

# **Vehicle Transport and Movement Management System for Jayarathne Transport and Movers**

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**2017**



# **Vehicle Transport and Movement Management System for Jayarathne Transport and Movers**

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

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**University of Colombo School of Computing  
2017**



## Declaration

The thesis is my original work and has not been submitted previously for a degree at this or any other university/institute.

To the best of my knowledge it does not contain any material published or written by another person, except as acknowledged in the text.

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This is to certify that this thesis is based on the work of

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under my supervision. The thesis has been prepared according to the format stipulated and is of acceptable standard.

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## **Abstract**

This document is the Project Report for the project titled “Vehicle Transport and Movement Management System”, relating to manage all required functionalities for Jayarathne Transport and Movers LTD. The Management of this company is interested in a fully-functional system to be developed in order to support the business needs so that they can reach their objectives with ease and within the structured set of milestones.

As a benefit of this system, management can keep track of all vehicles, drivers, employees, customers and transport schedule details. The customers are able to make reservations, cancellations and track the vehicle’s location. Through this system ‘Jayarathne Transport and Movers’ will be able to provide facilities and services in high priority to their customers. The purpose of this report is to document the various stages of development throughout the life of the project. This is researched, designed and ultimately implemented using Java NetBeans IDE 8.2and MySQL Server.

The system captures the vehicle location through GPRS tracking module and the vehicle movement will be notified to customers/ organization officials. The web based module makes communication with customer through SMS, email and Web.

## **Acknowledgements**

I would like this opportunity to express my deep sense of gratitude and profound feeling of admiration to my supervisor Mr. Kapila Dias of University of Colombo School of Computing (UCSC), who guided me throughout the project.

The knowledge that I obtained in the lectures conducted at UCSC throughout 2 years became great foundation for me to develop this project. I would like to thanks my friends who helped me in implementing the system.

Special thanks to my client, who trusted me and motivated me towards building a complete solution for them.

Finally, I would like to offer my gratitude to my parents, husband and daughter for encouragement and assistance given to me.

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## **Abbreviations**

OOSE - Object-Oriented Software Engineering

OOPL - Object Oriented Programming Languages

OOP - Object Oriented Programming

JVM - Java Virtual Machine

VMD - Vehicle Management Database

PDL - Program Design Language

LUCID - User-Centered Interaction Design

RAD - Rapid Application Development

SCR - Software Change Request

# **Chapter 1: Introduction**

## **1.1 Client's Background**

Jayarathna Transport and Movers (Pvt) Ltd is an emerging company in the field of transportation and house/office moving that established in Nugegoda/ Thalpathpitiya area. Currently Client Company is having a manual paper based system in order to handle their day today activities.

## **1.2 Motivation for the Project**

Movement management and transportation service are one of the fast growing and very competitive service market in Sri Lanka.

In current context even there are many companies who provide these services most of them are lacking the quality of service because of lack of information and information processing power. Even though some companies achieve quality to some extent but they had to waste so much resources in the process which makes them away from optimum use of resources.

In this project IT is used in every business solution within the company to improve the business and expand their services through the use of Information Technology.

## **1.3 The Problem Domain**

The following problems have been identified in the existing manual system in the company.

- There is no proper mechanism to manage vehicles, customers, drivers & workers details
- At present the orders are placed by the customers over the phone.
  - This leads to many difficulties and conflicts in allocating the customer orders.
  - The customer base is limited and most customers are around Thalpathpitiya and Nugegoda area.

- Difficult to handle hire details such as reserving hires and cancelling the reserved hires.
- No systematic process to calculate salaries, fuel & other expenses or to calculate income and maintain Company Accounts details.
- There is no systematic method for tracking vehicle location & customer location, and selecting best routes for transportation.

By implementing a system the organization can handle their day today work properly through the automated system. They can organize their work systematically avoiding duplication of work and unnecessary work and procedures.

Through automating the work carried out in the organization they can reduce the wastages and improve the efficiency of their service. Movement management industry is vastly growing field in Sri Lanka. There are many organizations which are well established in this field. Eg : Family Movers Ltd.

To compete with such other companies Jayarathna Transport and Movers Ltd should have a proper online web system. The customers can access and make booking over the internet. They can expand their customer segment all over the island though such a system.

This system will facilitate to daily operations and to identify the vehicle location to select most efficient route and etc.

## **1.4 Objective of Project**

The objective of this project is to propose an ICT based solution to:

- a. Improve the efficiency of the processes such as transportation fee calculation, driver and workers arrangement for carrier vehicles, vehicle license and insurance renew notifications, eco test schedule for the vehicle, improve the security of the data, easy search and edit data of the existing system.
- b. Provide MIS data for better decision making so that manager can operate the company more efficiency.
- c. Track vehicle location and customer location & moving location information to identify best routes.

## 1.5 Scope of Project

The proposed system is a web based system designed for the customers and staff of the Jayarathna Transport and Movers (Pvt) Ltd. Following are the main functionalities proposed by the new system.

1. Online vehicle booking system for customers
  - ✓ Customers can place orders through web. This enables to attract customers all over the island and improve the customer base.
  - ✓ Allocate vehicles and drivers for customer orders.
  
2. Track Vehicle location and Customer location & moving location
  - ✓ Enable to identify the best route and easy to manage time.
  
3. Automated transportation fee calculation [1],[2]
  - ✓ The fee is calculated based on the distance and workers allocated for a particular job-order.
  - ✓ Manage information related to fuel usage
  
4. Drivers and workers payment calculation [1],[2]
  - ✓ Driver/ Worker Registration
  - ✓ Calculate salaries and wages of drivers and workers through this payment module of the system.
  
5. Manage Vehicle status and generate notifications. [1],[2]
  - ✓ Maintain licence and insurance details of vehicles and generate notification before they expire.
  - ✓ By considering the vehicle status and maintain or arrange Eco test for vehicles.

## **1.6 Dissertation Structure**

### Chapter 1 – Introduction

Introduces the background, problem statement, significance of the study, objectives, scope and limitation of the study and presents the framework to give readers a basic idea of this project.

### Chapter 2 – Background

Literature review of similar systems available and technological review relevant to improve the system and their pros and cons will also be included.

### Chapter 3 –Analysis& Design

Requirement gathering, analyzing and management techniques are discussed. Functional and non-functional requirements of the proposed system will also be included.

Initial design diagrams and the methodological approach used in the system designing, alternative approaches and their justification for not using in the system are discussed.

### Chapter 4 – Implementation

Appropriate coding and implementation tools and techniques which will be used developing the system are included.

### Chapter 5 – Testing &Evaluation

Developed system will be tested against the user requirements which are gathered at the beginning. Actual data from the client's environment will be used.

### Chapter 6 – Conclusion

This chapter discussed about the system enhancements which can be done in the future and also provide a summary note of the system achievements at last.

## **Chapter 2: Background**

### **2.1 Introduction**

Jayarathna Transport and Movers (Pvt) Ltd main business functions are vehicle hiring and moving customer items to the new location and place them according to the directions of customer coordination. At present all the processes are done manually. Now they need to implement a software solution to improve the efficiency and save the time of manual processing. Their system must have order processing, vehicle arrangement, driver assigning, fuel arrangement, GPS integration & vehicle tracking and so on.

### **2.2 Existing Similar Systems**

There are different type of vehicle transport and Movement management systems around the world. Most of the popular systems are in United States, European countries and East Asian countries which are owned by vehicle transport agencies.

Most of the software solutions are developed for general purposes. Some systems have features with limitations. That makes the customer confuse and dissatisfy. This chapter describes existing similar systems with advantages and disadvantages.

#### **2.2.1 Truckers Helper Overview**

Truckers Helper is a fleet and trucking management solution for small and medium businesses. It offers such services as billing and invoicing, dispatch management, mileage tracking, and others. The software was designed and launched by Truckers Helper Online headquartered in Florida, United States. [3]

The software is a viable solution for small and medium sized businesses. It can be used in such major industries and domains as retail and wholesale, transport and delivery services, third party logistics, automation and manufacturing, and others. Some notable clients of the software include J&B Broughton Trucking, Overnight Carriers, S&S Trucking, and others.

### 2.2.1.1 Truckers Helper Features

The software features an accounting module which manages income and expenses. It offers reliable mileage tracking with gallon calculation per state and fuel tax reporting. Customer and driver records are maintained including safety records and auto-reminders. The software also offers log book to keep track of logs and verify driver rule compliance.

Truckers Helper offers comprehensive truck maintenance, trailer maintenance, and inventory management services. Other important capabilities include billing and invoicing, payroll management, trailer tracking, dispatch management, routing and scheduling, and others. [4]

This software product is not yet rated.

### 2.2.2 Dossier Fleet Maintenance Overview

Dossier Fleet Maintenance Software is a fleet and asset management software solution for your business. The software was released by Arsenault Associated headquartered in New Jersey, United States. Various fleet maintenance operations and PM Service schedules are automated by the software, in addition to other services. [5]

The software offers extensive features and is powerful enough to meet the needs of all business sizes. If your company needs an advanced fleet maintenance system that can regulate all the aspects related to equipment, scheduling, and other aspects, Dossier Fleet Maintenance can provide that to you.

Swift implementation of the software makes it a viable solution for you if you want to save time. If your business is in expanding stages, the software will still work for you since it is flexible enough to expand with the evolving business needs.

The software is deployed in a wide range of industries dealing in heavy equipment. Noteworthy clients of the software include Potomac Disposal, Inc., Grand Prairie ISD, Acadian Ambulance, and Krapf Bus Companies.



### 2.2.2.1 Dossier Fleet Maintenance Features

The software focuses on efficient equipment and asset management while also providing features for other aspects such as estimating, accounting and management. Any type of equipment, no matter how heavy, can be tracked with the software and this includes buses, tractors, trailers etc.

Low learning curve and quick implementation of the software allows for minimum training duration of employees, thus saving money and time. Efficiency is also improved with the special one-click data entry system. Other important features of the software that you can benefit from include billing & invoicing, dispatch interface, driver compliance, fuel optimization, IFTA reporting, maintenance scheduling.

Dossier Fleet Maintenance allows you to save resources by providing you with optimum route for transportation. This is made possible by the special route optimization feature. [6]

This software product is not yet rated.

### 2.2.3 BrokerPro Overview



Figure 1 : BrokerPro Interface

BrokerPro is a comprehensive Transportation Management Software solution designed to make life easier for medium to large transportation intermediaries dealing in TL and LTL

freight. With BrokerPro, dispatchers work from a single screen where they can easily build loads, assign carriers; enter shipment details, fax or email rate confirmations and post loads to load boards. [7]

#### 2.2.3.1 BrokerPro TMS solutions Features

- **LTL Capability**  
Less than truckload capability lets you split loads, enter multiple customers, stops, consignees, and rate information.
- **Quick-books**  
Seamless bi-directional integration with QuickBooks makes accounting a breeze. Automatically generate customer invoices and carrier settlements.
- **Power Search**  
Ability to Power Search by virtually any field in the system and query all orders, customers and carriers by user-defined criteria such as carrier name, city of origin, consignee, P.O. number, date, MC#, etc.
- **Infinity Posting Service**  
A single ``click`` pushes your loads to DAT, Internet Truckstop and Post everywhere. It doesn't get easier than this.
- **Email, Fax & Print**  
Quickly fax, print or email customer and carrier rate confirmations from one screen. Automatically send status emails as check-calls are received.
- **Detailed Reports**  
Tools to generate and modify reports detailing active & open orders, assigned & pending loads, aging summaries, sales & load history, performance ratings, and more.
- **Affordable Subscription**  
Affordable, monthly subscription, no large upfront investment required. Customizable pricing plans fit everyone's budget, large or small.
- **SaferWatch**  
SaferWatch gives you the ability to simply and quickly qualify, import, and manage carriers.

## **2.3 Review of the Systems**

Above systems, they design the software solutions for common purposes in vehicle transport industry. They have well organized web based automated vehicle transport management system with transport order management system. Concept is good but the requirement of Jayarathna Transportation and MoversLtd is slightly different than these solutions. Especially they need both back end and front end solutions for vehicle transportation and movement management.

## **Chapter 3: Analysis and Design**

### **3.1 Introduction**

Analysis phase is the most significant from the software development life cycle. It is necessary to get a clear idea about the problem domain and what are the user's requirements for the new system before developing a system.

Requirements gathering and documentation was done at this stage by using various techniques such as prototyping, interviews etc. Object-Oriented Software Engineering (OOSE) contains a requirements model and an analysis model in which user case diagrams and use case narratives are drawn. Therefore it is directly documented.

### **3.2 Requirement model of OOSE**

#### **3.2.1 Requirement Gathering and Fact Finding**

Gathering requirements is an essential activity in any kind of system developing. Since that is the most difficult, considerable amount of time has to be spent here. Correct decisions makes the analysis phase a successive. Most commonly, identifying the problem and what the client needed as the solution seems to be unclear at the beginning. Yet when going forward it will come across to a clear situation.

If for some reason analyst was unable in analyzing the situation carefully, the whole project will become a failure due to that, because the delivered system would be something other than the client's requirements. Therefore understanding what is on the client's mind is important here.

In requirement gathering stage can be done using various fact finding techniques. Following techniques have been used for the gathering requirements.

##### **3.2.1.1 Interviews**

Interviews allow us to get an instant feedbacks and clarify doubts occurred from scenario based requirement gathering immediately. Further during the interview, non-verbal

communication can be observed and interpreted. Also users are not restricted for specific structure; they can freely express their ideas and indirect observation also can be done during the interview. Interviews are done with some selected users in the organization.

#### 3.2.1.2 Questionnaires

A questionnaire allows getting a quick response from users of the system and results can be tabulated quickly, also easy to analyze. Since many employees busy with their own work and some employees like drivers and lorry keepers not good with this had to use other methods rather than questionnaire in the project.

#### 3.2.1.3 Report Inspection

Report inspection is which involves reading through historic documents such as company vehicle inspection reports, transaction reports, forms and employee files to get an information about existing process. Various transaction reports such as renting, vehicle fuel, taxi allocation, and customer/ driver registration forms also carefully inspected. This become easy as there was very less user involvement to this, however some employees help us to clarify some unclear documents.

#### 3.2.1.4 Prototyping

Prototyping is a sample of the real system which build in short time to demonstrate how real system is like. These enable clients to have a better understanding of the system going to build; therefore they can give comments and critics which lead us to solve all misunderstanding between us and organization.

#### 3.2.1.5 Observation

Observation is a technique where analyze activities by watching person perform activities. This used to identify certain parts that were missed by users during they were describing on those activities.

Observation is used to identify process of message passing between employees to work as whole company. Informal observation is used as users might be uncomfortable from being watch and might do odd things because of that. We have done informal observation on the time of interviews too.

