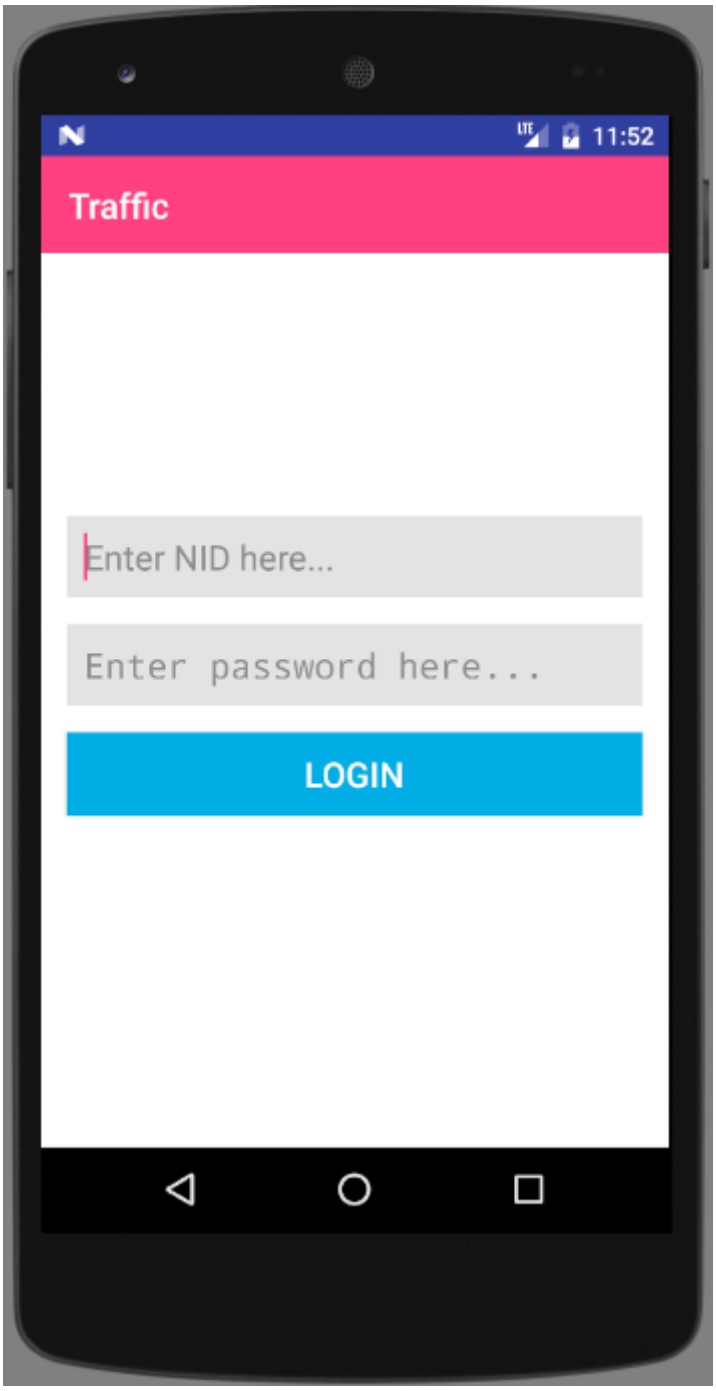

Figure 6.31: Traffic login activity

6.32 Traffic search vehicle

Traffic police need to search vehicle for checking papers. Now this will be happened through our application. After login to the application, traffic police see the search activity by which they might be able to search vehicle. Now, I will show the activity below.

