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Chapter 1

Introduction

The number of vehicles and its users are increasing day-by-day. The increasing number of buyers opening new doors for trading used vehicles. Buying, Selling and Renting of used vehicles could prove to be a hectic task, due to large no. of available options, it creates confusion. A fraud could take advantage of this confusion & cheat with customer. Therefore, there is a need to make this process Fraud-Resistant. Elimination of confusion by providing Best Possible choices of vehicles according to requirements of a customer is equally important. Hence, a Recommendation System with correct information suggesting choices based on trends is a necessary tool. Therefore, building an e-commerce website for used vehicles dealer and customer.

1.1 Need:

There is an ever-growing market for used vehicles in India. Increase in the average wages of people and limitations of public transport are two major factors encouraging purchase of private vehicles. Every year a large number of people are becoming middle-class and upper middle-class it becomes a matter of pride for some. In metro cities like Mumbai, Delhi, Chennai, Kolkata, etc. having a private vehicle proves to be a blessing as the travel time is reduced and overcomes limitations of public transport. The people who cannot afford to buy a new vehicle look to buy used vehicles as an alternative, and the ones who have a vehicle and keen to buy a new one are looking to sell the old one. Buying /Selling/Renting used vehicle provides a good option to a person looking to buy a new one. Securing this process is important for the potential buyer. There are a large number of complaints of fraud in such situations. Therefore, identifying and eliminating any potential fraud risk is equally important. Also, there is confusion in potential buyer's mind as there are so many options available. This can be eliminated by providing best possible choices using a Recommendation system could prove to be a boon for a potential Buyer.

1.2 Basic Concept:

In today's world of internet, there are many e-commerce websites for advertising used vehicle for sale or rent, but there is none that checks history of vehicle and then only lists it for the buyers. Many of them focus on only one kind of vehicle. This opens a way for frauds to cheat with customer. It could cost customer money and time. To overcome the drawback, we came up with idea of developing a system that verifies the vehicle is safe to trade or Not and then recommend it to the customer with a recommendation system that recommends vehicle based on the frequently viewed basis.

1.3 Applications:

- ◆ Easy and convenient to use.
- ◆ Risk free environment for trading used vehicles.
- ◆ Use of data mining to recommend vehicles to customer.

Chapter 2

Review of Literature

Developing an E-commerce website is not a simple task. It goes through Different phases such as planning, requirement analysis, designing, coding, testing and bug fixing [1]. But the important thing for a website is its content. There are many E-Commerce websites as well as applications to list vehicles for sale or rent, but there are very few that focus on important aspects such as user's privacy protection, authentication of vehicles, providing fraud-resistant environment, user friendliness, and recommendation system.

Recommendation system can be developed using filtering techniques such as collaborative filtering and content-based filtering. Collaborative filtering can be further classified into model based, memory based, and item based [2], the authors also explain its applications. Such as of e-commerce, marketing, e-learning, social networking sites as well as in the marketing of books, movies and music, and service centres such as travel, tourism and adhoc Networks offer services.

Collaborative filtering technique can compare user behaviour to find similar users as the subjected user and make prediction based on their preferences. Whereas a content-based recommendation determines the correlation between the contents of items in the dataset and recommend items [3]. The authors have implemented both the techniques alongside for a Book recommendation system.

The authors of “A Content-based Movie Recommender System based on Temporal User Preferences” [4] have implemented a movie recommendation system using a content-based technique by collecting the data from IMDB users. The data comprised of fields such as genres that user liked in a specified time and earlier rated. Movies to recommend movies in future.

The “Study on Application of Apriori Algorithm in Data Mining” [5] explains Apriori algorithm its advantages and disadvantages in depth.

The authors of “Recommendation System using Apriori Algorithm” suggests Apriori algorithm can be implemented with user Interface component, data extraction, web usage mining and pattern recognition [6].

The authors of “Book recommendation service by improved association rule mining algorithm” suggests improvements in Apriori algorithm by two means i.e. By reducing the scale of candidate itemset and ignoring transaction records that are useless for frequent item sets generated [7].

Chapter 3

Report on the Present Investigation (Existing System)

- ◆ A website is made only for used cars to buy and sell. They provide certification of cars on car conditions but they do not provide security about documents that car documents are proper or not. So, in our website we provide authentication of vehicle and we provide facilities for both bike and cars.
- ◆ Many websites do not calculate on road bike price. They don't give any documentation process.
- ◆ Some websites provide only vehicles to customer without any certification and so there will be occur fraud in documentation and also in vehicle.

Chapter 4

Aim and Objectives

4.1 Aim:

- ◆ To provide a fraud resistant environment for trading vehicle.
- ◆ To provide Best Possible options of vehicles to customer according to his/her requirements using a recommendation system.

4.2 Objectives:

- ◆ Enabling a risk-free option to trade vehicles.
- ◆ Provide Best Possible options of vehicles using a Recommendation system.
- ◆ Eliminating any sort of confusion.
- ◆ Simplifying the process of Buy/Sell/Rent for used vehicles.

Chapter 5

Problem Statement

The existing websites do not have a way to verify the safety of trading a vehicle. These websites focus on only one type of vehicles. To solve these issues, we are developing a User-Friendly system that focuses on Buying, Selling & Renting process for used vehicles and provides a Fraud-Resistant environment and Recommending best possible choices using a recommendation system.

Chapter 6

Proposed System for Project

6.1 Principles of proposed system:

- ◆ Proposed system works in coordination with data provided by Traffic Police on their Website.
- ◆ System is designed to reduce any chances of fraud.
- ◆ It protects dealer's & customer's privacy details.
- ◆ It also provides accurate information of vehicles.
- ◆ It provides Best relevant options and suggestions to customer with a Recommendation system.
- ◆ System is designed according to Easy and Convenient to Use policy.

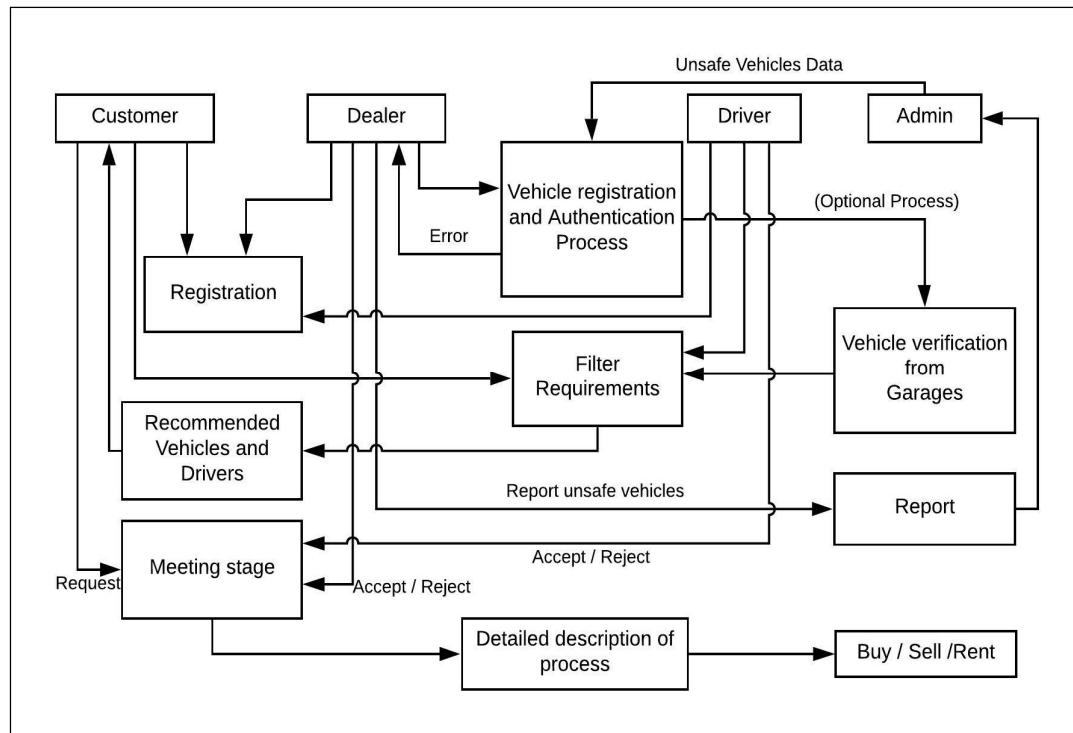


Fig. 6.1. Block diagram of Proposed system

6.2 Working of Proposed System:

- ◆ The proposed system comprises of five elements customer, dealer, buyer, garage and driver.