The whole system is designed with five separate subsystems. They are Vehicle registration system, Driver/Employee registration system, Vehicle management and tracking system, Movement management system and Report generation system. Illustration of the system's intended functions, its surroundings and the relationship between them are provided using use case diagrams. Main use cases represent the functionality provided by the system. Administrator, Drivers, System Operators (clerk & receptionist) and manager are the main actors of the company.

### **3.3 System Requirements**

#### **3.3.1 Functional Requirements**

As a solution for the above identified requirements an online web application for the company with portals to customer and vehicle drivers to interact is proposed. The online web application will contain following main modules and functionalities.

#### **Administrative Module**

This module enables the system administrator to add/update/delete records in the database.

- Vehicle Registration – Administrator has the privilege to add/update/delete vehicle details in the system.
- Employee Registration – Employees details including drivers, lorry assistance and other internal employees' details are recorded in the system.
- Internal User Management – Administrator assign user authorities for the internal users.

## **Internal Operational Module**

Through this module company clerk/receptionist can perform the following functionalities.

- Customer Management – Corporate customer details are entered to the system by the internal operator. Normally customer fills the customer application form of the company to register with system.
- Driver/Assistant profile management – Some Jobs are allocated by the company clerk.
- Managing vehicle profiles – Fuel management, licensing and insuring the vehicles.
- Inquire/Manage vehicle bookings – View details of the vehicle reservations.
- Track vehicle locations on the map – Enables identify the location of the vehicle.

## **Internal Management Module**

Manager is assigned with to this module.

- Manage Vehicle Rates - Hiring rates and fees are entered though this module.
- Manage offers – Seasonal offers details are introduced.
- MIS Report Generation – Required reports are generated by the manager. Appendix D includes all the system generated reports.

## **Customer Module**

Online registered users are considered as the customers of the system. They can do the following functionalities using the system.

- Customer registration
- Modify personal profile details
- Manage service reservation/cancelation
- Check transaction history
- Manage notification – SMS/email alerts are sent to the customer.
- Track currently hiredvehicle's location and status

## **Service Module**

These are the other services provides by the vehicle management and transportation system.

- Taxi Service
- Custom option to select desired vehicle with driver on advantage booking
- Check vehicle's and driver's profiles
- Make/cancel reservations
- Give ability to track vehicle in the time of driver/customer is using the taxi
- Ability to make custom add-on packages on customer desires.
- View available vehicle to hire and their details
- Rent desired vehicle for a period

### **3.3.2 Non Functional Requirements**

#### **Security**

There should be some security levels for the users of the site. Some users have administrative privileges, some has limited access, some can only input data & modify data and internal operators only can view data. Session management will handle the main security levels.

Basic Level Security - The users have access to particular pages that can only view the details in the pages except insert or updating features.

Middle Level Security - The middle level users are permitted to insert and modify details in the database but do not have the administrative authority.

Administrative Level Security -The administrator of the system can access/insert/modify or delete the data from the database.



**Reliability**

The system should be reliable when it comes the making reservations, which is very important module to the customer. It is also necessary that the updating of the database which is done through the system very accurately.

**Accuracy**

Report generation, data input should be accurate in the system.

### 3.4 Network Diagram

A network diagram is a visual representation of network architecture. It maps out the structure of a network with a variety of different symbols and line connections. It is the ideal way to share the layout of a network because the visual presentation makes it easier for users to understand how items are connected.

This is a brief network diagram of the Vehicle Transport and Movement Management system of Jayarathna Transport and Movers. Internal Computers are connected to the server through a router and the server is protected with a firewall from the external users' access.

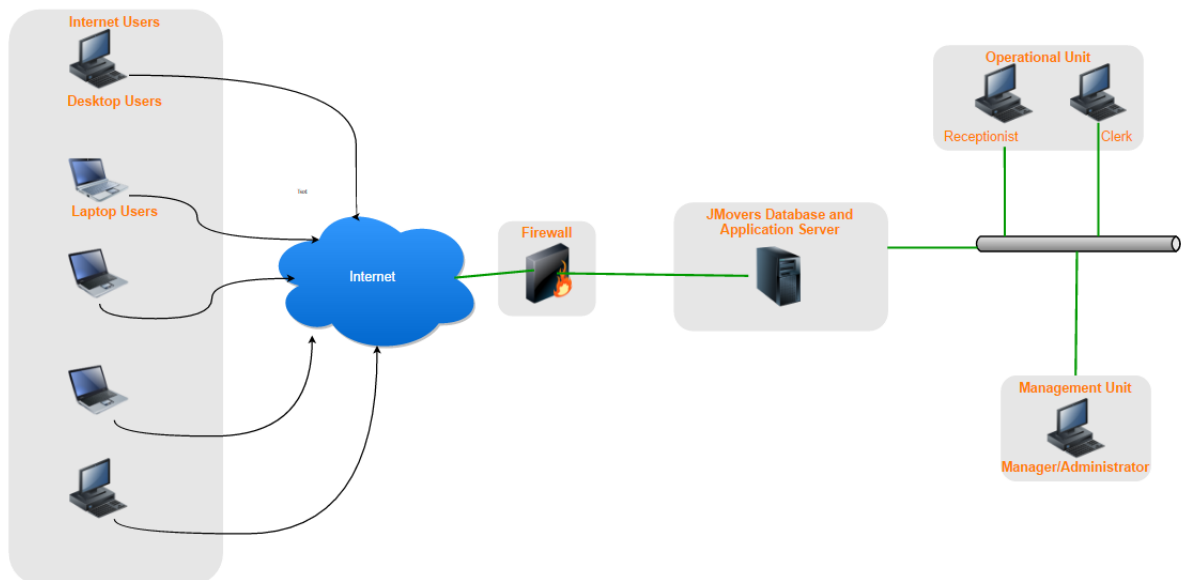


Figure 2 : Network Diagram

### 3.5 Use Case Diagram

Following use case scenario description refers in 'Figure 3' helps to identify the actors and vehicle management system processes. Receptionist has only view authority, but the clerk can view information and update details. Manager has the privilege for MIS reports. Customer can make booking though online website of system. Administrator has full authority of the system.

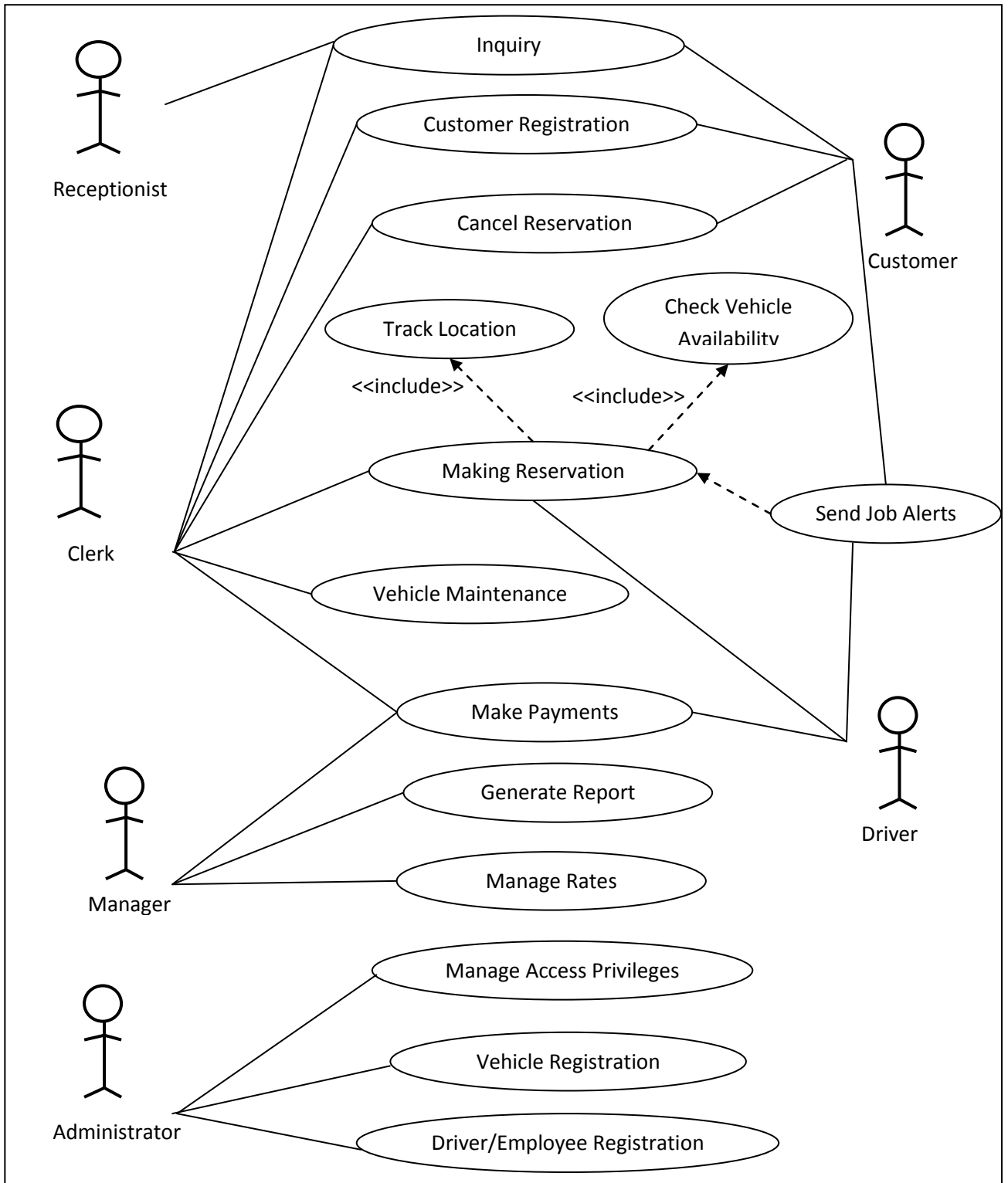


Figure 3: Use Case Diagram

### 3.6 Use Case Narratives

This shows the use case narratives for Vehicle Registration use case. All remaining use case narratives are attached Appendix A.

**Table 1 : Use Case Narrative - Vehicle Registration**

Use Case Name :	Vehicle Registration	Use-Case Type – Business Requirement
Use Case ID :	VM – 01	
Priority :	High	
Source :	Document	
Primary Business Actor :	Administrator	
Other Participating Actors:		
Other Interested Stakeholders:		
Description:	At present Company vehicles are used for the hiring. (If needed outsourced vehicles can be included.) Required vehicle information captured to the system.	
Preconditions:	Logged in user should have admin privileges.	
Trigger:	This use case is initiated when the administrator select the option to Register Vehicles.	
Typical Course of events	<b>Actor Action</b>	<b>System Response</b>
	<b>Step 1:</b> Administrator entered vehicle details to the system.	<b>Step 2:</b> System verifies the information and added to the database.
		<b>Step 3:</b> VehicleRegistration number is set as the primary key.
	<b>Step 4:</b> Send registration information to the printing Job.	<b>Step 5:</b> System formatted the registration information and print registered vehicle report.
Alternate Courses	Vehicle Registration number has set as the Primary Key.	
Post conditions	Vehicle was successfully registered and system registration information issued.	

### 3.7 Sequence Diagram

Sequence diagram shows how objects communicate by passing messages. Sequence diagrams consist of blocks, which are directly used for program design. Program Design Language (PDL) was used for block designs. Block designs are later on combined to create the necessary methods in the classes. User Registration sequence diagram is shown below. All the other diagrams are in Appendix A.

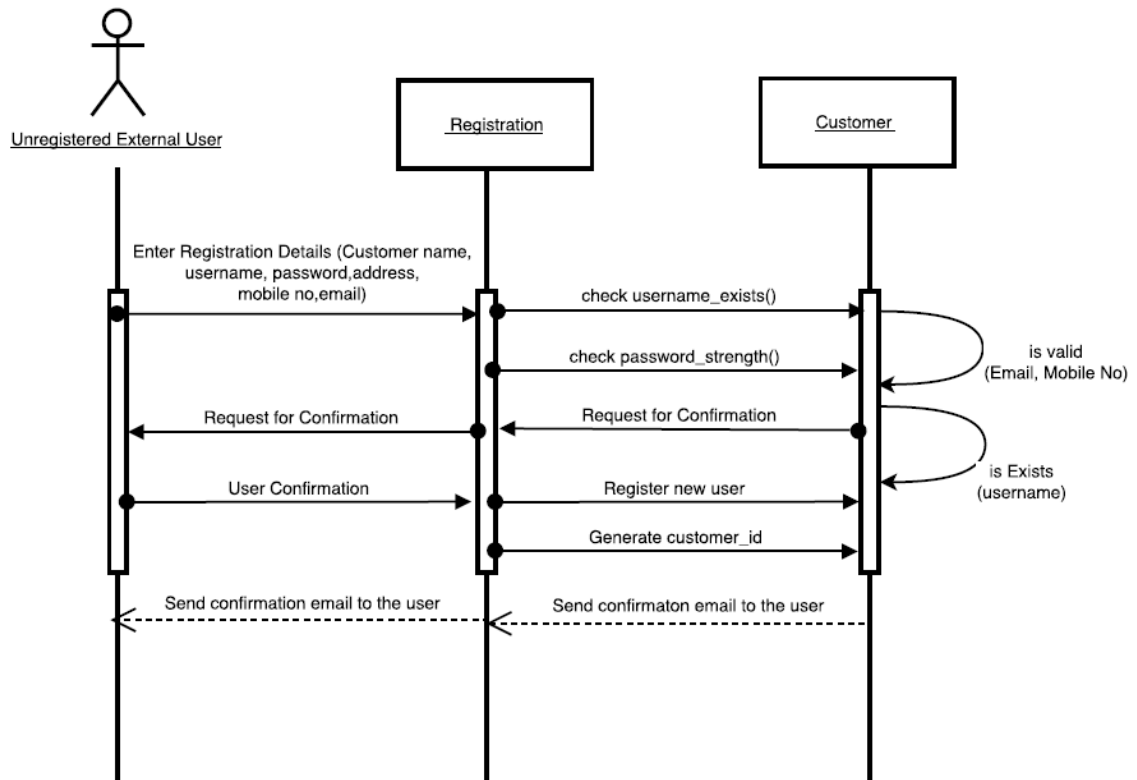


Figure 4 : User Registration Sequence Diagram

### 3.8 Class Diagram

This represents the static view of the system, as it shows interaction between classes in the system. Also classes can be seen as the blueprint for objects. Ultimately the attributes of the classes are used to create database design and normalized tables are taken in to final implementation of database. Class diagram is discussed in more details in Appendix A.