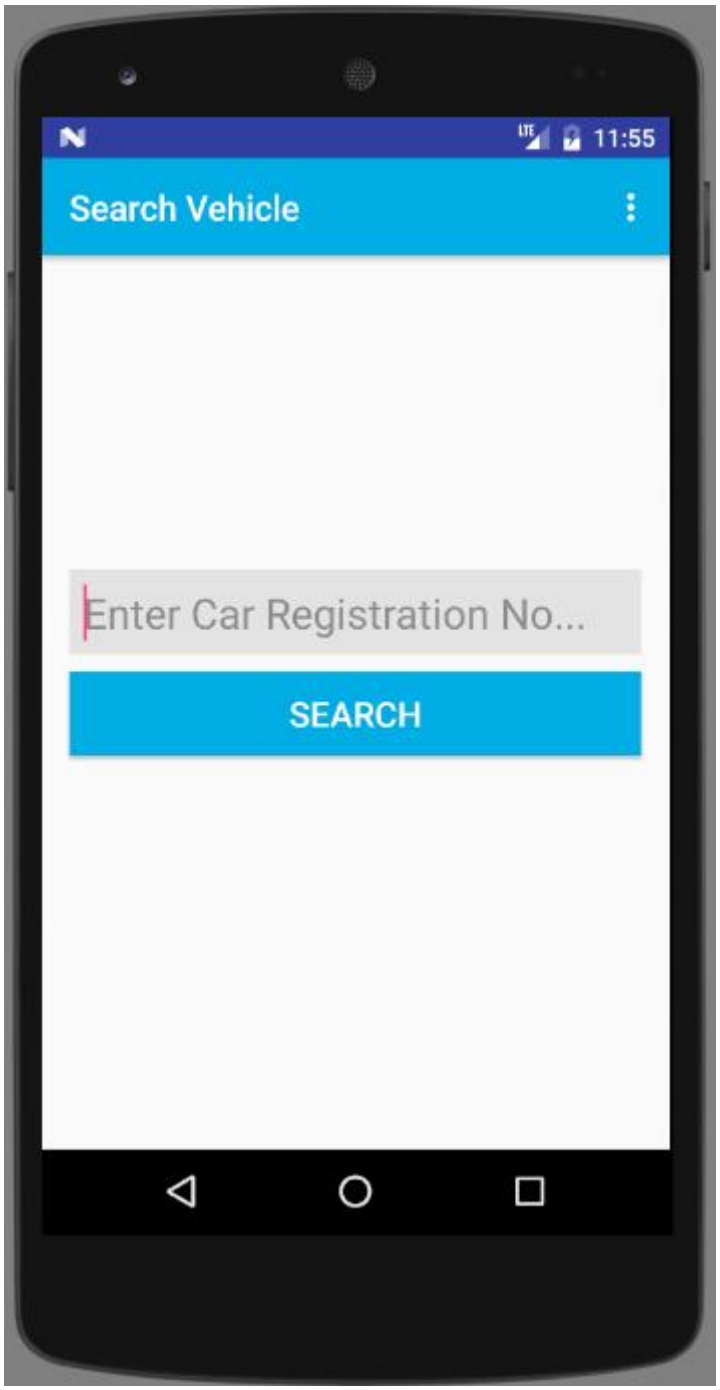

Figure 6.32: Traffic search vehicle

6.33 Traffic verify vehicle papers

Traffic need to verify vehicle data. After searching vehicle, traffic police see the actual data which is important to see at a glance. Now I will provide the application activity below.

Figure 6.33: Traffic verify papers

6.34 Traffic apply demerit points to drivers

Traffic police can be able to give demerit points to the drivers. The point range from 1 to 10. For that reason, traffic police need to click the specific button for demerit points. Now I will show the interface of giving demerit points below.