- ◆ Every user creates an account if not already existing and then login to his/her account to buy, sell or rent vehicle.
- ◆ When a customer logs in the system looking for a vehicle to buy or rent, system displays all the available choices to the customer. System also recommends vehicles on frequently viewed basis using Apriorialgorithm.
- ◆ Dealer after logging in into his/her account to list vehicle and its details. The vehicles listed by the dealer are first authenticated, and then only shown to the customer. Verification of condition of vehicles from affiliated garages is optional. If vehicle is verified then it displays verified icon to customers.
- ◆ Customer after selecting a vehicle can view its details and request dealer for meeting. When dealer accepts the request, customer gets notification of venue and timing, after that further process of buying will begin.
- ◆ Customer looking to rent a vehicle will have to mention his/her requirements in system. The system then provides all available vehicles and also recommends vehicles to the customer. Rent or fare of a vehicle depends on the details provided by dealer per-km or per-day basis.
- ◆ Customer has an additional option to hire a driver. The driver registers his/her details in system, these details can be viewed by a customer. Customer can also rate the service provided by the driver, these ratings could be useful for other customers.

Chapter 7

Requirement Analysis (SRS)

7.1 Introduction:

7.1.1 Purpose:

- The purpose of this document is to develop an Authentic Vehicle Trading and Recommendation System using Apriori algorithm.

7.1.2 Scope:

- The proposed system is available 24x7.
- Vehicles type is limited to Car and Bike.
- Currently limited to used vehicles, can be implemented for new vehicles.
- Limited to a city, can be extended to State or National level.

7.2 Overall description:

- ◆ The system to be developed stores dealer's, driver's, vehicle's, stolen vehicles data in a database.
- ◆ This data will be provided to the customer via system to hire a driver or rent/buy a vehicle from a dealer.
- ◆ The system provides recommendation using Apriori algorithm.

7.3 Functional requirements:

7.3.1 User interfaces:

- Front-end language: HTML, CSS, JavaScript.
- Back-end language: Java, Python

7.3.2 Hardware interfaces:

- Windows.
- A browser which supports CSS, HTML &JavaScript.

7.3.3 Software interfaces:

Table 7.3.3.1

Software used	Description
Operating system	Any OS
Database	MySQL
Environment	Photon Eclipse Java ee

7.3.4 Communication interfaces:

- This project supports all types of web browsers.

7.4 Non-functional requirements:

- ◆ Performance of the website.
- ◆ Speed of data manipulation and retrieval.

Chapter 8

Feasibility Study

Feasibility study is necessary to determine that the proposed system is Feasible by considering the technical, Operational, and Economical factors. By having a detailed feasibility study, the management will have a clear-cut view of the proposed system. The following feasibilities are considered for the project in order to ensure that the project is variable and it does not have any major obstructions. Feasibility study encompasses the following things:

- Technical Feasibility
- Economic Feasibility
- Operational Feasibility

In this phase, we study the feasibility of proposed systems, and pick the best feasible solution for the problem. The feasibility is studied based on three main factors as follows.

8.1 Technical:

In this step, we verify whether the proposed systems are technically feasible or not. i.e., all the technologies required to develop the system are available readily or not. Technical Feasibility determines whether the organization has the technology and skills necessary to carry out the project and how this should be obtained. The system can be feasible because of the following grounds:

Operating System: Windows 7 or higher

Languages: Java, Python

Database System: Xampp, MySQL

Documentation Tool: MS – Word

8.2 Economical:

Economically, this project is completely feasible because it requires no extra financial investment and with respect to time, it's completely possible to complete this project in 6 months. Our project is economically feasible because the cost of development is very minimal when compared to financial benefits of the application.

8.3 Legal:

Legal feasibility determines whether the proposed system conflicts with the legal requirement or not. A project may face legal issues after completion if this factor is not considered at the first stage.

8.4 Operational:

Our project is operationally feasible because the time requirements and personnel requirements are satisfied. We are a team of three members and we worked on this project for Six working months.

Chapter 9

Methodology

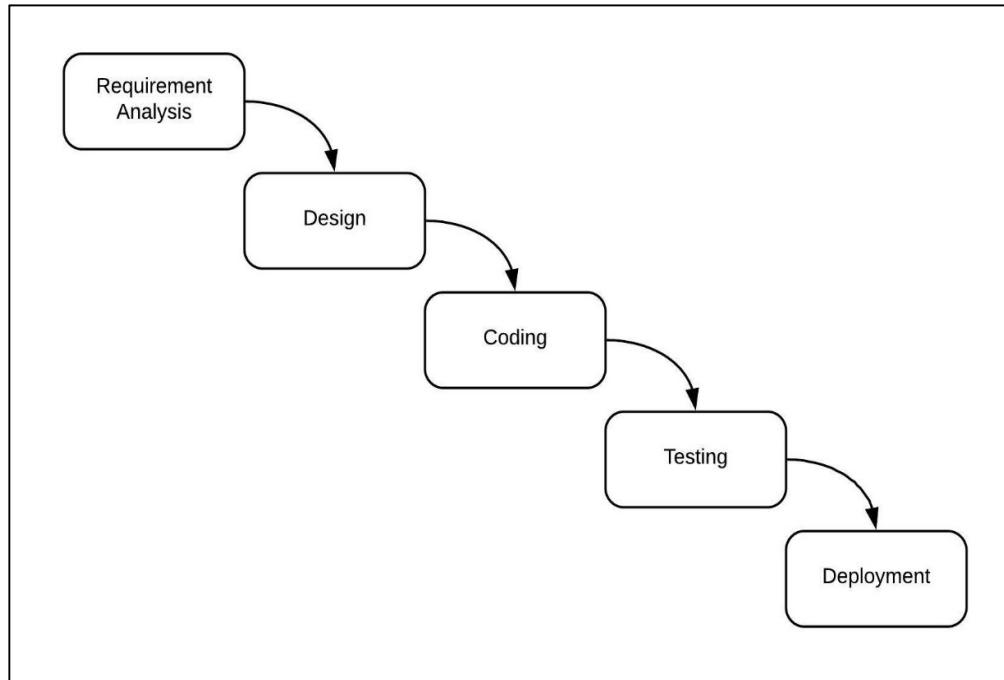


Fig. 9.1 Waterfall model

Waterfall model is a basic SDLC model. In this model no phases overlap on each other. Each phase has to be completed before the other could begin.

9.1 Requirement analysis:

- ◆ Analysing requirements for project.
- ◆ Gathering requirements.
- ◆ Brainstorming and understanding requirements.
- ◆ Feasibility analysis of the requirements.

9.2 Design:

- ◆ Creating design for implementation of project.
- ◆ Document designing.

9.3 Coding:

- ◆ Creating codes as per the design.
- ◆ Integrating codes for next phase of development.

- ◆ Unit testing of code

9.4 Testing:

- ◆ Integrate unit tested code and test it.
- ◆ Testing codes for different scenarios to find bugs.
- ◆ In case of anomaly, report it.
- ◆ Create a testing report.

9.5 Deployment:

- ◆ Checking whether the system is in working condition and working properly.
- ◆ Deploying the system after all checks.