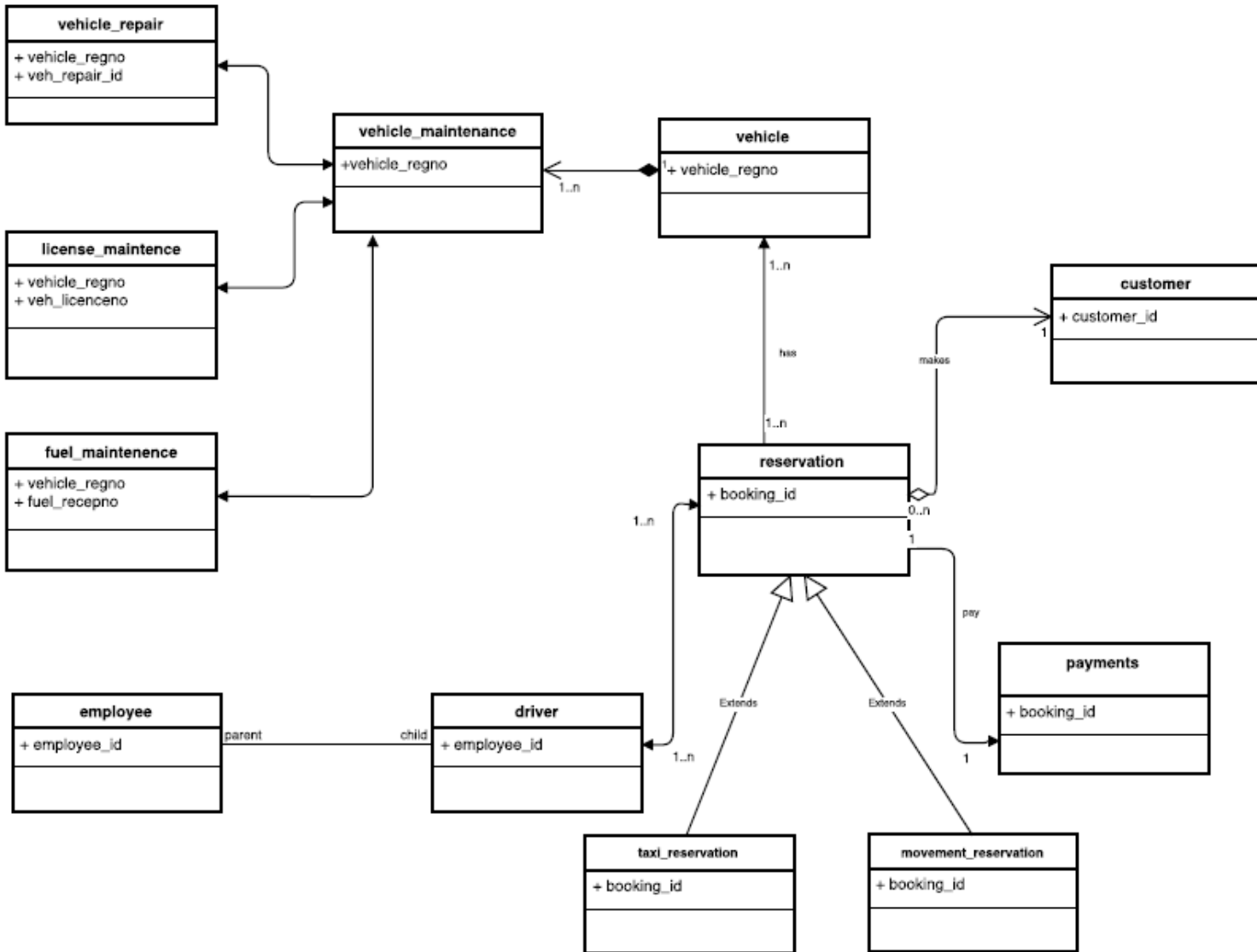


Figure 5 : Class diagram of the system

### 3.9 Database Design

Database design is an important place in designing a system. During this phase care should be taken to avoid redundancy of information storing into a database, since it leads to wastage of memory space.

The attributes of the classes are used in database design and normalized tables are taken into the implementation of the database. Vehicle Management Database (VMD) is designed using MySQL database design software. Technical details of the tables are further elaborate in Appendix A.

**Table 2 : Table structure for table admin\_user**

<b>Column</b>	<b>Type</b>	<b>Null</b>	<b>Description</b>
<i>emp_id</i>	varchar(10)	No	Employee ID
username	varchar(30)	No	User Name
userpass	varchar(30)	No	Password
user_catg	varchar(10)	No	User Category
user_add	date	No	User added date to system
user_chg	date	Yes	User details change date

The table 'admin\_user' consists with the users of the staff-members who have privileges to logging to the system. Their logging information is saved in the logged\_admin\_users table.

**Table 3 : Table structure for table logged\_admin\_users**

<b>Column</b>	<b>Type</b>	<b>Null</b>	<b>Description</b>
<i>emp_id</i>	int(10)	No	Employee ID
uname	varchar(30)	No	User Name
login	Date/Time	No	Login Details
logout	Date/Time	Yes	Logout Details

## Chapter 4: Implementation

### 4.1 Introduction

During the implementation process NetBeans IDE 8.2 platform used to build the code and web interface which were the outcome of the design process. Database which is designed using the class diagram was created using MySQL software.

### 4.2 Technological Overview of the Implementation

#### 4.2.1. Implementation Language

Current developments are mainly done using Object Oriented Programming Languages (OOPL). Because of its re-usability, easy maintenance and better support from case tools are few that Object Oriented Methodology is necessary. OOSE is an object oriented system design methodology with all these advantages, therefore move forward with OOSE as we discussed in previous chapter. With this methodology and concerning application as web application we have few popular programming language options to go forward; those are Java, PHP and HTML.

Apart from that, the main advantages of Object Oriented Programming (OOP), besides being able to create more complex software, and develop answers without changing the questions, are numerous. OOP facilitates creating reusable code, which can save a lot of work. Information can be hidden to safeguard data from improper access. *Polymorphism* lets the programmer to create multiple definitions for operators and functions, with the programming context determining which definition is used and also *Inheritance* lets the programmers derive new classes from older ones. When using OOP, the programmer can focus on representing concepts, instead of concentrating on tasks.

When it comes to Java it is a very well defined OOPL, which can be run in any machine that has the Java Virtual Machine(JVM) and Java is an open source language which has real object oriented concepts in use. As this is a web project can use Java NetBeans IDE to develop well structured, secure web applications.



### **4.2.2 Implementation Database**

The free and open source relational database management system MySQL with the GUI tool phpMyAdmin was used in this project to implement the VMD.

'*DBConnect*' java class file consist of coding which can be reused to connect to the VMD.

### **4.2.3 Frontend Implantation**

For the front end implementation of web based user interfaces used HTML and JavaScript as JQuery Framework with Bootstrap to implement better dynamic responsive web pages design (in NetBeans IDE 8.2).

## **4.3 Implementation model of OOSE**

After deriving the database design from the class diagram, implementation of the database is done using MySQL. The database is password protected and database administrator has ability to restrict its usages as desire.

This project uses MVC (Model, View, Controller) Architecture to structure the system. Model contains all the logic and interactions with database level and these modules are used collaboratively between many web pages through the controllers to enhance reusability. '*VehicleCommon*' java file and '*VehicleServlet*' java file contains coding to act as the main model and main controller in the vehicle transport and managements system. Other '*jsp files*' contain the coding regarding to view the system. Main JSP file of the system is '*index.jsp*'.

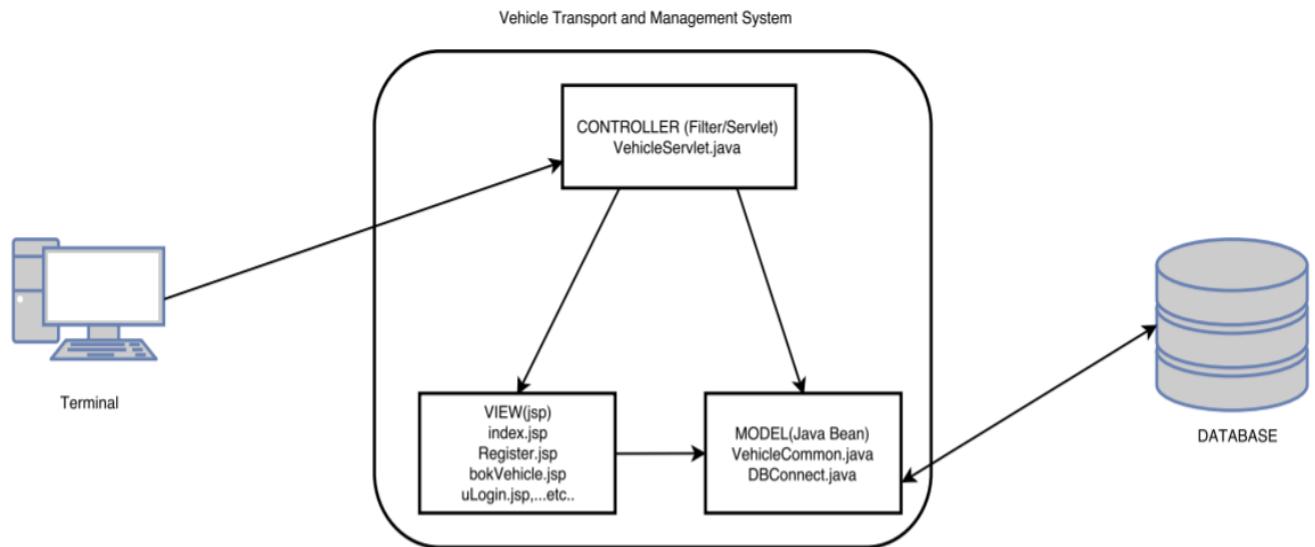


Figure 6 : Module Structure of the System

#### 4.4 User Interface Design

To design the user interface web pages the concept of Logical User-Centered Interaction Design (LUCID) Methodology by Kreitzberg is used to provide user the best user friendliness from the system. [8]

As the prototype used in requirement gathering it was easy to gather the user interface requirements. The screens were design by HTML and Java Scripts.

Since most of the internal users are interact with the system full day, it is necessary for going on light colour, but components need to be easily viewable to them. There it is decided to use substance themes for this user interface designs. After the implementation of the interface, the training and help through the system is done.

But for the external users, interfaces are designed with more attractive features and combining bright colours.

Java script files were used to design the users interface. Cascading style sheets with Bootstrap features were used to improve the graphical view the user interface parameters such as forms, buttons, menus, text boxes, fonts and etc.

Sample user interfaces of the system are in the Appendix B.

## **Chapter 5: Evaluation and Testing**

### **5.1 Introduction**

Major objective of the testing phase is to produce an error free system to the client. Testing is an activity that helps in finding out bugs/defects/errors in a software system under development, in order to provide a bug free and reliable system/solution to the customer. Testing is an activity which is broadly deployed in every phase of the software development.

Each method is tested with white box testing and black box testing. Thereafter, classes are tested in combination. Then group of classes are tested as cluster testing. Finally the full system is checked for integration. User validation and verification with the document is done eventually.

### **5.2 Objectives of Testing**

System testing was initially done by us since we have access to all the relevant database tables and user interfaces which lead to use live data. Later system was installed in client environment for testing. Considering functionality of the system, system was tested in three stages.

- Component Testing – Each individual data table and user interfaces has tested for the functionality.
- Integrated systems testing – Component tested as integrated system for the interdependencies of the component.
- Network testing – System is testing in local area network as well as over the internet for client server communication.

Software testing is the crucial element of software assurance and represents the ultimate review of specification, design and code generation.

The objectives are:

- Test the system to check out and verify whether the functional requirements are satisfied.
- Identify the bugs or defects in the implementation so that they can be debugged and rectified.
- Identifying the manner in which the system responds to different scenarios and the robustness and helpfulness for erroneous situations.

Based on the results of testing solution can be further improved in processing performance, which might have been overlooked in previous stages. Further testing provides the usability of the system, based on which enhancements could be carried out.

Testing always ensures the following:

- System comes to bug free position.
- Separate procedures/function performance and check whether those are working properly.
- System quality kept to the expected level.
- Check whether the system provide exact user requirements.

### **5.3 Test Model of OOSE**

At the beginning for each class it is checked whether relevant methods and operations are captured, further check whether all attributes related to the objects are identified. These attributes specifies various stages of class can undergo, also whereas the operations provides the relevant interface to communicate with it. Message passing between object lets them to communicate to perform task successfully. Therefore it is necessary to perform that.

### 5.3.1 Unit Testing

As the system require higher degree of accuracy each method is tested using white box testing and black box testing. As example model class functions are tested with mock data to in and out to in the controller to identify functions are working at expected level.

Further unit level test cases are written to verify black box testing. Below is an example for it to verify login functions. Test Plan and Test Cases are further elaborated in Appendix E.

**Table 4 : Test Case - Login to the system as customer**

Test case No	01	
Test Case Type	Unit Testing	
Test Case Name	Login to the system as customer	
Test Case Description	Registered customer logged in to the system	
Test Data		
Valid	Invalid	
Valid Username	Invalid Username	
Valid Password	Invalid password	
Expected Output		
Valid	Invalid	
User should navigate to user portal of particular user.	Inform login combination invalid message. Should show link to the registration page.	
Result	Pass	

### 5.3.2. Integration Testing

After ensuring the accuracy of the methods, model classes are tested on the whole. It is identified whether the classes contain all relevant methods and attributes.

For example the model class “*Reservation*” has several methods and delegates which will be called during triggers from events. Some methods are called during runtime when the form loads. If the methods and delegates give the expected output without an error, when we run the class using controller classes to ensures its accuracy.

### **5.3.3 System Testing**

All classes are tested. Therefore, it is necessary to check whether all classes work together by passing messages between models as well as controllers and views.

Further, to make sure the accuracy of the system, a complete set of accurate data is taken from the users. The relevant customer details, driver/vehicle details, and transactions details are taken to be entered. Further, these details are manually processed by some users. Ultimately, details are compared to check the accuracy. Until the system provides the accurate results this was carried on thrice. However ultimately it was successful.

### **5.3.4 Acceptance Testing**

This was done together with clients. Selected staff from the client was given with created test data to perform activities. Their feedback on the system and their exception levels were recorded for improvements. Level of user satisfaction was the key factor considered and as below mentioned usability testing was carried out through the project to ensure what is creating is what user actually wants. Sample testing feedback form is included in the Appendix E.

### **5.3.5. Regression Testing**

Finally the system scenarios test cases are written and some of those static test cases are automated using selenium java client version to save time in regression testing process as continuously integrate new changes to the code to make sure nothing new broken from those. Results of testing are included in Appendix E.

### **5.3.6 Usability Testing**

Usability testing is a necessity to test as that reduces the highest risk impact to the system to user acceptance. In early stages of the project UML diagrams and thereafter prototype web interfaces are used to evaluate and get feedbacks on user experience to enhance the system while developing.