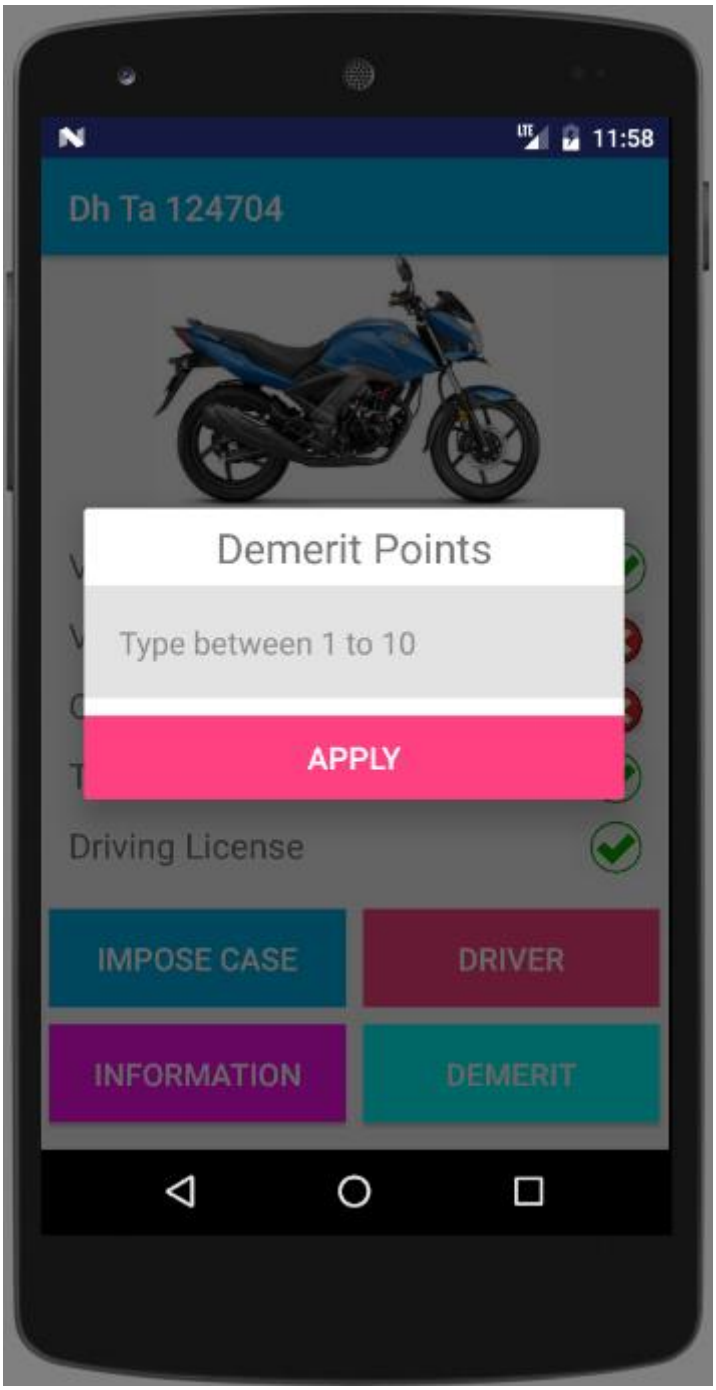

Figure 6.34: Traffic apply demerit points to the drivers

6.35 Traffic impose case to vehicles

Generally, we find that, traffic police impose case to the vehicles whether find any violence. Using our application, traffic police can also be able to impose case than before. After searching vehicle, traffic police need to click the specific button for impose case. After that, a new alert dialog will appear to the screen. After that, he need to click cases. Traffic police can be able to check one more case at a time. Now, I will show the activity below.