Chapter 10

Project Design

10.1 Context Level diagram:

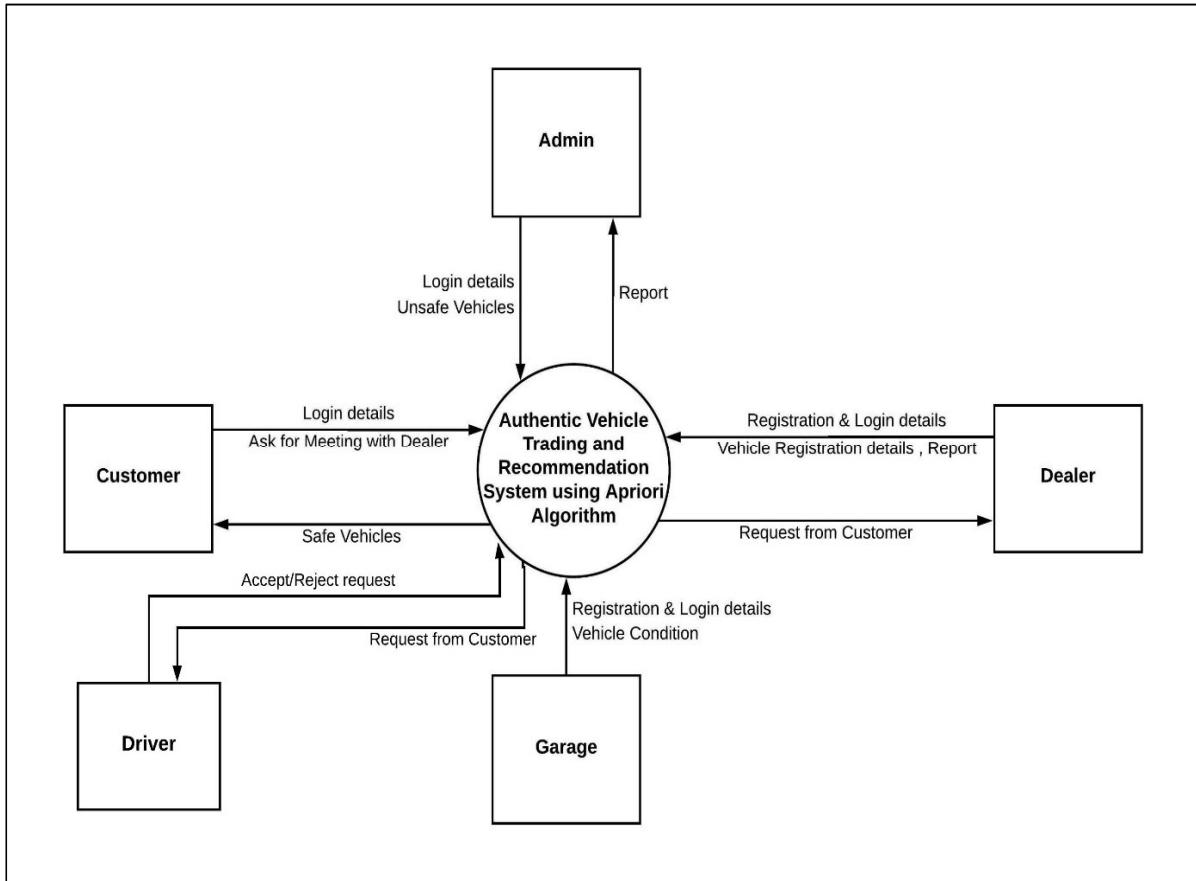


Fig. 10.1 Context level diagram

10.2 DFD Diagram:

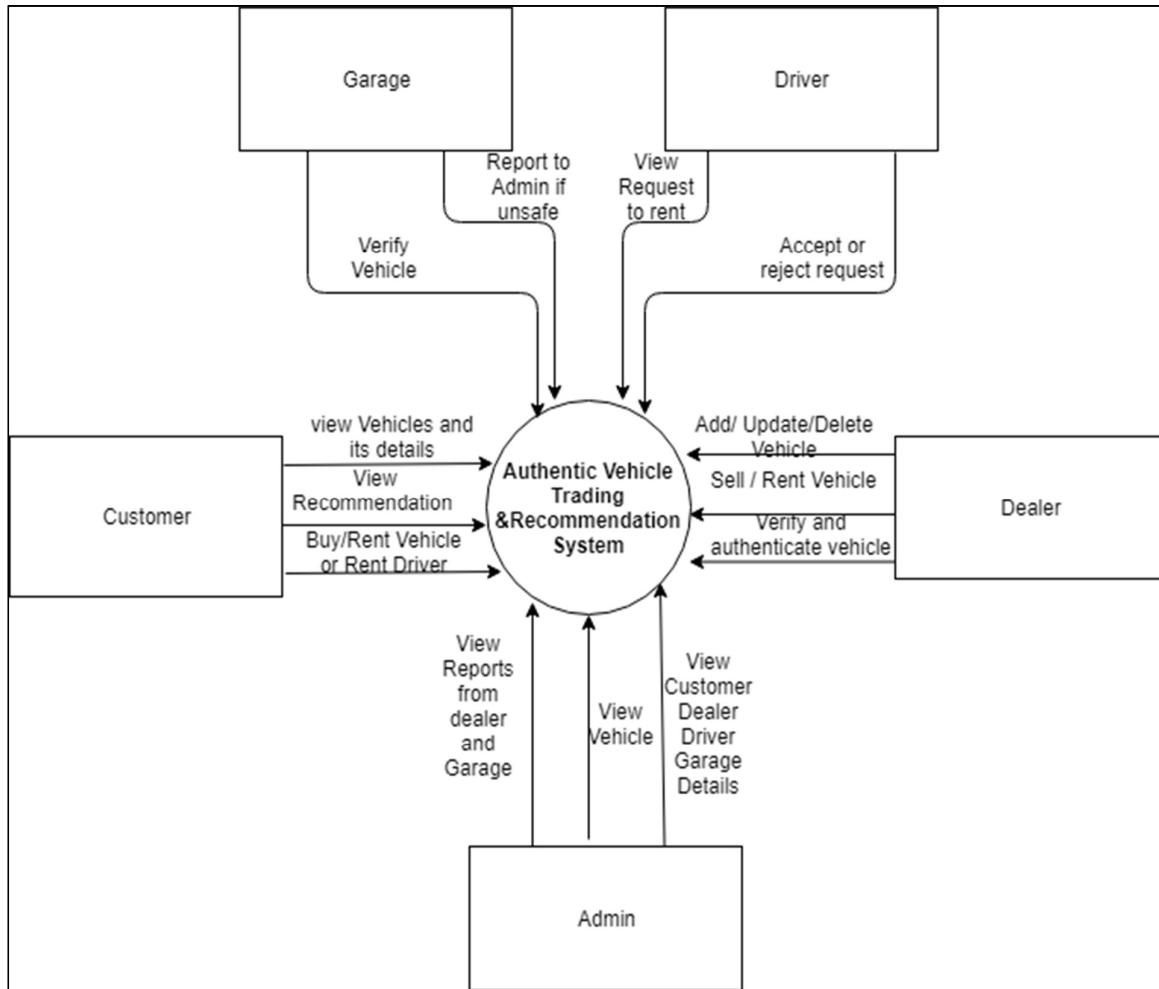


Fig. 10.2 DFD

10.3 Sequence Diagram:

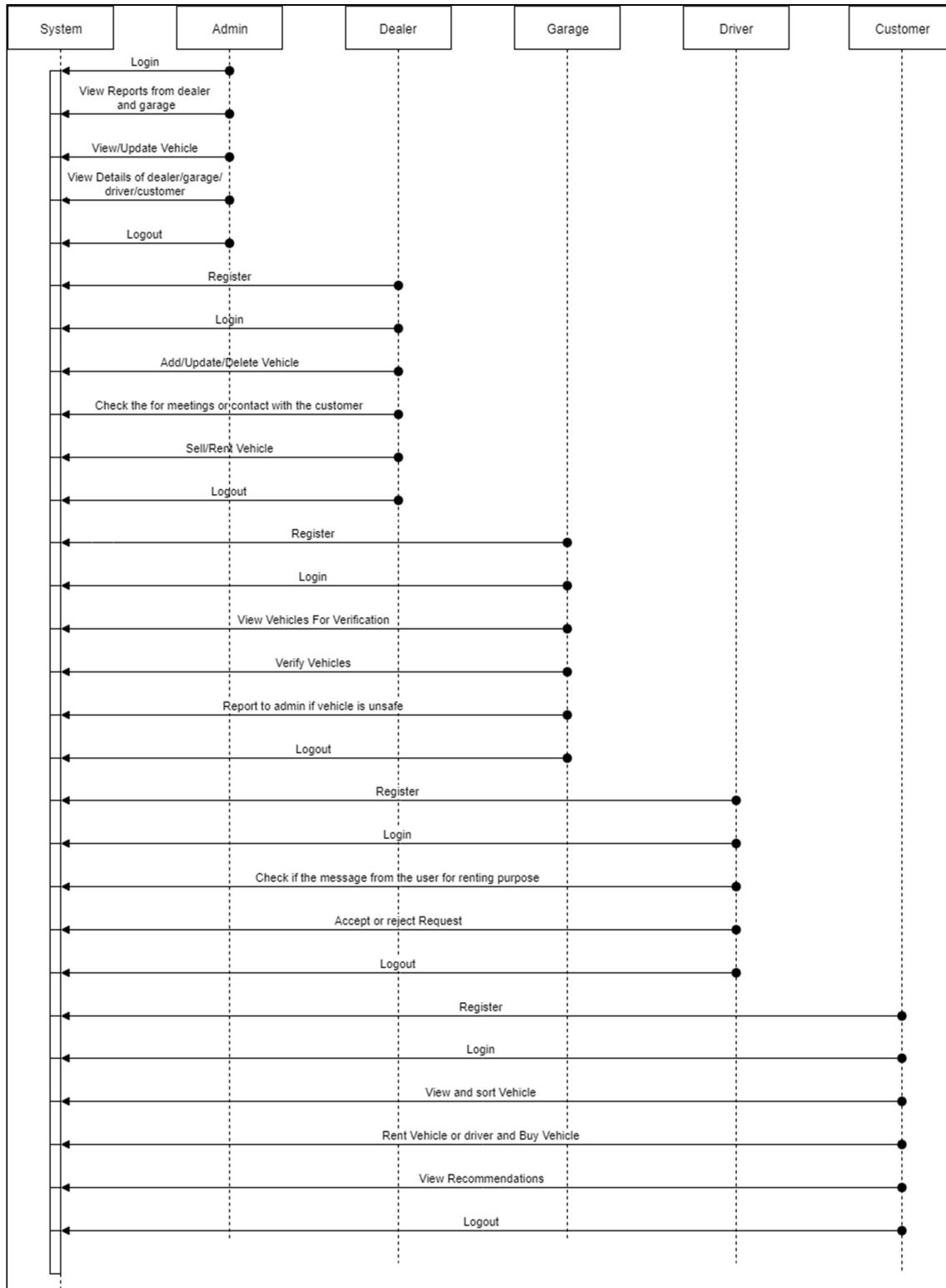


Fig. 10.3 Sequence diagram

10.4 E-R Diagram:

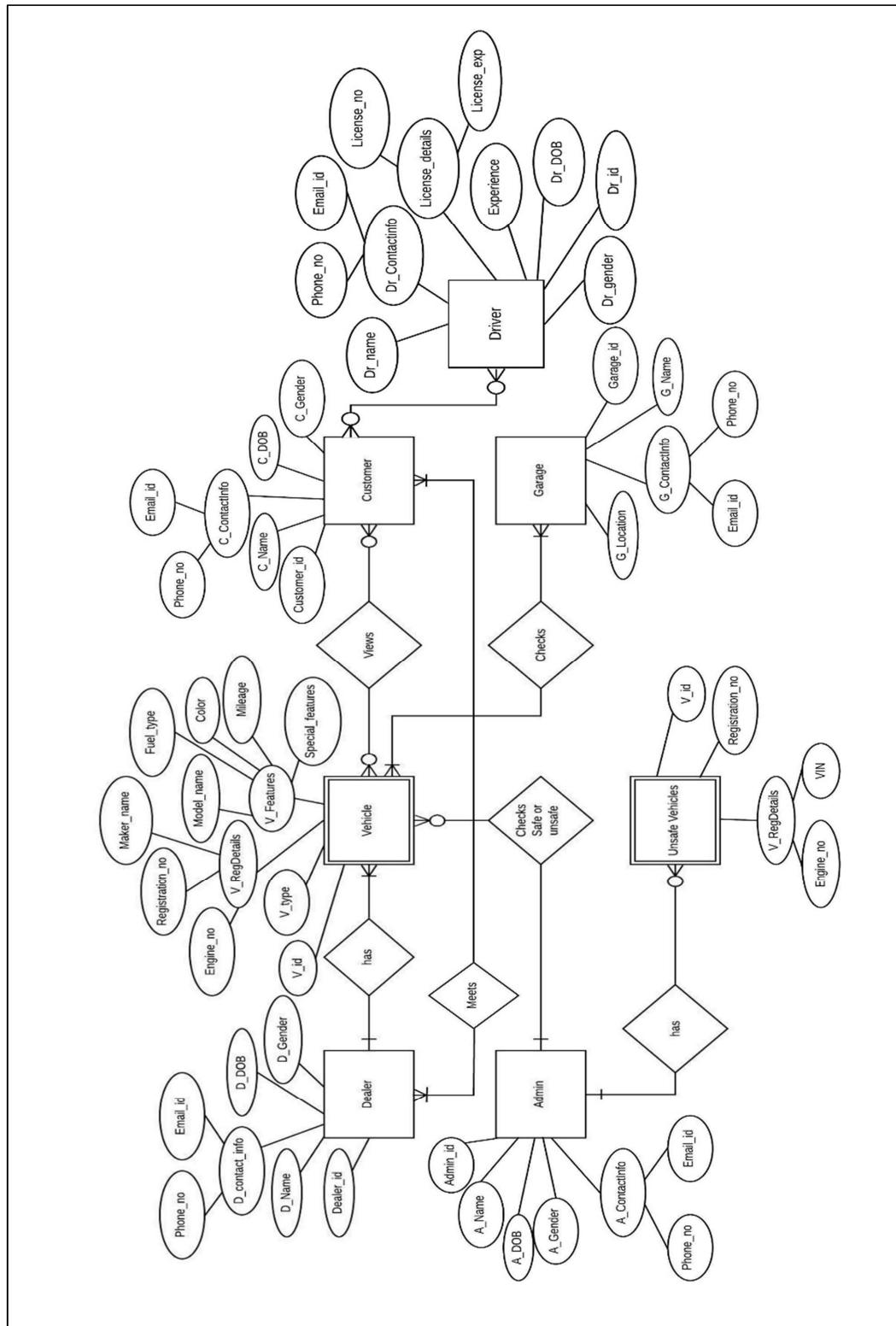


Fig. 10.4 ER diagram

10.5 Use Case Diagram:

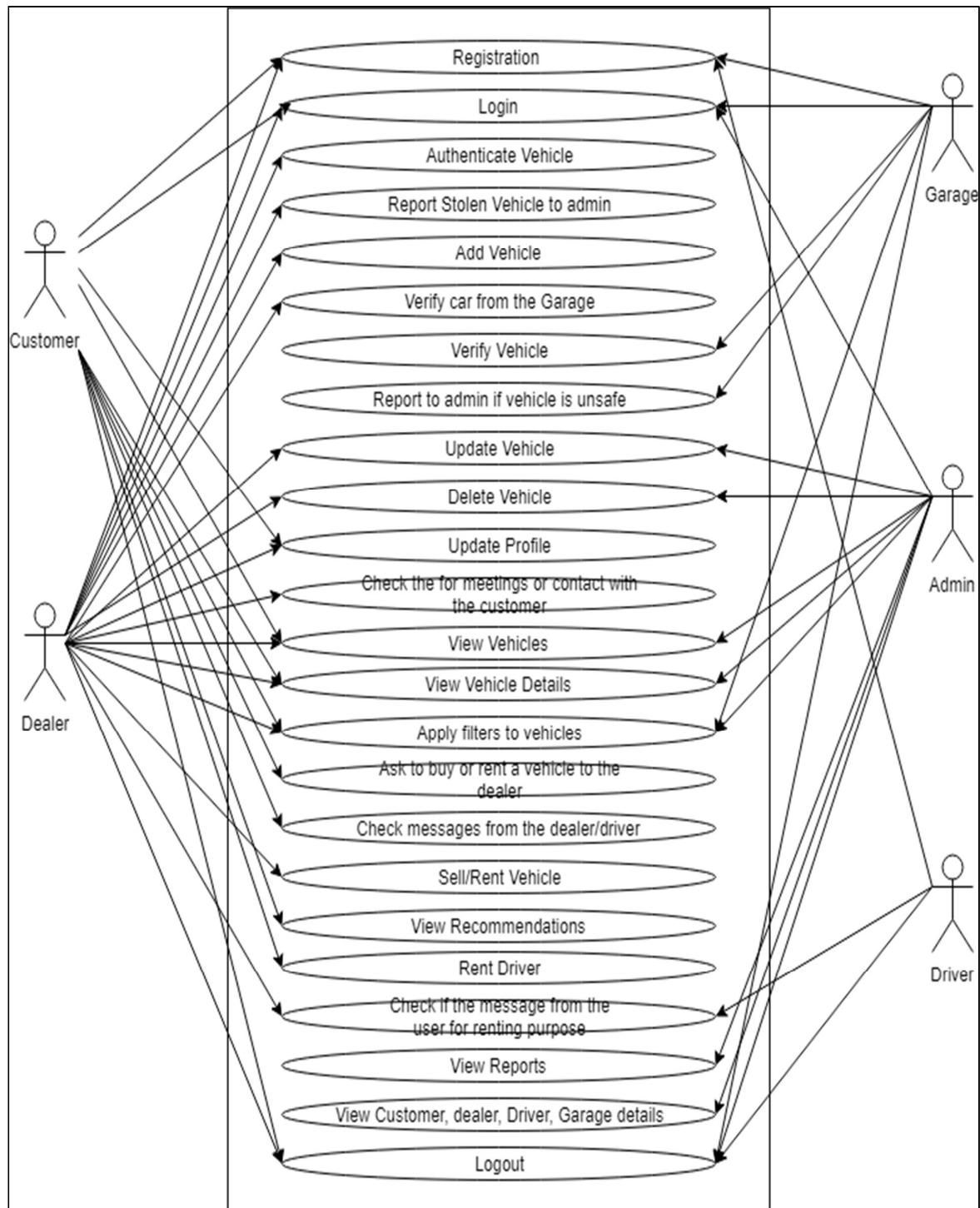


Fig. 10.5 Use case diagram

10.6 Control Flow Diagram:

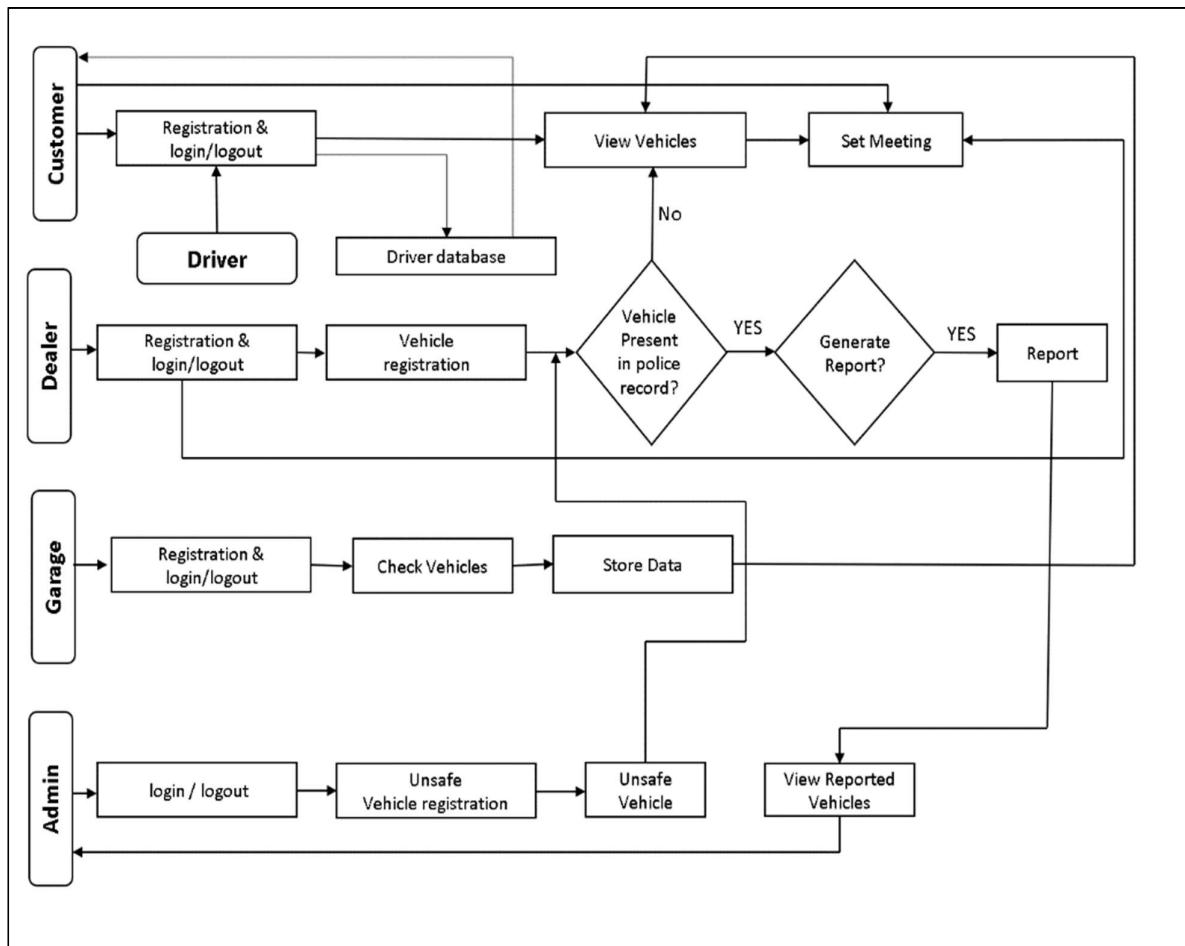


Fig. 10.6 Control Flow Diagram

10.7 Activity Diagram:

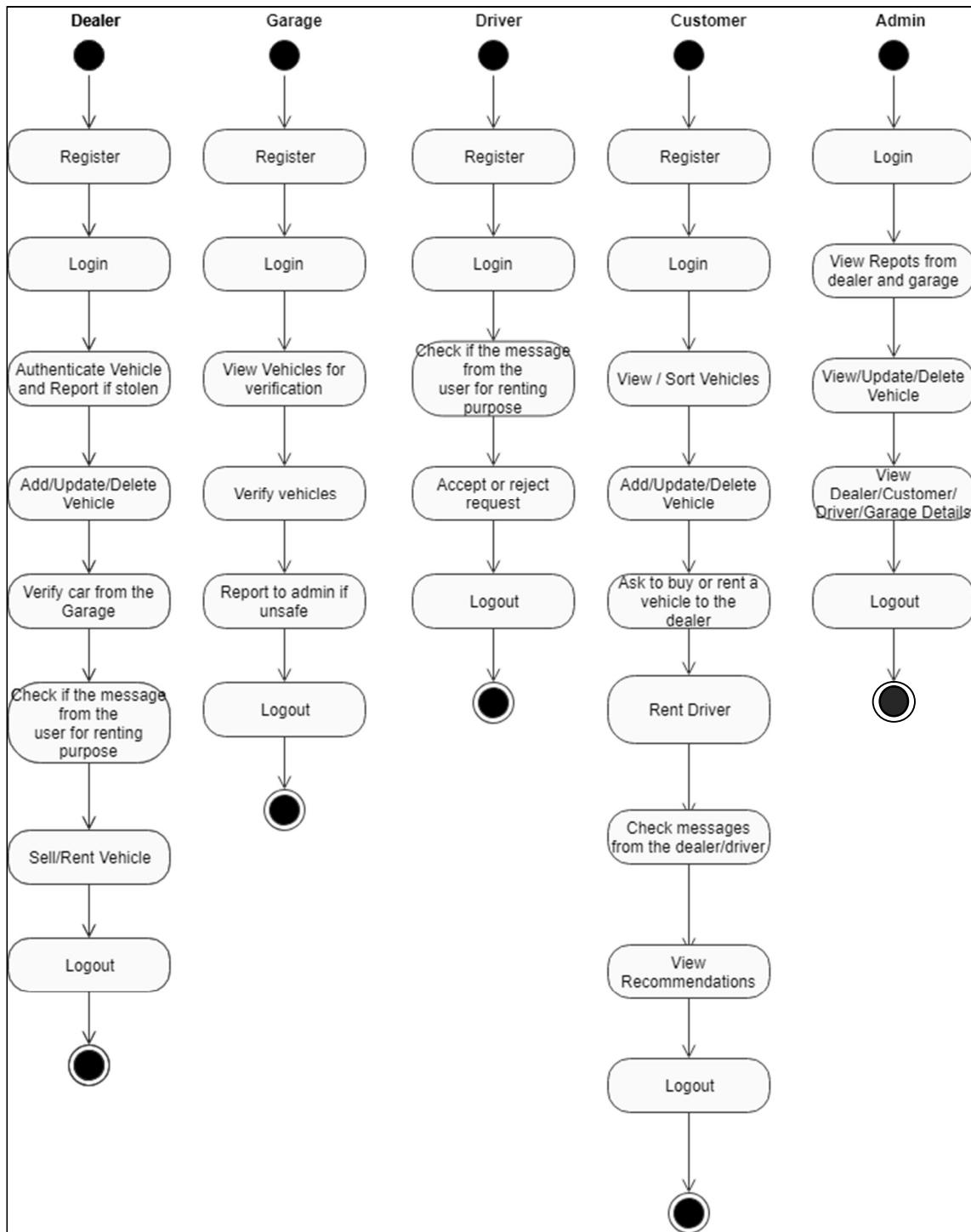


Fig. 10.7 Activity diagram

10.8 Class Diagram:

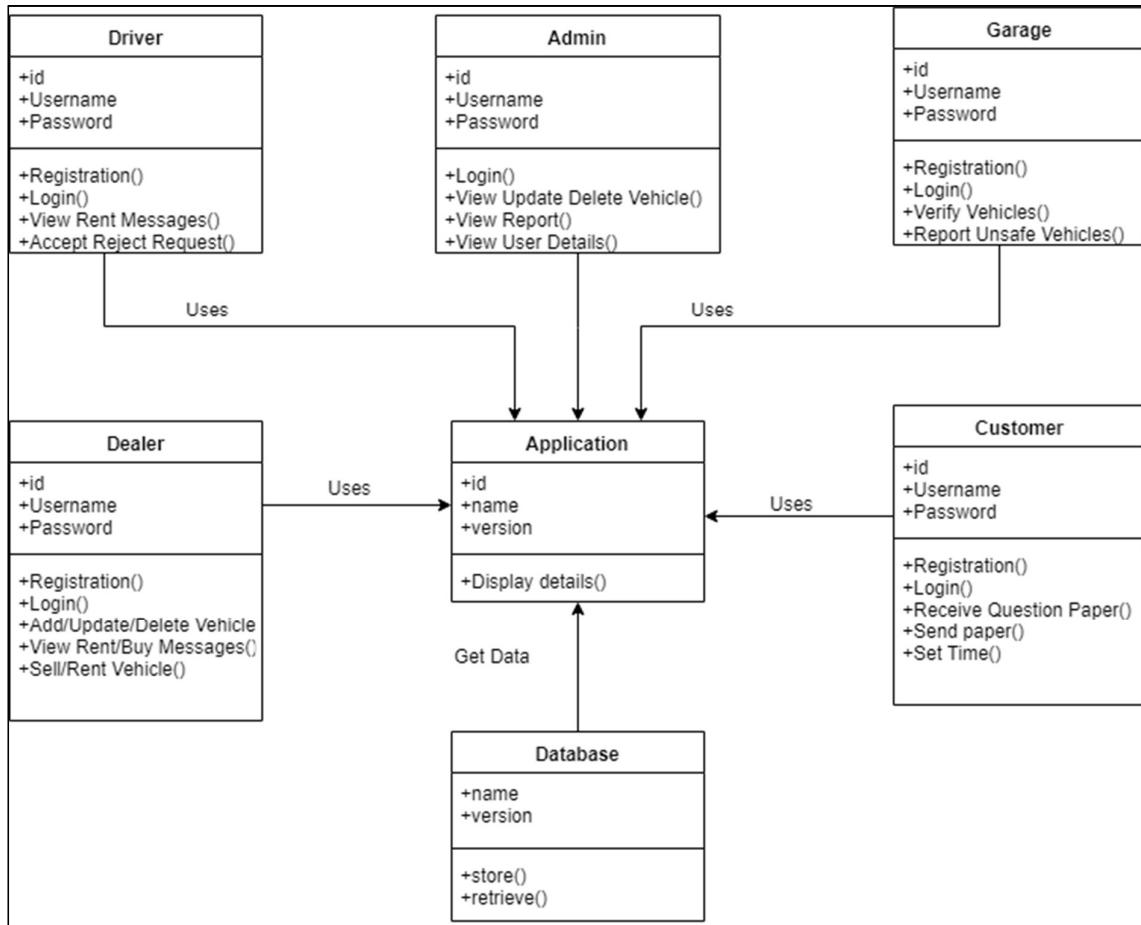


Fig. 10.8 Class diagram

Chapter 11

Implementation and Experimental Set up

11.1 H/w and S/w requirements:

11.1.1 Hardware Requirements:

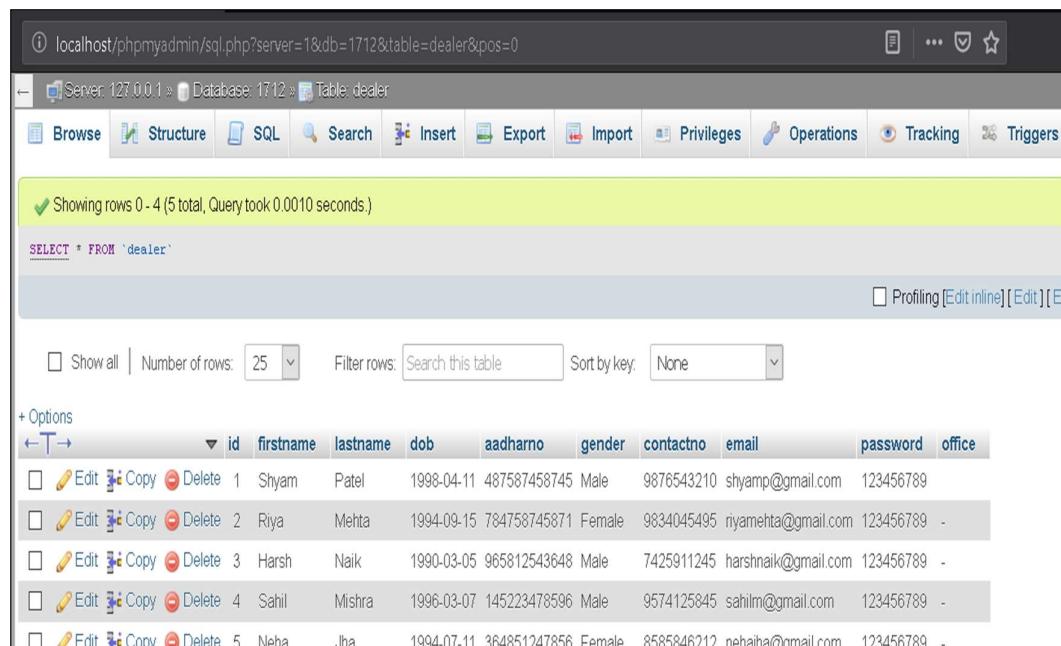
- Processor - Core 2 Duo or above.
- Hard Disk - 160GB or above
- RAM - 1GB or more

11.1.2 Software Requirements:

- Operating System -Any OS
- User Interface - HTML, CSS
- Client-side Scripting – JavaScript
- Programming Language – Java, Python
- Web Applications - JDBC, Servlets, JSP
- IDE/Workbench -Photon Eclipse java ee
- Database - Oracle MySQL
- Server Deployment – Tomcat9.x