The developed web interfaces were shown to the clients and the functionalities described. The interfaces were tested to ensure that only the required information is available. Then all the JSP pages were put through – Performance testing, where most of the pages were tested separately for the performance of the individual pages. The pages that cannot perform individually (depend on other pages and java classes) were tested for performance after the individual performance testing of the other JSP pages were done. When the interfaces were shown to the client, at some occasions they came up with some more requirements and suggestions. The possible actions to adopt them in the system were also made.

Under performance testing, ‘load testing’ and ‘volume testing’ was done with the help of the organization staff. HTTP load tool was used to determine how the server handles the workload.

Further after complete development evaluate on usability by getting feedbacks on parallel run period by letting them experience the system hands on.

#### 5.3.6.1. Evaluation of the system

Evaluation can be considered as systematic acquisition and assessment of information used to provide feedback with regard to developed system. Therefore, the results of the system evaluation can be considered as key indicators in accessing the degree of success associated with the development process.

The evaluators were selected carefully to evaluate all the related operations of the system. Selected staff of the company and the Supervisor was the evaluators of this system. The system was tested by using the dummy data on offline. Further the site is planned to be evaluated or modified according to the feedbacks of users once it is sited.

The evaluation criteria were selected for evaluation and some of the main criteria used for assessment as follows. Test plan summary is included in the Appendix E.

- Overall functionality of the system
- Usability and practicality of the system for use in day today activities.
- Performance and speed
- Overall assessment of the system
- Website information contents assessment, usability of the site, attractiveness etc..

The evaluation was carried out mainly based on the feedback obtained from the evaluators during and after the system demonstration.

### **Test Plan**

The Test Plan describes the scope, approach, resources and schedule of intended test activities. The system has been tested under following criteria. The plan is attached to Appendix E.

- Function Testing
- Usability Testing
- Content Testing
- Interface Checking
- Compatibility Testing

#### 5.3.6.2. Evaluation Result

Most of the evaluators were satisfied with the functions offered by the system and they were agreed this can be used as a final website.

The following section lists out the main areas that gave more satisfaction and the improvement are which were pinpointed by the evaluators.

#### **Evaluator's Satisfactory Points**

- User-wise access controls and functionalities
- Use of combo boxes to minimize the typing effort and rejects the input data
- Related information for a selected or given criteria will be automatically displayed
- Restriction of invalid characters during the data input
- Overall functionality of the system
- Meaningful warnings and errors to users of the system



### Proposed Improvements

- Certain printed statistics such printed reports details
- Integration more payments methods
- Introducing own payment wallet

## **Chapter 6: Conclusion and Future Work**

### **6.1 Introduction**

Critical appraisal is the process of systematically examining developed software to judge its value and relevance. Purpose of this chapter is to argue about the developed system. Web application was developed to transform the current manual system of JayarathneTransportation and MoversLTD. The significant importance of this system is its networked and centralized architecture, allowing several clients to connect and access the same data of this system to reduce ambiguity and increase availability of the information. Clients and Drivers are usually located all around the country, which needs to communicate with the office to get jobs and with customer to find where they are. Critical analysis of the developed system will be discussed next.

### **6.2 Evaluation of the Project**

At the end of the project, all the required functional, nonfunctional requirements were completed while adhering to constraints of the project. Also client requirements that were given while system development was also satisfactory implemented.

We were delighted with the response received from the client on implementation of the project on time. They were very happy with the easy to use, attractive and web interfaces which the staff could easily learn and business model that generates new revenues to the company.

In the beginning of the project some requirements and processes were bit more complex and accessibility to the business data should be limited according to each employee's task without blocking tasks he needs to do, this lead to do requirement gathering process in more detail way which helps us to identify every business process very clearly.

There centralized database was chosen , because of some data should be able to viewable separately as well as in combination to provide all necessary information to make quick

decisions without having need to go through many interfaces. Therefore, centralized database was necessity.

The project has been done as client server system by using HTML and Java Script as a front-end and Java and MySQL Server as the back-end. Moreover, OOSE has been selected as the system design. Reasons for choosing these options were clearly defined with comparisons with other comparatives are clearly described in the introduction chapter at Designing and Implementation chapters of the project report.

Whole project and report was done by the writer. Many books and internet had to refer to enhance the knowledge. The knowledge obtained from Rapid Application Development module was very helpful. Program Design and Programming lectures conducted by UCSC to develop system using Java language and NetBeans IDE Framework were used in the system development. We had no previous knowledge in MySQL server however content we got from Database Systems subject help us to overcome those problems with database.

Interface designing and database designing were done by using diagrams drawn from the information gathered, and then those database tables were further developed by normalizing before using into coding.

Finally we would like to inform, from this system we were able to solve all the problems informed by the client. Therefore we can assure with guarantee that this system will lead to improve efficiency & productivity of the employees as well as save money and time with improving business quality and security.

### **6.3 Project Management**

While the developer was able to complete the project close to originally planned time but for several sections such as development and implementation sections needed much more time than the proposed time duration at the beginning. This was purely due to the under estimation if time needed to learn new technologies used in the project. Several new features were needed to be carefully examined and studied in order to implement them in the developed system. The detailed analysis took much time in order to verify the actual requirements of the training process.

The developer had realized that many new skills set to be acquired or unfamiliar technologies introduced in a project could greatly affect the overall project schedule. Hence, if the developer has to re-draw this or draw another project schedule, this can be taken as an important learning point for the overall project planning.

## **6.4 Lessons Learnt**

From the beginning of the project it was a great source of learning and experience to me. As we had no previous experience in business environments and no previous knowledge in how taxi and movement services operate in depth, so this project became challenging to me.

However as we go through the project life cycle, we learnt in-depth processes of the business environment and learnt accounting from many resources handle all day to day accounting on that company. Therefore that knowledge becomes grate assert to us create this system and any further systems in that domain.

Further, handling client was become a great experience to us, as we learn how to understand client's expectation, how to make them convince on the project progress without using technical stuff and how to get process in their mind into use. Therefore that becomes good experience on working with client which we learnt from this project.

Finally as there is a strict time schedule as there is only for months to complete the project, we learnt lot about time management during the project to cover up deadlines with other studies. Also from this project we got a skill of overcoming stress during the project which can apply to whole life.

## **6.5 Future Enhancements**

Even though the main objective of the system is to satisfy client 100% is impossible, due to client was needed further enhancements of the project at the period of implantation by using fully functioned mobile based solution to make customers and driver more interact with the business on the go as taxi services are mobilized business.

Therefore we have agreed to enhance project by enhancing existing mobile application which used to track user locations and display. In order to allow customers of the company to interact with company to get details, make payments and make bookings, also allows drivers to update their status and to get information on their tasks which cause to bring up business into next level.

Also the program can be further modified in order to meet the security measures that arise in the further, which will enable the company to have high data security with many payment methods as requested by owner.

Finally Backup system can also be expanded in order to deal with more problematic situations enabling the company to restore fast in problems that may arise suddenly or unexpectedly.

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# Appendix A– System and Technical Documentation

## Use Case Narratives

**Table 5 : Use Case Narrative - Vehicle Registration**

Use Case Name :	Vehicle Registration	Use-Case Type – Business Requirement
Use Case ID :	VM – 01	
Priority :	High	
Source :	Document	
Primary Business Actor :	Administrator	
Other Participating Actors:		
Other Interested Stakeholders:		
Description:	At present Company vehicles are used for the hiring. (If needed outsourced vehicles can be included.) Required vehicle information captured to the system.	
Preconditions:	Logged in user should have admin privileges.	
Trigger:	This use case is initiated when the administrator select the option to Register Vehicles.	
Typical Course of events	<b>Actor Action</b>	<b>System Response</b>
	<b>Step 1:</b> Administrator entered vehicle details to the system.	<b>Step 2:</b> System verifies the information and added to the database.
		<b>Step 3:</b> VehicleRegistration number is set as the primary key.
	<b>Step 4:</b> Send registration information to the printing Job.	<b>Step 5:</b> System formatted the registration information and print registered vehicle report.
Alternate Courses	Vehicle Registration number has set as the Primary Key.	
Post conditions	Vehicle was successfully registered and system registration information issued.	

**Table 6 : Use Case Narrative - Driver /Employee Registration**

Use Case Name :	Driver /Employee Registration	Use-Case Type – Business Requirement
Use Case ID :	VM – 02	
Priority :	High	
Source :	Document	
Primary Business Actor :	Administrator	
Other Participating Actors:		
Other Interested Stakeholders:	Drivers and Employees	
Description:	All employees including drivers must be registered with their personal details. They provide their information to the administrator.	
Preconditions:	Logged in user should have admin privileges.	
Trigger:	This use case is initiated when the administrator select the option to register details of driver/employee.	
Typical Course of events	<b>Actor Action</b>	<b>System Response</b>
	<b>Step1:</b> Administrator enters driver/employees details to system.	<b>Step 2:</b> System verifies the information and added to the database.
		<b>Step 3:</b> Auto generated employee registration number according to their job category.
	<b>Step 4:</b> Send registration information to the printing Job.	<b>Step 5:</b> System formatted the registration information and print registered Driver/ Employees report.
Alternate Courses	Employee ID is generated after the driver/employee information entered.	
Post conditions	Driver/employee successfully registered and Employee ID issued.	



**Table 7 : Use Case Narrative - Customer Registration**

Use Case Name :	Customer Registration	Use-Case Type – Business Requirement
Use Case ID :	VM – 03	
Priority :	High	
Source :	Document/ Online Form Feed	
Primary Business Actor :	Customer	
Other Participating Actors:	Clerk / Customer	
Other Interested Stakeholders:		
Description:	Online customers provide their details directly to the system. But some customers (mostly the corporate customers) can fill the company registration form and register with the company. These customer details are entered to the system by the clerk. Customer registration has to be done before requesting the hire.	
Preconditions:		
Trigger:	This use case is initiated when the user select the option to register.	
Typical Course of events	<b>Actor Action</b>	<b>System Response</b>
	<b>Step 1:</b> User/Clerk enters customer details to the system.	<b>Step 2:</b> System verifies the information and added to the database.
		<b>Step 3:</b> Customer Registration number is auto generated.
	<b>Step 5:</b> Clerk print registered customers details report when required.	<b>Step 4:</b> Send registration information to the customer's given email address.
Alternate Courses	Customer ID is generated after the customer information entered. Username and password is verified.	
Post conditions	Verified username and password is given to the successfully registered customer.	

**Table 8 : Use Case Narrative - Making Reservation**

Use Case Name :	Making Reservations	Use-Case Type – Business Requirement
Use Case ID :	VM – 04	
Priority :	High	
Source :	Online Request / Conversation	
Primary Business Actor :	Customer	
Other Participating Actors:	Clerk, Driver	
Other Interested Stakeholders:	Customer – customer will receive the SMS after making the reservation. Receptionist – Reservation information need to generate reports.	
Description:	Customer login to the system and add hire details to the system. SMS containing the reservation details will send to the driver after making the reservation.	
Preconditions:	Customer should be registered user of the system. Vehicles should be available for allocation.	
Trigger:	This use case is initiated when making the reservation.	
Typical Course of events	Actor Action	System Response
	Step 1: Customer will look for the vehicle type available at the time of hire.	Step 2: System will check whether the customer is registered.
		Step 3: Track location and check the availability of vehicle.
	Step 4: Customer will enter the hire details.	Step 5: System will add hire details for the registered customer.
		Step 6: Reservation ID is generated by the system.
	Step 7: System will send SMS to the customer and allocated driver.	
Alternate Courses	Driver and vehicle is allocated to the reservation. Job Alert is sent to the driver.	
Post conditions		

**Table 9 : Use Case Narrative - Cancel Reservation**

Use Case Name :	Cancel Reservation	Use-Case Type – Business Requirement
Use Case ID :	VM – 05	
Priority :	High	
Source :	Online Request/ Document	
Primary Business Actor :	Clerk	
Other Participating Actors:	Customer	
Other Interested Stakeholders:	Driver	
Description:	Customer login into the system and request to cancel the reservation. Or customer can request to the organization’s clerk to cancel the reservation by giving information.	
Preconditions:	Cancellation can be allowed 24 hours before the departure time.	
Trigger:	This use case is initiated when canceling the reservation.	
Typical Course of events	Actor Action	System Response
	Step 1: Search by reservation ID	Step 2: System display search result
	Step 3: User click cancel reservation.	Step 4: system check the cancellation possibility. if possible -> proceed otherwise -> show error message “cannot proceed cancel reservation”
	Step 5: Clerk print Cancellation report when required.	
Alternate Courses	Number of cancelations per customer is recorded.	
Post conditions		

**Table 10 : Use Case Narrative - Manage Access Privileges**

Use Case Name :	Manage Access Privileges	Use-Case Type – Business Requirement
Use Case ID :	VM – 06	
Priority :	Moderate	
Source :	Document	
Primary Business Actor :	Administrator	
Other Participating Actors:	Manager, Clerk, Receptionist	
Other Interested Stakeholders:		
Description:	<p>Administrator can be able to insert, update, delete and view details of the system.</p> <p>Administrator assigns privileges to the other 3 user levels. (Manager, clerk and receptionist).</p>	
Preconditions:		
Trigger:		
Typical Course of events	Actor Action	System Response
	Step 1: Administrator will choose the modules allowed for the user according to his/her job category.	Step 2: System will asks the modules to be select for the particular user.
	Step 3: Administrator will select insert, update or delete or view system information.	Step 4: System will update tables according to the changes has done by administrator.
Alternate Courses	The login page and accessibility changed according to the privileges given to the job category.	
Post conditions		

**Table 11 : Use Case Narrative - Generate Report**

Use Case Name :	Generate Report	Use-Case Type – Business Requirement
Use Case ID :	VM – 07	
Priority :	High	
Source :	System	
Primary Business Actor :	Manager	
Other Participating Actors:	Administrator	
Other Interested Stakeholders:		
Description:	Reports regarding Customers, hires, payments, cancellations, Vehicle maintenance etc could be generated.	
Preconditions:	Manager should enter the type of the report to be printed.	
Trigger:	When manager want the MIS details from the system this use case is initiated.	
Typical Course of events	Actor Action	System Response
	Step 1: Manager will select the report type.	Step 2: System displays the report type entered by manager.
	Step 3: Manager will enter the requirements needed to generate the report.	Step 4: Report will be printed.
Alternate Courses	Management decisions can be taken base on the reports.	
Post conditions		

**Table 12 : Use Case Narrative - Make Payments**

Use Case Name :	Make Payment	Use-Case Type – Business Requirement
Use Case ID :	VM – 08	
Priority :	High	
Source :	Document	
Primary Business Actor :	Clerk	
Other Participating Actors:	Driver	
Other Interested Stakeholders:	Customer	
Description:	<p>Corporate customers and customers who received the movement service pay directly to the company clerk.</p> <p>For the short trips drivers will accept payments and handover the same to clerk. Driver issue manual receipt to the customer when makes payments. The clerk enters payment details from the manual receipt book.</p>	
Preconditions:	Hiring and reservation information should be entered to the system.	
Trigger:	This use case is initiated when the customer makes the payment.	
Typical Course of events	Actor Action	System Response
	Step 1: Clerk logs in to the system.	
	Step 2: Clerk enters the reservation id.	Step 3: Display reservation details.
	Step 4: Select payment mode and make payment.	Step 5: Update payment information
		Step 6: Print Receipt
Alternate Courses	Payment is Accepted.	
Post conditions	Transaction completed.	