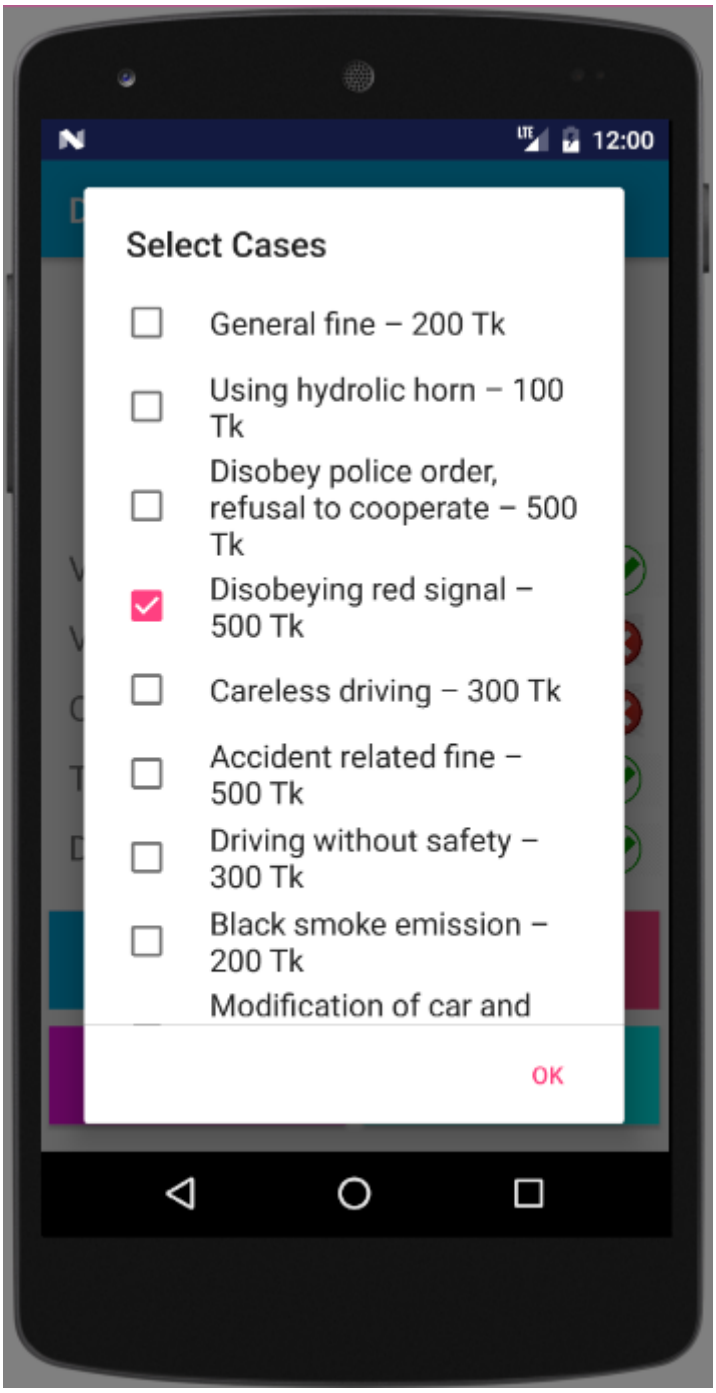

Figure 6.35: Traffic impose case to vehicle

6.36 Traffic view driver

Traffic can be able to view drivers of specific vehicle. Traffic police will be able to view NID, license number, address etc. Now, I will show the activity below.