11.2 Data Set and connectivity:

As the system aims to provide interaction between Customer, Dealer, Driver, Garage and Admin, the data of models is stored on the device in respective scenes. Thus, we are using dynamic database for storing the data of customer in this system. Database is connected to every module of system because data is accessed by every admin in system. Data can be accessed by Customer, Dealer, Driver, Garage and Admin.



The screenshot shows the phpMyAdmin interface for a MySQL database named '1712'. The 'dealer' table is selected. The table structure includes columns: id, firstname, lastname, dob, aadharo, gender, contactno, email, password, and office. Five rows of data are listed:

	id	firstname	lastname	dob	aadharo	gender	contactno	email	password	office
<input type="checkbox"/>	1	Shyam	Patel	1998-04-11	487587458745	Male	9876543210	shyamp@gmail.com	123456789	-
<input type="checkbox"/>	2	Riya	Mehta	1994-09-15	784758745871	Female	9834045495	riyamehta@gmail.com	123456789	-
<input type="checkbox"/>	3	Harsh	Naik	1990-03-05	965812543648	Male	7425911245	harshnaik@gmail.com	123456789	-
<input type="checkbox"/>	4	Sahil	Mishra	1996-03-07	145223478596	Male	9574125845	sahilm@gmail.com	123456789	-
<input type="checkbox"/>	5	Neha	Jha	1994-07-11	364851247856	Female	8585846212	nehajha@gmail.com	123456789	-