**Table 13 : Use Case Narrative - Manage Rates**

Use Case Name :	Manage Rates	Use-Case Type – Business Requirement
Use Case ID :	VM – 09	
Priority :	Moderate	
Source :	Document	
Primary Business Actor :	Manager	
Other Participating Actors:	Administrator	
Other Interested Stakeholders:	Management of the Company.	
Description:		
Preconditions:	Logged in user should have manager privileges.	
Trigger:	This use case is initiated when the manager select the option to Add/modify/delete rates information.	
Typical Course of events	<b>Actor Action</b>	<b>System Response</b>
	<b>Step 1:</b> Manager enters rates details to the system.	<b>Step 2:</b> System verifies the information and added to the database.
	<b>Step 3:</b> Send rates information to the printing Job.	<b>Step 5:</b> System formatted the rates information and print Rates details report.
Alternate Courses	Vehicle was successfully registered and system registration information issued.	
Post conditions		

**Table 14 : Use Case Narrative - Vehicle Allocation**

Use Case Name :	Vehicle Allocation	Use-Case Type – Business Requirement
Use Case ID :	VM – 10	
Priority :	High	
Source :	System	
Primary Business Actor :	Customer	
Other Participating Actors:	Clerk	
Other Interested Stakeholders:		
Description:	Customer will give the reservation details. System will track the vehicle location and check availability and allocate the vehicle for reservation.	
Preconditions:	Reservation details should enter before allocate the vehicle.	
Trigger:	When vehicle reservation use case is initiated this use case is initiated.	
Typical Course of events	Actor Action	System Response
	Step1: Customer initiate reservation request.	Step 2: System will track the location of the vehicle.
		Step 3: System will check availability of the vehicle.
		Step 4: System shows available vehicles for reservation.
	Step3 : If vehicle satisfies the customer request, then confirmation is send to the system.	Step 4: Reserve the vehicle.
Alternate Courses		
Post conditions	Vehicle is allocated for the hire.	



**Table 15 : Use Case Narrative - Manage Vehicle**

Use Case Name :	Manage Vehicle	Use-Case Type – Business Requirement
Use Case ID :	VM – 11	
Priority :	Medium	
Source :	Document	
Primary Business Actor :	Clerk	
Other Participating Actors:		
Other Interested Stakeholders:	Driver	
Description:	Clerk records daily vehicle attendance details, fuel management details, insurance, license and repair details.	
Preconditions:		
Trigger:	This use case is initiated when the vehicle maintenance information is done.	
Typical Course of events	Actor Action	System Response
	Step1: Administrator enters vehicle maintenance details.	Step 2: System Notify when the vehicle need to renew the license/ redo the eco test.
		Step 3: System Notify when the vehicle need to be service.
		Step 4: Calculate vehicle maintenance cost.
Alternate Courses		
Post conditions		

## Sequence Diagrams

Sequence diagram shows how objects communicate by passing messages. Sequence diagram consist of blocks, which are directly used for program design.