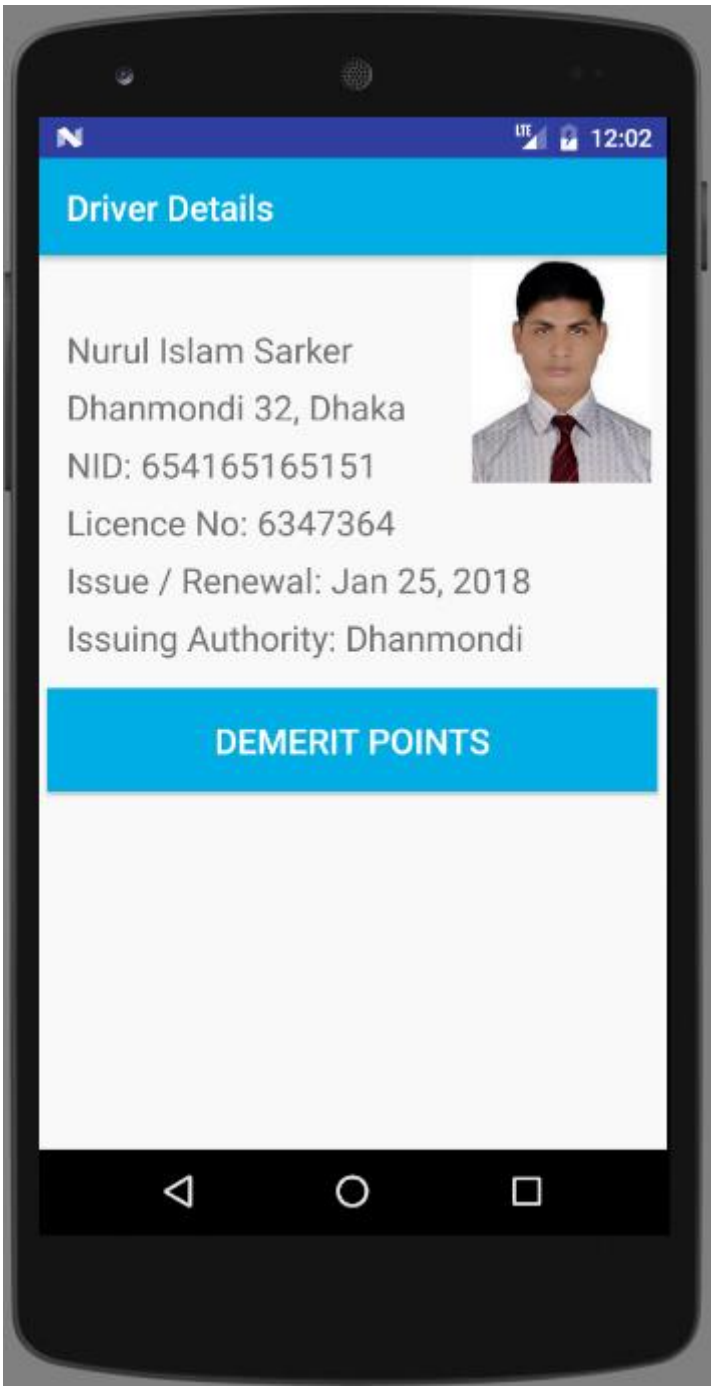

Figure 6.36: Traffic view vehicle driver

6.37 Traffic view vehicle information

Traffic police can be able to view vehicle information in details from the details activity. Now, I will provide the screenshot of vehicle information below.

Figure 6.37: Traffic view vehicle information

Chapter 7
Conclusion

7.1 GitHub Link

https://github.com/SAhmedNaim/journey-web

https://github.com/SAhmedNaim/journey-app

7.2 Project Summary

I have started to develop this project from August. From the very starting of development of this project, it demands hard working, patients, persistency to meet the requirements of stakeholders. After that I have proposed the design. And then started to work.

Database plays a vital role for any application software. And so this is why, I have designed the database diagram having tables with proper relationship. After that, I have prepared the user interface and take their approval to continue to the next part. It is to be said that, the interface of my application is very simple and easy to understand. After completing that, I have started to write the core functionality of the project.

Developing project is not end of all tasks actually. There are some other important tasks to perform. And that is testing. It is also known as quality assurance also. Almost at every software company there are a quality assurance team. Their main responsibility is to find the loop holes or vulnerability of software. If there any bug remains before handover to the stakeholders, there is a change to ruin the whole project. So testing plan is very important. And after developing the project, I have assured the quality of this project.

7.3 Limitations

For developing this project, I have faced some limitations. Now I will describe those in brief.

- **Payment Method:** In our application, there is not having any payment method directly by which one can make their transaction through our application. End user need to pay and after that they will enter those data to our application. At last recipient will confirm the transaction.
- **Only Android Version:** We have mobile version for traffic and drivers at Android platform. But there are also some other mobile operating systems for mobile like Windows or iOS. But we have not developed our mobile applications for those versions. So mobile users need to have a smartphone with Android version.

7.4 Obstacles and Achievements

I believe that if there are not any obstacles to develop a project, then there doesn't have any challenges. Because we know, challenge give us the opportunity to prove ourselves. Obstacles, challenges and achievements are like a path to the success.

Before starting this project, I didn't know the actual flow of software development life cycle. By developing this project, I have learnt to know how to have a row requirement from clients. After that I have learnt system analysis, database design and many things. My supervisor helps me a lot from the very beginning of the development of this project.

There are some other obstacles and achievements also that I will describe below.

- **Lack of Stakeholder's Engagement:** There are different types of stakeholders in our application. And each stakeholder uses different functionality. And almost they are busy with their day to day activities. So this is why, I didn't get all of them in proper time.
- **Scope Change:** Sometimes, some features need to be changed or modified. Then I need to follow reverse engineering process. And again designed to meet the new requirements. It also made me frustrated sometimes.

7.5 Future Scope

I have learnt a lot throughout the whole development stage of this project. For making this project developed, I have also meet some young entrepreneurs and enthusiasts also. I am very much thankful to all of them as their idea and discussion gave me some opportunities to make my product complete. It will help me to work with similar type project in future also.

7.6 References

I have gained some knowledge from some platforms. Obviously I will mention those references. For making my project successful those resources help me a lot. Not I will mention the names below.

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