Fig. 11.2.1 Dealer database

	<input type="checkbox"/> Edit	<input type="checkbox"/> Copy	<input type="checkbox"/> Delete	id	firstname	lastname	dob	address	gender	contactno	email	password
<input type="checkbox"/>	<input type="checkbox"/> Edit	<input type="checkbox"/> Copy	<input type="checkbox"/> Delete	1	Deepak	Nair	1996-02-17	Near Borivali Railway Station, Borivali	Male	7485547848	deepaknair@gmail.com	123456789
<input type="checkbox"/>	<input type="checkbox"/> Edit	<input type="checkbox"/> Copy	<input type="checkbox"/> Delete	2	Misha	Patel	2000-12-22	house no 154, Kandivali East	Male	7485722566	mishapatel@gmail.com	123456789
<input type="checkbox"/>	<input type="checkbox"/> Edit	<input type="checkbox"/> Copy	<input type="checkbox"/> Delete	3	Niraj	Gupta	1989-05-12	Kandivali	Male	8475213695	nirajgupta@gmail.com	123456789
<input type="checkbox"/>	<input type="checkbox"/> Edit	<input type="checkbox"/> Copy	<input type="checkbox"/> Delete	4	Nisha	Mehta	1990-07-08	Malad	Female	7266541125	nishamehta@gmail.com	123456789
<input type="checkbox"/>	<input type="checkbox"/> Edit	<input type="checkbox"/> Copy	<input type="checkbox"/> Delete	5	Divya	Patil	1992-03-07	Bandra	Female	8596485262	divyapatil@gmail.com	123456789
<input type="checkbox"/>	<input type="checkbox"/> Edit	<input type="checkbox"/> Copy	<input type="checkbox"/> Delete	6	Nivya	Patel	1994-07-09	Virar	Female	8369521548	nivyapatel@gmail.com	123456789