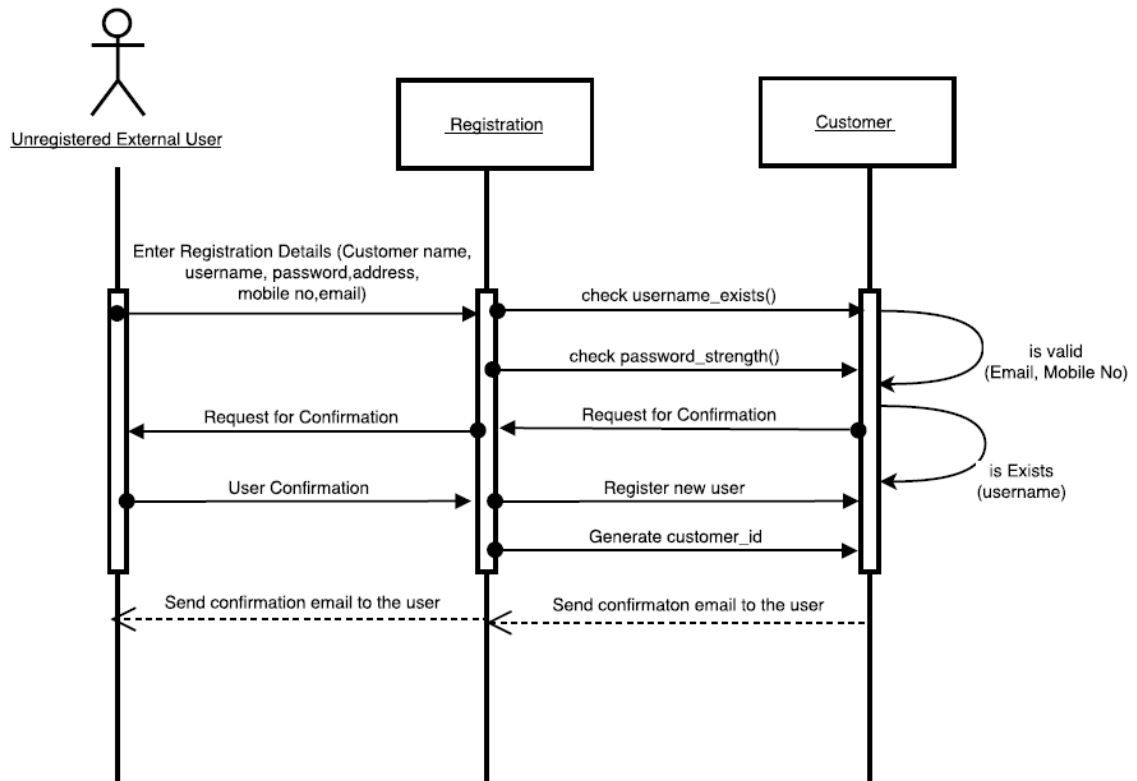


Figure 7 : Sequence Diagram of Customer Registration

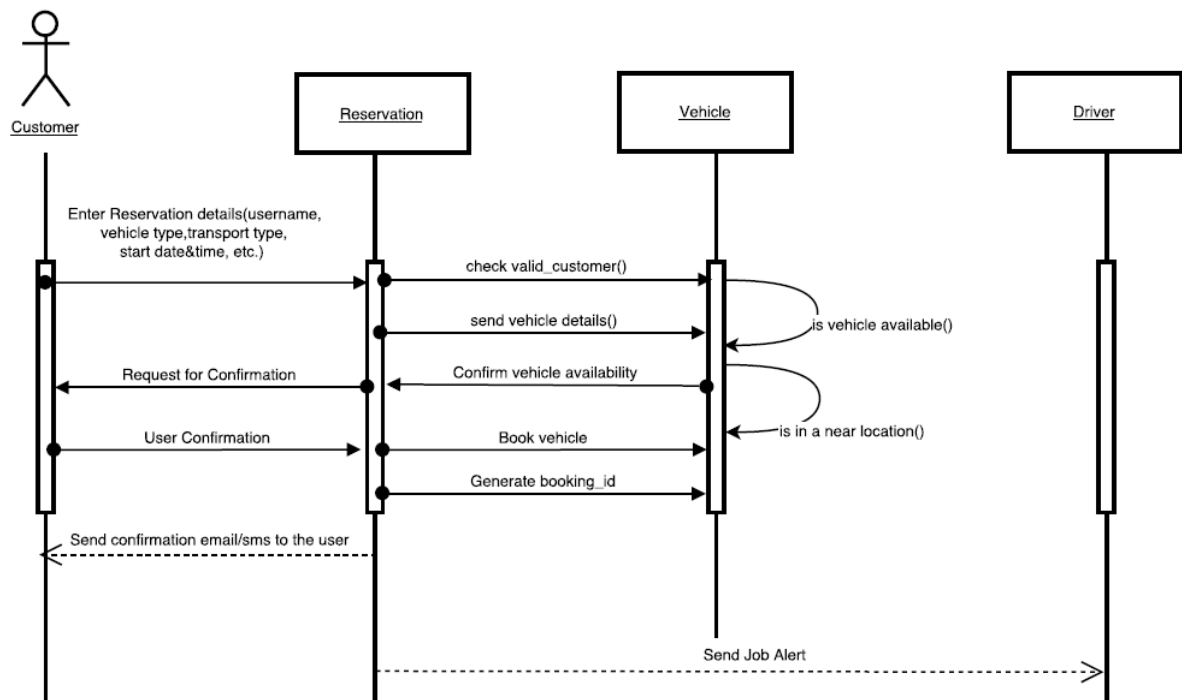


Figure 8 : Sequence Diagram of Vehicle Reservation

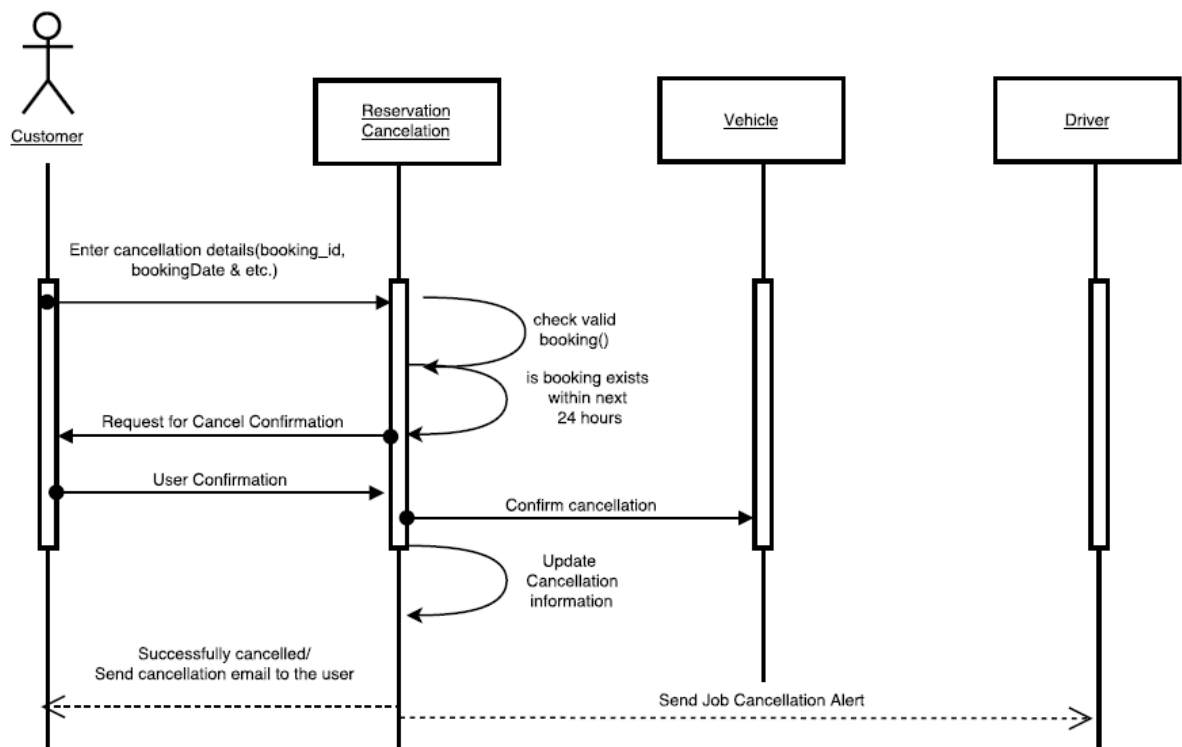


Figure 9 : Sequence Diagram of Vehicle Reservation Cancellation

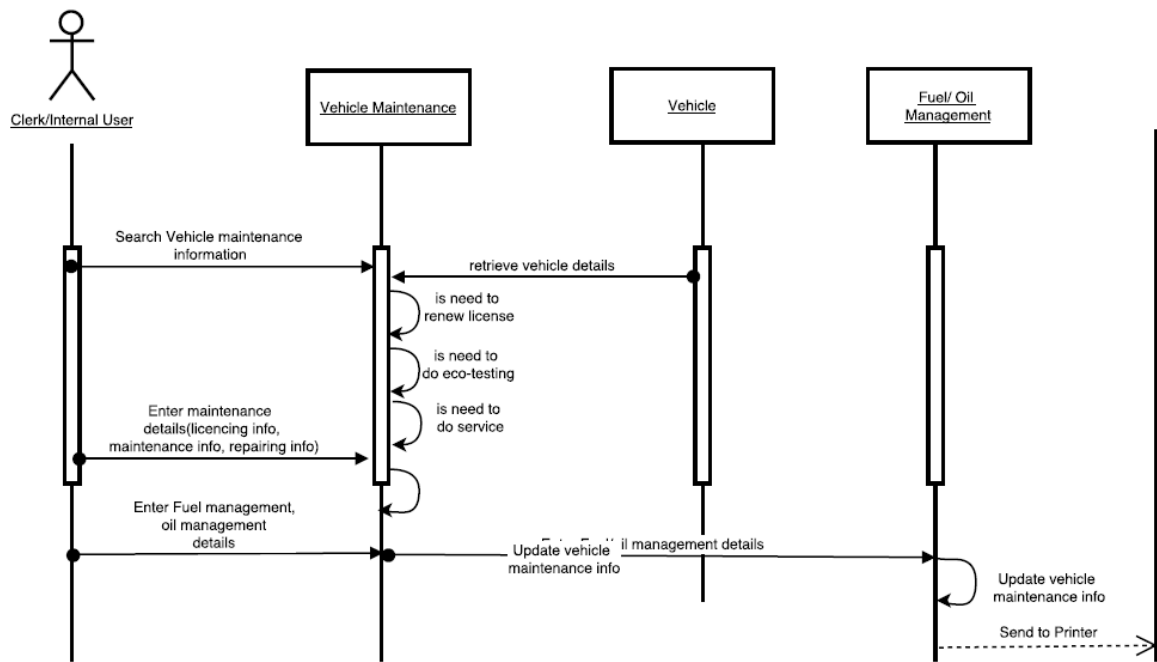


Figure 10 : Sequence Diagram of Vehicle Maintenance

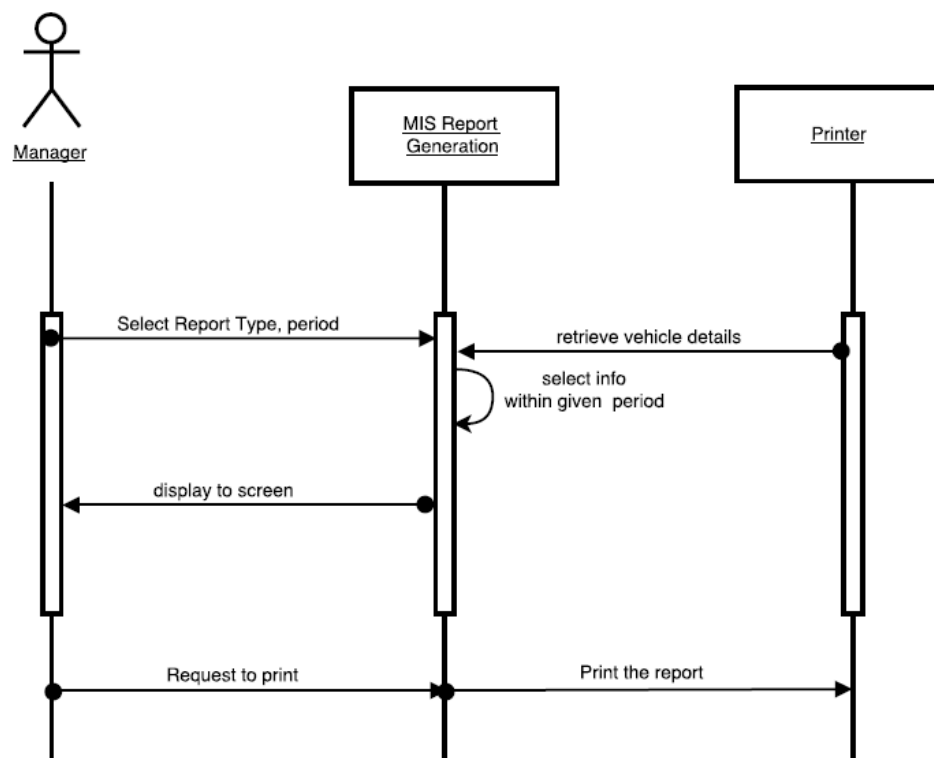


Figure 11 : Sequence Diagram of MIS Reports Generation

## Class Diagrams

This represents the static view of the system, as it shows interaction between classes in the system.

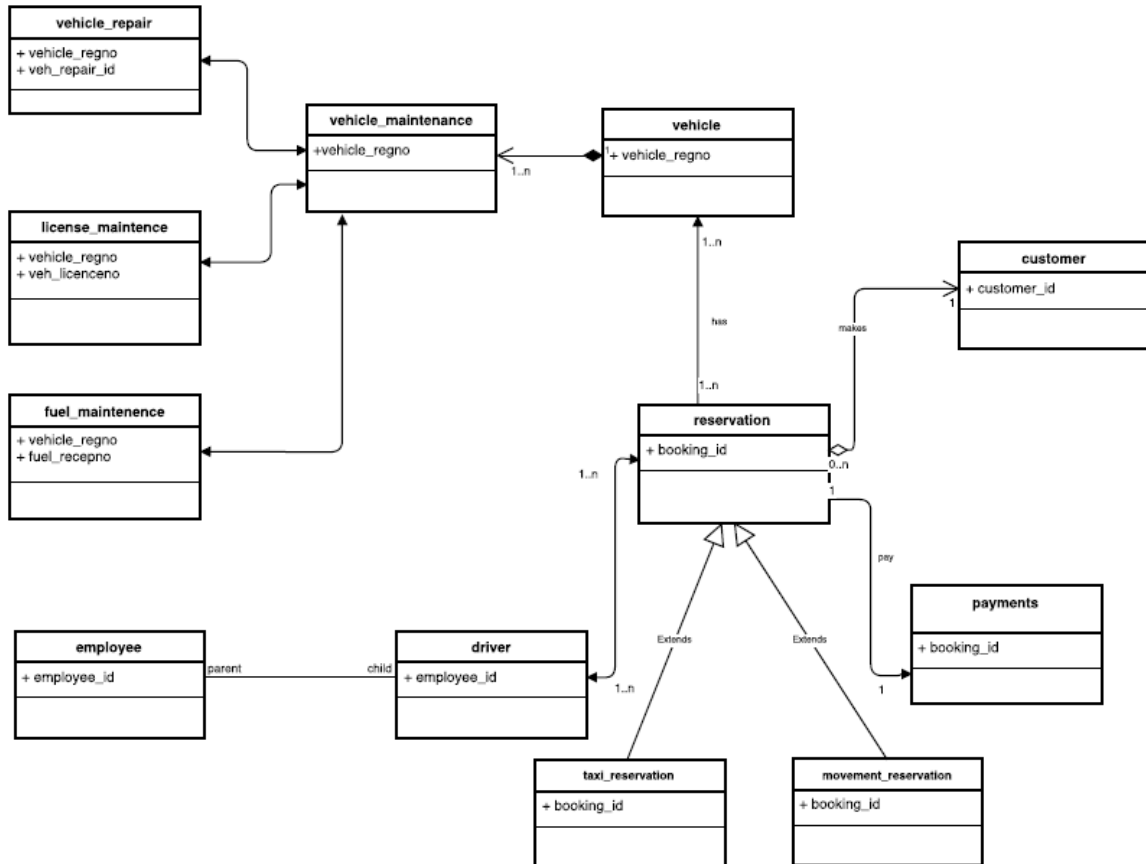


Figure 12 : High Level Class Diagram

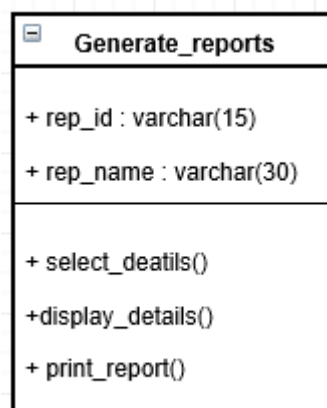


Figure 13 : Generate MIS Reports Class

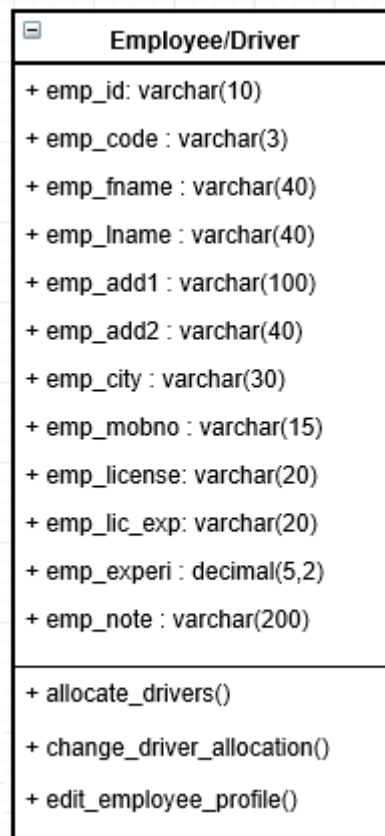


Figure 14 : Employee Class



Figure 15 : Reservation Class

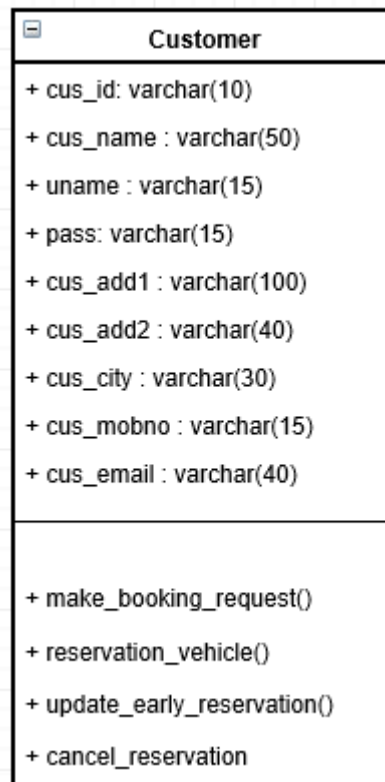


Figure 16 : Customer Class

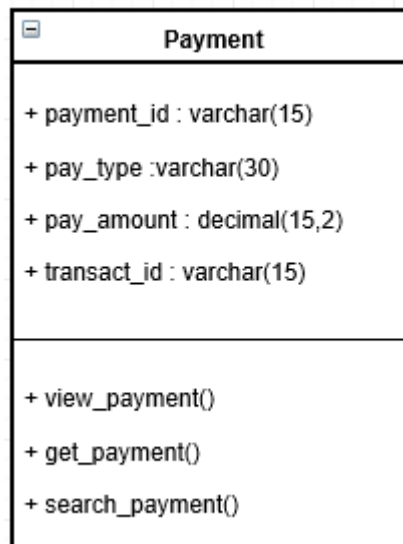


Figure 17 : Payment Class

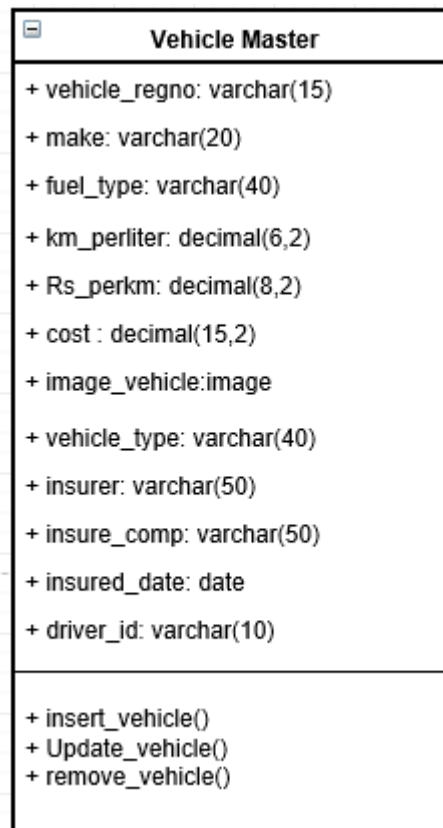


Figure 18 : Vehicle Master Class

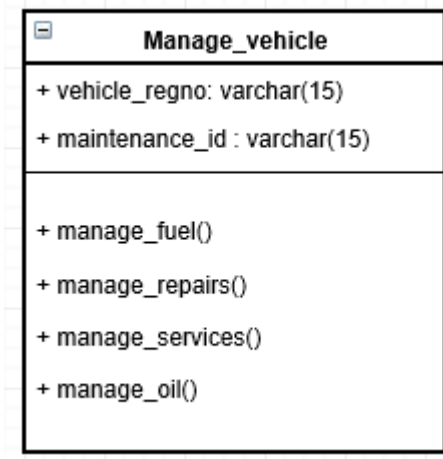


Figure 19 : Manage Vehicle Class



## Database Tables Structure

The attributes of the classes are used to create database design and normalized tables are taken in to final implementation of database.

**Table 16 : Table structure for table Bookings**

<b>Column</b>	<b>Type</b>	<b>Null</b>	<b>Description</b>
<i>b_id</i>	int(10)	No	Booking ID Code
u_id	int(10)	No	User ID
u_name	varchar(40)	No	User Name
v_name	varchar(50)	No	Vehicle Registration Number
d_id	varchar(50)	No	Driver ID
sdate	varchar(30)	No	Start Date
edate	varchar(30)	No	End Date
nod	int(10)	No	Number of Days
km	varbinary(10)	No	Distance in km
no_of_seats	int(10)	No	No of Seats
status	varchar(20)	No	Status
b_date	varchar(40)	No	Booking Date

Customer booking information is included in this table. Field 'status' contain the booking status such as 'Pending', 'Approved', 'Reject' and 'Completed'.

**Table 17 : Table structure for table employee**

<b>Column</b>	<b>Type</b>	<b>Null</b>	<b>Description</b>
<i>emp_id</i>	int(10)	No	Employee ID
emp_code	varchar(3)	No	Employee Category
emp_fname	varchar(40)	No	Employee First Name
emp_lname	varchar(40)	No	Employee Last Name
emp_add1	varchar(100)	No	Address Line 1
emp_add2	varchar(40)	No	Address Line 2
emp_city	varchar(30)	No	City
emp_mobno	varchar(15)	No	Mobile Number
emp_license	varchar(20)	No	Licence Number
emp_exp	varchar(20)	No	Expiry Date
emp_experiance	Decimal(5,2)	No	Experience
emp_note	varchar(200)	No	Notes

All the employees who have access to the system are in the employee table. But the employees under “*emp\_code = 'DRIVER'* ” have no privilege to logging to the system.

**Table 18 : Table structure for table fuel\_details**

<b>Column</b>	<b>Type</b>	<b>Null</b>	<b>Description</b>
<i>f_id</i>	int(10)	No	Fuel ID
v_name	varchar(50)	No	Vehicle Registration Number
d_id	varchar(50)	No	Driver ID
date	varchar(40)	No	Fuel Filling Date
f_type	varchar(40)	No	Fuel Type
qty	varchar(10)	No	Quantity
cost	int(10)	No	Cost Amount
note	varchar(200)	No	Remarks

Fuel cost is recorded in the fuel\_detail table and oil change & vehicle service cost include in oil table.

**Table 19 : Table structure for table oil\_detail**

<b>Column</b>	<b>Type</b>	<b>Null</b>	<b>Description</b>
<i>o_id</i>	int(11)	No	Oil Filling ID
v_name	varchar(50)	No	Vehicle Registration Number
d_name	varchar(50)	No	Driver ID
date	varchar(40)	No	Oil Filling Date
cost	int(10)	No	Cost Amount
o_type	varchar(30)	No	Oil Type
odometer	varchar(20)	No	Odometer Value
note	varchar(200)	No	Remarks

**Table 20 : Table structure for table repair**

<b>Column</b>	<b>Type</b>	<b>Null</b>	<b>Description</b>
<i>r_id</i>	int(10)	No	Repair ID
v_name	varchar(50)	No	Vehicle Registration No
g_name	varchar(50)	No	Garage Name
d_id	varchar(50)	No	Driver ID
date	varchar(40)	No	Repairing Date
odometer	varchar(20)	No	Odometer Value
cost	int(10)	No	Cost
note	varchar(200)	No	Remarks

Vehicle repairing information is included in repair table.