<input type="checkbox"/>	<input type="checkbox"/> Edit	<input type="checkbox"/> Copy	<input type="checkbox"/> Delete	7	Dhyan	Shukla	1997-03-03	Andheri	Male	9635826954	dhyanshukla@gmail.com	123456789
<input type="checkbox"/>	<input type="checkbox"/> Edit	<input type="checkbox"/> Copy	<input type="checkbox"/> Delete	8	Meera	Raut	1996-04-08	Borivali	Female	8521674239	meeraraut@gmail.com	123456789
<input type="checkbox"/>	<input type="checkbox"/> Edit	<input type="checkbox"/> Copy	<input type="checkbox"/> Delete	9	Sayali	Patil	1998-06-07	Andheri	Female	8762958426	sayalipatil@gmail.com	123456789
<input type="checkbox"/>	<input type="checkbox"/> Edit	<input type="checkbox"/> Copy	<input type="checkbox"/> Delete	10	Rishabh	Sankhe	1998-12-10	Dadar	Male	8624951379	rishabhsankhe@gmail.com	123456789
<input type="checkbox"/>	<input type="checkbox"/> Edit	<input type="checkbox"/> Copy	<input type="checkbox"/> Delete	11	Swaraj	Chavan	1998-04-07	61-C/14,N.P.goregaon	Male	9664814302	swarajchavan55@gmail.com	M1234
<input type="checkbox"/>	<input type="checkbox"/> Edit	<input type="checkbox"/> Copy	<input type="checkbox"/> Delete	12	Sharif	Biradar	1990-11-19	malad west, mumbai-400095	Male	9822355020	sharifbiradar0905@gmail.com	S1234

Fig. 11.2.2 Customer database

	<input type="checkbox"/> Copy	<input type="checkbox"/> Delete	id	regno	brand	type	model	vehicletype	yearsused	kmsdriven	mileage	myear	price	fuel	purpose	image	dealer	inspection
<input type="checkbox"/>	<input type="checkbox"/> Copy	<input type="checkbox"/> Delete	1	MH04CG4874	Volkswagen	Car	Volkswagen Scirocco 1.4 TSI Sport	Coupe	8	100000	14	2009	400000	CNG	Sell	[BLOB - 119.7 KB]	shyamp@gmail.com	Verified
<input type="checkbox"/>	<input type="checkbox"/> Copy	<input type="checkbox"/> Delete	2	MH04CG2548	Skoda	Car	Skoda Fabia 1.2	Sedan	7	70000	21	2010	590000	Petrol	Sell	[BLOB - 188 KB]	shyamp@gmail.com	Verified
<input type="checkbox"/>	<input type="checkbox"/> Copy	<input type="checkbox"/> Delete	3	MH04AX1235	Honda	Car	Honda HRV reserviert	SUV	15	150000	18	2000	500000	Diesel	Sell	[BLOB - 5.9 KB]	shyamp@gmail.com	Verified
<input type="checkbox"/>	<input type="checkbox"/> Copy	<input type="checkbox"/> Delete	4	MH04AX1245	Skoda	Car	Fabia II Combi Greenline	Sedan	5	100000	17.8	2012	400000	Diesel	Sell	[BLOB - 188 KB]	shyamp@gmail.com	Verified
<input type="checkbox"/>	<input type="checkbox"/> Copy	<input type="checkbox"/> Delete	5	MH04ZD1458	Skoda	Car	skoda yeti	SUV	5	90000	20	2013	500000	Diesel	Sell	[BLOB - 7.7 KB]	shyamp@gmail.com	Verified
<input type="checkbox"/>	<input type="checkbox"/> Copy	<input type="checkbox"/> Delete	6	MH49SD1254	Skoda	Car	skoda octavia	Sedan	10	150000	18	2006	350000	Diesel	Sell	[BLOB - 166.8 KB]	shyamp@gmail.com	Verified
<input type="checkbox"/>	<input type="checkbox"/> Copy	<input type="checkbox"/> Delete	7	MH32US1684	Skoda	Car	skoda roomster	Crossover	11	170000	17	2007	290000	Diesel	Sell	[BLOB - 50.4 KB]	shyamp@gmail.com	Verified
<input type="checkbox"/>	<input type="checkbox"/> Copy	<input type="checkbox"/> Delete	8	MH04SH1036	Fiat	Car	Fiat Punto	Sedan	2	10000	18	2017	370000	Diesel	Sell	[BLOB - 9.6 KB]	shyamp@gmail.com	Verified
<input type="checkbox"/>	<input type="checkbox"/> Copy	<input type="checkbox"/> Delete	9	MH04SH1037	Fiat	Car	Fiat Scudo Bulli	MPV	12	14000	19	2006	600000	Diesel	Sell	[BLOB - 8.4 KB]	shyamp@gmail.com	Verified
<input type="checkbox"/>	<input type="checkbox"/> Copy	<input type="checkbox"/> Delete	10	MH04SH1038	Fiat	Car	Fiat Panda	SUV	7	13000	20	2011	450000	Petrol	Sell	[BLOB - 55.1 KB]	shyamp@gmail.com	Verified
<input type="checkbox"/>	<input type="checkbox"/> Copy	<input type="checkbox"/> Delete	11	MH04SH1039	Fiat	Car	Fiat_Marea	Crossover	8	150000	21	2010	5000	Petrol	Rent	[BLOB - 14.4 KB]	shyamp@gmail.com	Verified
<input type="checkbox"/>	<input type="checkbox"/> Copy	<input type="checkbox"/> Delete	12	MH04SH1040	Fiat	Car	Fiat Scudo Bulli	MPV	10	200000	19	2008	7000	Petrol	Rent	[BLOB - 8.4 KB]	shyamp@gmail.com	Verified
<input type="checkbox"/>	<input type="checkbox"/> Copy	<input type="checkbox"/> Delete	13	MH04SH1041	Volkswagen	Car	Volkswagen Caddy	MPV	7	25000	26	2012	8500	Petrol	Rent	[BLOB - 9 KB]	shyamp@gmail.com	Verified
<input type="checkbox"/>	<input type="checkbox"/> Copy	<input type="checkbox"/> Delete	14	MH04SH1042	Volkswagen	Car	Volkswagen Multivan	MPV	6	50000	21	2012	9000	Petrol	Rent	[BLOB - 128.1 KB]	shyamp@gmail.com	Verified
<input type="checkbox"/>	<input type="checkbox"/> Copy	<input type="checkbox"/> Delete	15	MH04SH1043	Volkswagen	Car	Volkswagen Polo	Sedan	8	85000	15.6	2009	5000	Petrol	Rent	[BLOB - 9.6 KB]	shyamp@gmail.com	Verified

Fig. 11.2.3 Vehicles database

11.3 Pseudo Code:

Apriori algorithm:

- * $C_k \rightarrow$ join L_{k-1} with itself
- * Any $(k-1)$ -itemset not frequent cannot be a subset of a frequent k -itemset of vehicles.

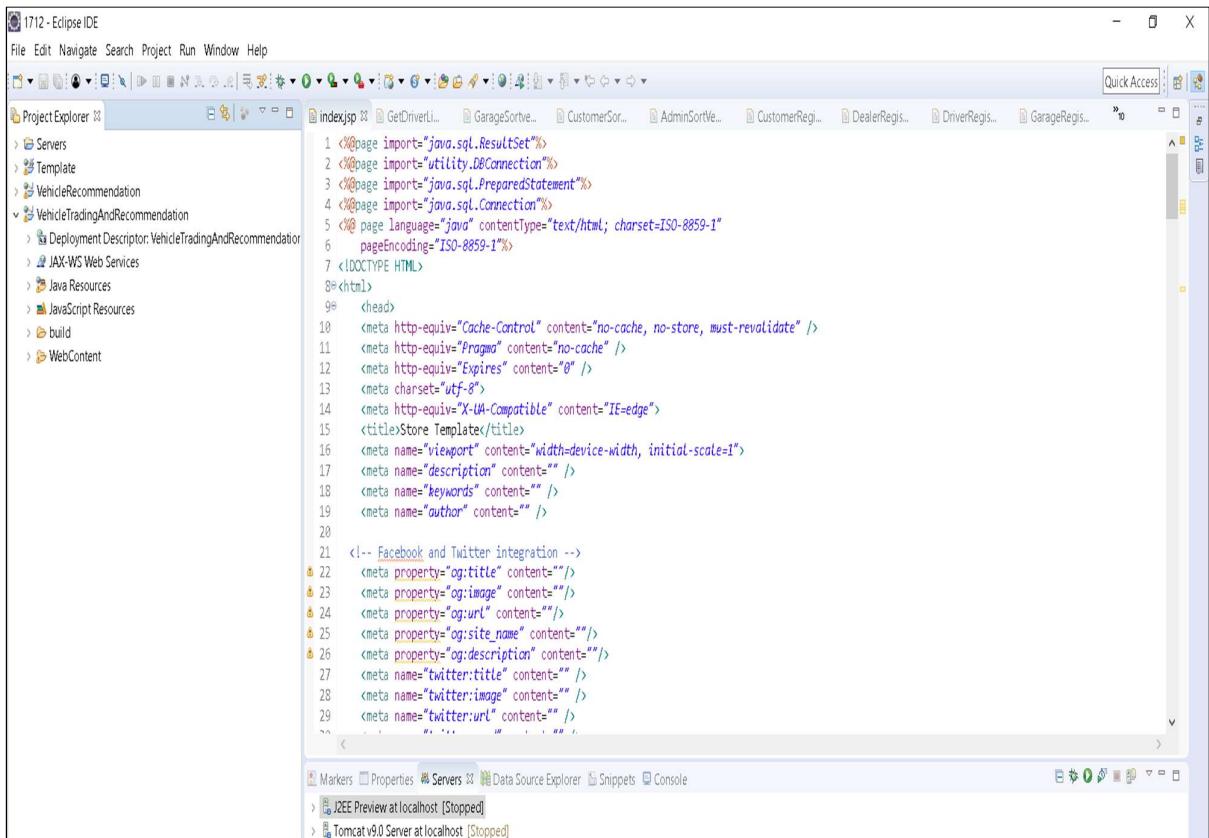
```

 $L_1 = \{\text{frequent itemset}\}$ 
For ( $k=1$ ;  $L_k = \emptyset$ ;  $k++$ ) do begin
     $C_{k+1} = \text{candidates generated from } L_k$ 
    For each transaction  $t$  in database do
        increment the count of all candidates in  $C_{k+1}$  that are contained in  $t$ 
     $L_{k+1} = \text{candidates in } C_{k+1} \text{ with min\_support}$ 
End
Return  $U_k L_k$ ;