**Table 21 : Table structure for table users**

<b>Column</b>	<b>Type</b>	<b>Null</b>	<b>Description</b>
<i>cus_id</i>	int(10)	No	Customer ID
custname	varchar(100)	No	Customer Name
uname	varchar(50)	No	User Name
pass	varchar(50)	No	Password
cus_add1	varchar(100)	No	Address Line 1
cus_add2	varchar(50)	No	Address Line 2
cus_city	varchar(30)	No	City
cus_mobile	varchar(15)	No	Mobile No
cus_email	varchar(30)	No	email Address

**Table 22 : Table structure for table vehicle\_mast**

<b>Column</b>	<b>Type</b>	<b>Null</b>	<b>Default</b>
<i>v_id</i>	int(10)	No	Vehicle ID
v_name	varchar(40)	No	Vehicle Registration Number
make	varchar(20)	No	Make
fuel_type	varchar(40)	No	Fuel Type
kmr	double	No	Kilometer per one liter of Fuel
avg	varchar(10)	No	Rupees Per Kilometer
cost	int(10)	No	Cost
image	varchar(50)	No	Image of Vehicle
v_type	varchar(40)	No	Vehicle Type
insurer	varchar(50)	No	Insurer Name
company	varchar(50)	No	Insuring Company
date	varchar(40)	No	Insured Date
exp_date	varchar(40)	No	Expiry Date
d_id	varchar(40)	No	Driver Id

Both “rent a car” and “movement” vehicle details are recorded in the vehicle master table.

## Appendix B –User Interface Screens from the System

### Admin Login

### JMovers Online System -Employees Section




#### Staff Login Panel

User Name :

Password :

### Admin Home Page



http://localhost:8080/vehicle/template.jsp Vehicle Mgmt System

## Jayarathana Movers and Transportation (PVT) LTD.

### Admin Section

#### Admin Section

**About the Company**

Jayarathna Transport and Movers (Pvt) Ltd (JMovers) is an emerging company in the field of transportation and house/office moving that established in Nugegoda-Thalapathpitiya area. JMovers specializes in servicing the needs of today's demanding corporate & individual market. JMovers responds to the needs of our clients nationwide, with a dedication that delivers exemplary service. Our high standards of personalized care are distinguished by experience, efficiency and expertise. Please browse our web site further and you can find the best solution for your relocation.



## Add/View/Modify Vehicle Details

The screenshot shows a web browser window with the URL <http://localhost:8080/vehicle/template.jsp> and the page title 'Vehicle Mgmt System'. The page has a sidebar menu on the left with the following items: Vehicle Maintenance, Welcome Admin, Vehicle Details, Driver Details, Fuel Expenses, Oil Changes, Vehicle Repairs, Booking Details, and Logout. The main content area is titled 'View All Vehicle Details' and contains the following text: 'View all the Vehicle Details. If you want to add more Vehilce then [Click Here.](#)'

There are two vehicle detail cards:

- 1) Bajaj Three Wheelers**  
 Number : AAA-8990  
 Make : Bajaj  
 Fuel Type: Pertol  
 Vehicle Type: Taxi Cabs  
 Insurer : Mohomad Khan  
 Driver Name : Saman Perera  
 Cost : 400000 Rs.  
 Company : National Insurance Corporation  
[Edit Vehicle](#) [Delete Vehicle](#)
- 2) Dimo Batta**  
 Number : MH-12 2355  
 Make : Dimo Tata  
 Fuel Type: Desial  
 Vehicle Type: Lorries  
 Insurer : Amit Sharma  
 Driver Name :  
 Cost : 220000 Rs.  
 Company : ICICI Bank Ltd.  
[Edit Vehicle](#) [Delete Vehicle](#)

## Add/View/Modify Driver Details

The screenshot shows a web browser window with the URL <http://localhost:8080/vehicle/template.jsp> and the page title 'Vehicle Mgmt System'. The page has a sidebar menu on the left with the following items: Vehicle Maintenance, Welcome Admin, Vehicle Details, Driver Details, Fuel Expenses, Oil Changes, Vehicle Repairs, Booking Details, and Logout. The main content area is titled 'View All Driver Details' and contains the following text: 'View all the Records of Drivers. If you want to add more Driver Records then [Click Here.](#)'

Below the text is a table with the following data:

Driver Name	City Name	Mobile	Lic. No	Expiry Date	Experiace	Ation
Ajith Peris	Maharagama	0713565671	B45956	2017-03-17	6Years.	<a href="#">Delete</a>
Kushan Silva	Nugegoda	0783733322	B89891	2020-03-26	4Years.	<a href="#">Delete</a>
Nimal Fernando	Narahrenpita	0773686445	B95538	2022-03-04	6Years.	<a href="#">Delete</a>
Sachin Rodrigo	Udahamulla	0773415118	B60091	2018-03-26	4Years.	<a href="#">Delete</a>
Umesh Patirana	Battaramulla	0714849556	B75515	2019-03-17	3Years.	<a href="#">Delete</a>
Yuvraj Rajarathnam	Wellawatta	0775648115	B96123	2018-03-03	1Years.	<a href="#">Delete</a>

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## User/Customer Home Page

**Jayarathnana Movers and Transportation (PVT) LTD.**

**Welcome to JMovers Vehicle Management**

**Our Service at Your Door Step for the Best Price....**

**Welcome...**

- Home
- Register Now
- Login Now
- Take a Car Trip
- About Us
- Our Services
- Rates
- Book for Movements
- Book Taxi
- Rent a car
- Contact Us

**Quick Booking**

**Why Select Us**

JMovers was established in 2005 by providing movement managing solutions and transportation services. Our experienced and well trained staff can assist you every step of the way. Working as a team with you and your employees in drawing out plans in every detail to execute a job that would guarantee all phases of the work are carried out to your satisfaction. JMovers experienced staff will ensure that nothing is left to chance and would work with your move coordinators to establish a comprehensive relocation. JMovers will transport your items to the new location and place them according to the directions of your coordinators. It's the premium cab service provider in Sri Lanka that has been fulfilling all kinds of consumer transport requirements including taxi and rent-a-car services. JMovers taxi



## Customer Registration

**Our Service at Your Door Step for the Best Price....**

**If you want to make a Booking through our Online System, please Register your self first. If you are already Registered please [Login In](#) to Book the vehicle for your Trips.**

**Customer Registration Form**

\* Customer Name :

\* User Name :

\* Password :

Address :

City :

State :

\* Mobile No. :

E-mail :



## Customer Login

**Jayarathnana Movers and Transportation (PVT) LTD.**

**Welcome to JMovers Vehicle Mana**

**Our Service at Your Door Step for the Best Price**

**Login our Online System Vehicle Booking and Enjoy our Service.**  
**If You don't Register then [Click Here](#) to Register with us.**

**Customer Login**

User Name :

Password :

**Navigation Menu:**

- Welcome...
- Home
- Register Now
- Login Now
- Take a Car Trip
- About Us
- Our Services
- Rates
- Book for Movements
- Book Taxi
- Rent a car
- Contact Us

## Rates Information

**Our Service at Your Door Step for the Best Price....**

**Rates**

We give best rates par to the industry and unique edge with our peers. With a cutting edge and our strengths of our entities our threats are exterminated by customer approach and care we give to our customers. Our customer service hot line is open 24 hours to serve any part of location in the Island. Nevertheless we keep up with our promises all the time and deliver the best what we could.

Vehicle Type	Initial km	Additional km
Bajaj Three Wheeler	Rs.50.00	Rs.40.00
Tata Nano	Rs.50.00	Rs.45.00
Suzuki Maruti Alto	Rs.60.00	Rs.45.00
Maruti Suzuki Wagon R	Rs.60.00	Rs.45.00
Toyota K.D.H.	Rs.60.00	Rs.50.00
Foton Lorry	Rs.60.00	Rs.50.00
Dimo Batta	Rs.60.00	Rs.50.00

Waiting Charge per Minutes is Rs.5.00 for all types of vehicles except Three Wheelers(Rs.2.00).

**Navigation Menu:**

- Welcome...
- Home
- Register Now
- Login Now
- Take a Car Trip
- About Us
- Our Services
- Rates
- Book for Movements
- Book Taxi
- Rent a car
- Contact Us

## Book a Taxi

http://localhost:8080/vehicle/index.jsp JMovers PVT LTD

### Jayarathnana Movers and Transportation (PVT) LTD.

Welcome to JMovers Vehicle Mana


Our Service at Your Door Step for the Best Price

- Welcome...
- Home
- Register Now
- Login Now
- Take a Car Trip
- About Us
- Our Services
- Rates
- Book for Movements
- Book Taxi
- Rent a car
- Contact Us

#### 1) Suzuki ALto

**Number :** MH 12 BC12  
**Make :** Suzuki  
**Fuel Type:** Diesel **Cost :** 450000 Rs.  
**Vehicle Type:** Rent Cars  
**Insurer :** Bhushan Patil **Company :** Bajaj Finance Ltd.  
**Rupees Per Kilometer :** 10.0


[Book Vehicle](#)



ALto Eco

#### 2) Tata Nano

**Number :** MH 24 898  
**Make :** Tata  
**Fuel Type:** Petrol **Cost :** 340000 Rs.  
**Vehicle Type:** Rent Cars  
**Insurer :** Bhushan Patil **Company :** Bajaj Finance Ltd.



## Book for Movements

http://localhost:8080/vehicle/index.jsp JMovers PVT LTD

### Welcome to JMovers Vehicle Management System...


Our Service at Your Door Step for the Best Price....

- Welcome...
- Home
- Register Now
- Login Now
- Take a Car Trip
- About Us
- Our Services
- Rates
- Book for Movements
- Book Taxi
- Rent a car
- Contact Us

#### 1) Dimo Batta

**Number :** MH-12 2355  
**Make :** Dimo Tata  
**Fuel Type:** Desial **Cost :** 220000 Rs.  
**Vehicle Type:** Lorries  
**Insurer :** Amit Sharma **Company :** ICICI Bank Ltd.  
**Rupees Per Kilometer :** 12.0


[Book Vehicle](#)



#### 2) Foton Lorry

**Number :** MH 2334  
**Make :** Foton  
**Fuel Type:** Diesel **Cost :** 180000 Rs.  
**Vehicle Type:** Lorries  
**Insurer :** Mohomad Khan **Company :** National Insurance Corporation  
**Rupees Per Kilometer :** 5.2

[Book Vehicle](#)



## Appendix C – User Documentation

### User Documentation For Internal Users (Internal Staff Members)

1. Enter the system <http://localhost:8080/vehicle/admin.jsp>
2. The Login Screen will appear. Enter Username and Password to Login. You will direct to the Staff Home Page.



**JMovers Online System -Employees Section**

**Staff Login Panel**

User Name :

Password :

3. To register customer select, Register Customer.



**Customer Registration Form**

\* Customer Name :

\* User Name :

\* Password :

Address :

City :

State :

\* Mobile No. :

\* E-mail :


4. To track vehicle locations, select [View Vehicle Location](#).
5. To enter payment details, select [Payment Received](#).
6. To add/modify/delete Vehicle details use Vehicle Maintenance.

[View All Vehicle Details](#)

**View all the Vehicle Details.**  
**If you want to add more Vehilce then [Click Here](#).**


**1) Bajaj Three Wheelers**

<p><b>Number :</b> AAA-8990  <b>Make :</b> Bajaj  <b>Fuel Type:</b> Pertol  <b>Vehicle Type:</b> Taxi Cabs  <b>Insurer :</b> Mohomad Khan  <b>Driver Name :</b> Saman Perera</p>	<p><b>Cost :</b> 400000 Rs.   <b>Company :</b> National Insurance Corporation</p>
<p><a href="#">Edit Vehicle</a></p>	<p><a href="#">Delete Vehicle</a></p>



**2) Dimo Batta**

<p><b>Number :</b> MH-12 2355  <b>Make :</b> Dimo Tata  <b>Fuel Type:</b> Desial  <b>Vehicle Type:</b> Lorries  <b>Insurer :</b> Amit Sharma  <b>Driver Name :</b></p>	<p><b>Cost :</b> 220000 Rs.   <b>Company :</b> ICICI Bank Ltd.</p>
<p><a href="#">Edit Vehicle</a></p>	<p><a href="#">Delete Vehicle</a></p>



7. To add/modify/delete Employee/Driver details use [Employee/Driver Registration](#).
8. To Manage Vehicle maintenance details select [Vehicle Maintenance](#) option.  
 Under this there are 4 options available
  - Fuel Management
  - Oil Changing
  - Vehicle Service
  - Vehicle Repairs
9. To generate reports select [Generate Reports](#).
10. To calculate Drive payments and commission select [Driver/Employee Payments](#).

# User Documentation For Online Users

1. Login to the web page <http://localhost:8080/vehicle/index.jsp>



The screenshot shows the homepage of Jayarathnana Movers and Transportation (PVT) LTD. The header features a silver hatchback car on the left, the company name in red, and a 'Welcome to' message. Below the header is a navigation menu with options like Home, Register Now, Login Now, etc. The main content area is titled 'Why Select Us' and contains a paragraph describing the company's services, established in 2005. To the right of the text are four images of vehicles: a small white hatchback, a white hatchback, a white truck, and a white truck.

**Jayarathnana Movers and Transportation (PVT) LTD.**

Welcome to

Our Service at Yo

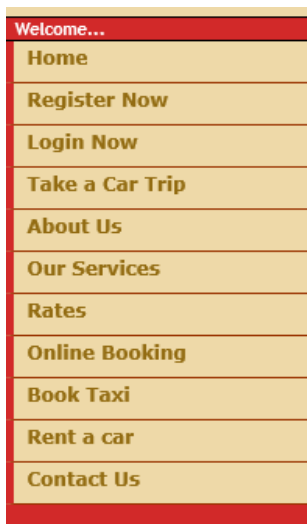
**Why Select Us**

JMovers was established in 2005 by providing movement managing solutions and transportation services. Our experienced and well trained staff can assist you every step of the way. Working as a team with you and your employees in drawing out plans in every detail to execute a job that would guarantee all phases of the work are carried out to your satisfaction. JMovers experienced staff will ensure that nothing is left to chance and would work with your move coordinators to establish a comprehensive relocation. JMovers will transport your items to the new location and place them according to the directions of your coordinators. It's the premium cab service provider in Sri Lanka that has being fulfilling all kinds of consumer transport requirements including taxi and rent-a-car services. JMovers taxi service also provides excellent and reliable service in 24 hours, 7 days a week, and 365 days a year. Best Prices are guaranteed for every service you has with us.

**About the Company**

Jayarathna Transport and Movers (Pvt) Ltd (JMovers) is an emerging company in the field of transportation and house/office moving that established in Nugegoda-Thalapathpitiya area. JMovers specializes in servicing the needs of today's demanding corporate & individual market. JMovers responds to the needs of our clients nationwide, with a dedication that delivers exemplary service. Our high standards of personalized care are distinguished by experience, efficiency and expertise. Please browse our web site further and you can find the best solution for your relocation.

2. Main menu screen will appear like this.



The screenshot shows a vertical list of menu items on a light brown background with a red border. The items are: Welcome..., Home, Register Now, Login Now, Take a Car Trip, About Us, Our Services, Rates, Online Booking, Book Taxi, Rent a car, and Contact Us.

Welcome...

Home

Register Now

Login Now

Take a Car Trip

About Us

Our Services

Rates

Online Booking

Book Taxi

Rent a car

Contact Us

3. To register as a Customer select [Register Now](#).

Fill the form (mandatory fields Customer Name, User Name, Password, Mobile No, E-mail) and click [Register Now](#) button.

**If you want to make a Booking through our Online System, please Register your self first. If you are already Registered please [Login In](#) to Book the vehicle for your Trips.**

**Customer Registration Form**

* Customer Name	:	<input type="text"/>
* User Name	:	<input type="text"/>
* Password	:	<input type="password"/>
Address	:	<input type="text"/>
City	:	<input type="text"/>
State	:	<input type="text"/>
* Mobile No.	:	<input type="text"/>
* E-mail	:	<input type="text"/>

---

4. After registered as a customer with the system can login to the system through Login Page.

**Login our Online System Vehicle Booking and Enjoy our Service. If You don't Register then [Click Here](#) to Register with us.**

**Customer Login**


User Name	:	<input type="text"/>
Password	:	<input type="password"/>

---


5. Click on [Book for Movements](#) to book vehicle for movement and transportation.


**Foton Lorry**

<b>Number :</b> MH 2334	<b>Rupees Per Kilometer :</b> 22
<b>Make :</b> Foton	
<b>Fuel Type:</b> Diesel	<b>Cost :</b> 180000 Rs.
<b>Vehicle Type:</b> Lorries	
<b>Insurer :</b> Mohomad Khan	<b>Company :</b> National Insurance Corporation



**Booking Details**

**Journey Start Date :**  

**Journey End Date:**  

**Number of Days:**  **Journey In KiloMeters :**  Km

**Number Of Seats :**

6. Click on [Book Taxi](#) to book vehicle for hiring and cab service.

7. Click on [Rent a car](#) to rent a car or van for transportation.

8. [Take a car Trip](#) option enables the customers to track the booked vehicle location.

9. For Company details select [About Us](#), [Our Services](#) and [Contact Us](#).

10. For Rates details select [Rates](#).

## Appendix D – MIS Reports

### Vehicle Details Report

Jayarathna Movers and Transportation (pvt) Ltd. Thalapattpitiya

Vehicle Reg. No.	Vehicle Type	Make	Fuel Type	Vehicle Value	Insuring Company	Insurer Name

Prepared By : .....

Checked By : .....

### Driver Details Report As at .....

Jayarathna Movers and Transportation (pvt) Ltd. Thanalapattpitiya

Employee Number	Driver Name	NIC Number	City	Mobile Number	License Number	Licence Expiry Date	Assigned Vehicle

Prepared By : .....

Checked By : .....



Vehicle Schedule Report As at.....

Jayarathna Movers and Transportation (pvt) Ltd. Thanalpathitiya

For the  
Period

From :

To :

Vehicle Reg.Number	Driver Name	Booking ID	Start Date	End Date	Travelled Km	Received Amont	Status

Prepared By : .....

Checked By : .....

Fuel Usage Report As at .....

Jayarathna Movers and Transportation (pvt) Ltd. Thanalpathitiya

For the  
Period

From :

To :

Vehicle Reg.Number	Driver Name	Date	Fuel Type	Quantity	Cost	Remarks

Prepared By : .....

Checked By : .....

Vehicle Maintenance Report As at .....

Jayarathna Movers and Transportation (pvt) Ltd. Thanalpathitiya

For the Period

From :

To :

Oil Maintenance

Vehicle Reg.Number	Driver Name	Date	Oil Type	Odometer Value	Cost	Remarks

Service

Details

Vehicle Reg.Number	Driver Name	Date	Garage Name	Cost	Remarks

Repairs

Vehicle Reg.Number	Driver Name	Date	Garage Name	Odometer	Cost	Remarks

Prepared By : .....

Checked By : .....

Payment Report As at .....  
Jayarathna Movers and Transportation (pvt) Ltd. Thanalapathpitiya

Payment Date	Payment ID	Payment Amount	Driver Name	Vehicle Reg.No

Total

Prepared By : .....

Checked By : .....

## Appendix E – Test Results

### The Test Plan

The system test is carried out to check whether the system meets the required specification whether it can operate successfully. The Vehicle Management application was been tested under following criteria.

- Function Testing
- Usability Testing
- Content Testing
- Interface Checking
- Compatibility Testing

The following checklist was done during the project execution time.

**Table 23 : The Test Plan**

#### A. Function Testing - Check all links

<b>ID</b>	<b>Description of Test</b>	<b>Test</b>	<b>Result</b>
1	Whether outgoing links from all the pages from the specific domain are tested?	Yes	Ok
2	Whether all internal links are tested?	Yes	Ok
3	Whether links are jumping on the same pages?	Yes	Ok
4	Whether there are any orphan pages?	Yes	Ok
5	Whether any broken links are in all above mentioned links?	Yes	Ok

### B. Test for all pages

<b>ID</b>	<b>Description of Test</b>	<b>Test</b>	<b>Result</b>
1	Whether all validations on each field are checked?	Yes	Ok
2	Whether default values of the field are checked?	Yes	Ok
3	Whether invalid inputs to the fields in the forms are checked?	Yes	Ok

### C. Database Testing

<b>ID</b>	<b>Description of Test</b>	<b>Test</b>	<b>Result</b>
1	Whether data consistency is existed?	Yes	Ok
2	Whether data integrity and no error are in the data?	Yes	Ok
3	Whether database queries are executed correctly?	Yes	Ok
4	Whether data is retrieved correctly?	Yes	Ok
5	Whether data is updated correctly	Yes	Ok

### D. Usability Testing - Navigation

<b>ID</b>	<b>Description of Test</b>	<b>Test</b>	<b>Result</b>
1	Whether web sites are easy to use?	Yes	Ok
2	Whether instructions are provided clearly, correct meaning and satisfy the purpose?	Yes	Ok
3	Whether main menu are provided in each pages and consistent?	Yes	Ok
4	Content Testing	Yes	Ok
5	Whether contents are logical, meaningful, understand easily, free from spelling and grammatical mistakes?	Yes	Ok
6	Whether dark color and unsuitable fonts are used?	Yes	Ok
7	Whether all the anchor links are worked properly?	Yes	Ok
8	Whether images are placed properly with proper size?	Yes	Ok

## E. Interface Checking

<b>ID</b>	<b>Description of Test</b>	<b>Test</b>	<b>Result</b>
1	Whether all the interactions between servers are executed properly and errors are handled properly?	Yes	Ok
2	If database or web server returns any error message for any query by application server, whether application server catches and displays this message approximately to users?	Yes	Ok

## F. Compatibility Testing - Browser compatibility

<b>ID</b>	<b>Description of Test</b>	<b>Test</b>	<b>Result</b>
1	Whether web application is tested on internet explorer, Firefox, Google chrome, Opera, Safari browsers with different versions?	Yes	Ok

## User Acceptance Forms

### A. Issue/Defect Report Sample

<b>ISSUE/DEFECT REPORT</b>			
Tester Name:		Software Version:	
Area of Software Impacted:		Preliminary Severity Assessment:	
<b>Nature of Issue/Defect:</b>			
What occurred:			
How did it occur:			
When did it occur:			
Describe how to reproduce the error:			
<b>SCR INFORMATION</b>			
Assigned SCR Number:	Severity:	Status:	

### B. Acceptance Test Final Report Sample

<b>ACCEPTANCE TEST FINAL REPORT</b>			
System Name:		Date:	
General description of the acceptance test effort:			
<b>Unresolved Defects</b>			
Issue/Defect	Impact (H, M, L)	Risk Mitigation (If known)	Work Around (If known)

## Test Cases

**Table 24 : Login to the System as Customer**

Test case No	01
Test Case Type	Unit Testing
Test Case Name	Login to the system as customer
Test Case Description	Registered customer logged in to the system
Test Data	
Valid	Invalid
Valid Username	Invalid Username
Valid Password	Invalid password
Expected Output	
Valid	Invalid
User should navigate to user portal of particular user.	Inform login combination invalid message. Should show link to the registration page.
Result	Pass



**Table 25 : User Tries To Register With the System as a Customer**

Test case No	02
Test Case Type	Unit Testing
Test Case Name	User tries to register with the system as a customer.
Test Case Description	Validate the username, password strength, Mobile number and email address.
Test Data	
Valid	Invalid
Valid new Username	Existing Username
Valid Strong password	Weak Password
Valid Mobile Number	Invalid Mobile Number
Valid Email address	Invalid Email address
Expected Output	
Valid	Invalid
User is registered successfully and customer ID is sent to the given email address and mobile number.	Invalid data fields are informed with a message.
Result	Pass

**Table 26 : Unregistered User Tries To Make A Reservation**

Test case No	03	
Test Case Type	System Testing	
Test Case Name	Unregistered user tries to make a reservation	
Test Case Description	Movement management and taxi reservation service is only available to the registered customers of the company.	
Test Data		
Valid	Invalid	
Expected Output		
Valid	Invalid	
User should redirect to the login page.		
Result	Pass	

**Table 27 : Registered Customer Tries To Make A Reservation**

Test case No	04	
Test Case Type	System Testing	
Test Case Name	Registered customer tries to make a reservation	
Test Case Description	After successful vehicle reservation notification should goes to the appointed driver and customer.	
Test Data		
Valid	Invalid	
Make valid reservation and confirm it.	Decline to confirm reservation.	
Expected Output		
Valid	Invalid	
Reservation details can be viewed by the customer and internal users. Job confirmation message should be sent to customer and appointed driver.	The reservation data should be wiped out and no message sent to the customer or driver.	
Result	Pass	

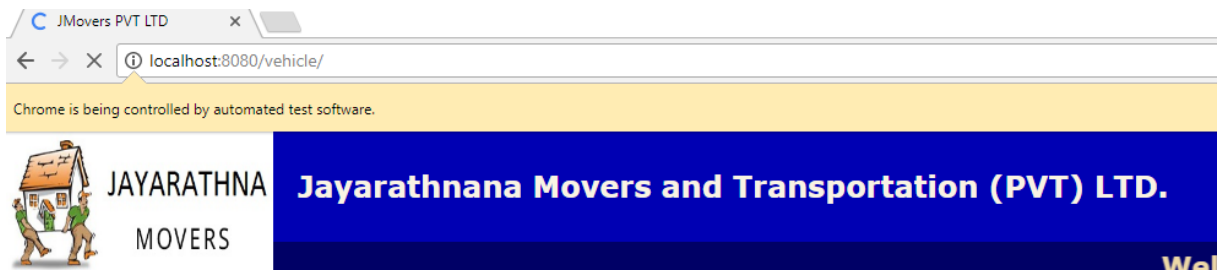
**Table 28 : Internal User Tries To Access Unauthorized Content for Him**

Test case No	05	
Test Case Type	Security Testing	
Test Case Name	Internal user tries to access unauthorized content for him.	
Test Case Description	System data should be properly secured to prevent unauthorized access.	
Test Data		
Valid	Invalid	
Clerk/Receptionist Level user tries to access to view rates or vehicle or driver information.	Clerk/Receptionist Level user tries to access to modify/delete rates or vehicle or driver information.	
Expected Output		
Valid	Invalid	
Rates, vehicle and driver information are displayed for inquiry.	Should show warning message and record in activity log.	
Result	Pass	

**Table 29 : Customer Booking Vehicle for Rent**

Test case No	06
Test Case Type	System Testing
Test Case Name	Customer booking vehicle for rent.
Test Case Description	In the time of rent period should be specified and selected vehicle should be in available state throughout the time.
Test Data	
Valid	Invalid
Customer tries to book a vehicle that is available throughout the selected time period.	Customer tries to book a vehicle that is not available throughout the selected time period.
Expected Output	
Valid	Invalid
Should show success message and make that vehicle's status in reserved state for that period of time.	Should show warning message saying this vehicle will not be available for those particular days.
Result	Pass

## Regression Testing Through Selenium Java Web driver



```
Output x BrokenLinks.java x
Java DB Database Process x GlassFish Server 4.1.1 x selenium (run) x

run:
Starting ChromeDriver 2.30.477700 (0057494ad8732195794a7b32078424f92a5fce41) on port 20880
Only local connections are allowed.
Jul 21, 2017 11:21:30 PM org.openqa.selenium.remote.ProtocolHandshake createSession
INFO: Detected dialect: OSS
http://localhost:8080/vehicle/#
http://localhost:8080/vehicle/# is a valid link
http://localhost:8080/vehicle/do?MOD=BOK&ACT=Home
http://localhost:8080/vehicle/do?MOD=BOK&ACT=Home is a valid link
http://localhost:8080/vehicle/do?MOD=BOK&ACT=Reg
http://localhost:8080/vehicle/do?MOD=BOK&ACT=Reg is a valid link
http://localhost:8080/vehicle/do?MOD=BOK&ACT=Login
http://localhost:8080/vehicle/do?MOD=BOK&ACT=Login is a valid link
http://localhost:8080/vehicle/do?MOD=BOK&ACT=trip
http://localhost:8080/vehicle/do?MOD=BOK&ACT=trip is a valid link
http://localhost:8080/vehicle/do?MOD=BOK&ACT=About
http://localhost:8080/vehicle/do?MOD=BOK&ACT=About is a valid link
http://localhost:8080/vehicle/do?MOD=BOK&ACT=OurServ
http://localhost:8080/vehicle/do?MOD=BOK&ACT=OurServ is a valid link
http://localhost:8080/vehicle/do?MOD=BOK&ACT=Rates
http://localhost:8080/vehicle/do?MOD=BOK&ACT=Rates is a valid link
javascript:bookMovements()
URL belongs to another domain, skipping it.
javascript:bookTaxi()
URL belongs to another domain, skipping it.
http://localhost:8080/vehicle/do?MOD=BOK&ACT=contact
http://localhost:8080/vehicle/do?MOD=BOK&ACT=contact is a valid link
http://localhost:8080/vehicle/do?MOD=BOK&ACT=DisVeh
http://localhost:8080/vehicle/do?MOD=BOK&ACT=DisVeh is a valid link
http://distancecalculator.globefeed.com/Sri_Lanka_Distance_Calculator.asp
URL belongs to another domain, skipping it.
http://localhost:8080/vehicle/#myCarousel
http://localhost:8080/vehicle/#myCarousel is a valid link
http://localhost:8080/vehicle/#myCarousel
http://localhost:8080/vehicle/#myCarousel is a valid link
BUILD SUCCESSFUL (total time: 29 seconds)
```

Figure 20 : Test Results