```

11.4 Simulation and working environment:

Figure 11.4.1 shows Photon Eclipse Environment in which we are using Java and python to develop “Authentic Vehicle Trading and Recommendation System”.



The screenshot shows the Photon Eclipse IDE interface. The top menu bar includes File, Edit, Navigate, Search, Project, Run, Window, and Help. The left side features the Project Explorer with a tree view of project files, including servers, templates, vehicle recommendation, deployment descriptors, JAX-WS web services, Java resources, JavaScript resources, build, and web content. The main workspace displays a Java code editor with the following content:

```

1 <%@page import="java.sql.ResultSet"%>
2 <%@page import="utility.DBConnection"%>
3 <%@page import="java.sql.PreparedStatement"%>
4 <%@page import="java.sql.Connection"%>
5 <%@ page language="java" contentType="text/html; charset=ISO-8859-1"%>
6   pageEncoding="ISO-8859-1"%>
7 <!DOCTYPE HTML>
8 <html>
9   <head>
10    <meta http-equiv="Cache-Control" content="no-cache, no-store, must-revalidate" />
11    <meta http-equiv="Pragma" content="no-cache" />
12    <meta http-equiv="Expires" content="0" />
13    <meta charset="utf-8">
14    <meta http-equiv="X-UA-Compatible" content="IE=edge" />
15    <title>Store Template</title>
16    <meta name="viewport" content="width=device-width, initial-scale=1" />
17    <meta name="description" content="" />
18    <meta name="keywords" content="" />
19    <meta name="author" content="" />
20
21    <!-- Facebook and Twitter integration -->
22    <meta property="og:title" content="" />
23    <meta property="og:image" content="" />
24    <meta property="og:url" content="" />
25    <meta property="og:site_name" content="" />
26    <meta property="og:description" content="" />
27    <meta name="twitter:title" content="" />
28    <meta name="twitter:image" content="" />
29    <meta name="twitter:url" content="" />

```

The bottom of the screen shows the Eclipse interface with markers, properties, servers, data source explorer, snippets, and console tabs. It also displays two stopped servers: JEE Preview at localhost and Tomcat v9.0 Server at localhost.

Fig.11.4.1 Development Environment

11.5 Gantt chart:

	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March	April
Work										
Study of existing system										
IEEE Papers										
Scope										
Feasibility analysis										
Requirement										
Design										
Coding										
Testing										
Deployment										
Documentation										

Fig. 11.5.1 Gantt Chart

Chapter 12

Testing

System testing is essential to ensure the parameters where the said functionality reaches its motto. Testing is a critical phase prior to deployment. Testing of this system involves debugging of methods and procedures along with testing API calls and ensuring proper functionalities all the while respecting the hardware specification and limitations. Testing parameters are evaluated with set of expected outputs that cementing the sole purpose of the system.

12.1 Verification and Validation testing:

12.1.1 Verification:

As this project also intends to provide interaction between Customer, Dealer, Driver, Garage and Admin by making website in which users can login. Variety of parameters are verified such as customer requirements, working of Recommendation system and vehicles provided by Dealer. Verification is intended to check that a system meets a set of design specifications. In the development phase, verification procedures involve performing special tests to model or simulate a portion, or the entirety, of system, then performing a review or analysis of the results.

12.1.2 Validation:

It is intended to ensure services provided by system (or portion thereof, or set thereof) meets the operational needs of the user. Our project ensures all the services provided by system are functioning properly. It is validated that it meets all the needs of a user without any problems.

12.2 Test Cases:

Table 12.2.1 Test cases

Test case no	Testcase name	Action	Expected Output	Actual Output	Status	Remark
TC_1	Add vehicle	Enter valid information	Vehicle added successfully	Vehicle added successfully	Pass	OK
TC_2	Buy vehicle	Select a vehicle to buy	Wait for dealer's approval/ Select another one	Wait for dealer's approval/ Select another one	Pass	OK
TC_3	Rent vehicle	Select a vehicle to rent	Wait for dealer's approval/ Select another one	Wait for dealer's approval/ Select another one	Pass	OK
TC_4	Hire Driver	Select a driver	Wait for Driver to accept/reject request	Wait for Driver to accept/reject request	Pass	OK

TC1: Adding vehicle

- ◆ If dealer wants to add a vehicle he/she clicks on “Add Vehicles” button as mentioned in Fig.12.2.1.
- ◆ After that, dealer has to enter the registration no. of vehicle. The system checks for vehicle in stolen vehicle database for authentication purpose as shown in Fig. 12.2.2.
- ◆ The system displays add another vehicle option if it is found in stolen vehicle database and also allow dealer to report the vehicle to dealer by “Report vehicle to admin” button as shown in Fig. 12.2.3.
- ◆ By clicking on it dealer admin will receive a message of reported vehicle as shown in Fig. 12.2.4.
- ◆ After that dealer fill vehicle details in Vehicle registration form as shown in Fig. 12.2.5.
- ◆ The vehicle is then successfully added and can be viewed by customers and dealer as shown in Fig. 12.2.6.

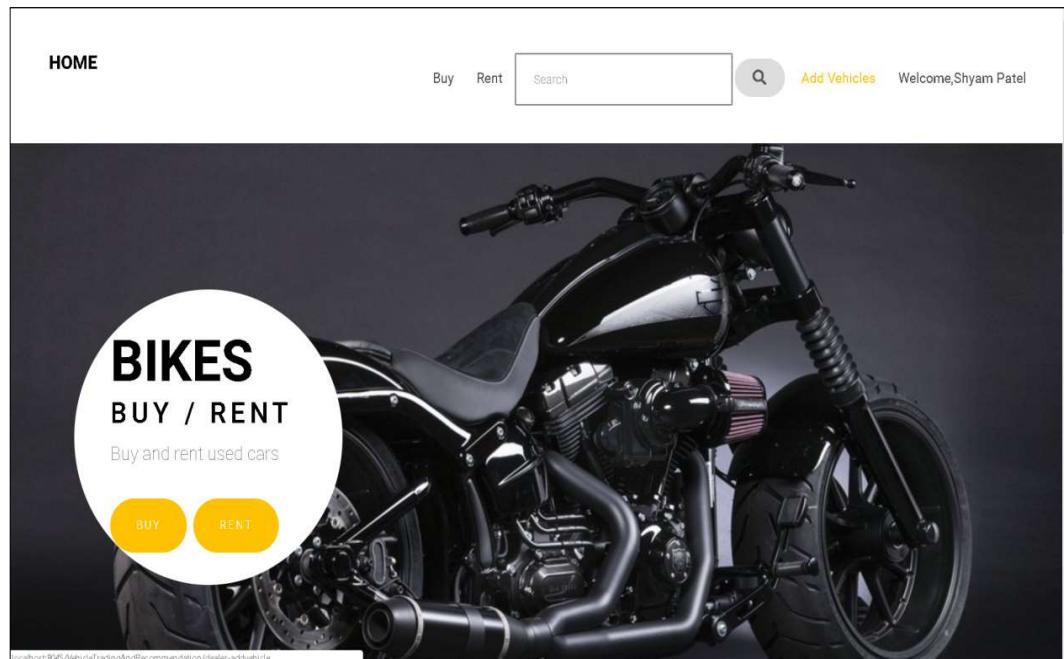


Fig. 12.2.1 Dealer adds vehicle

HOME Buy Rent Search Add Vehicles Welcome,Shyam Patel

Add Vehicles

Enter Vehicle Registration No.

Authenticate

Fig. 12.2.2 Dealer authenticates vehicle

HOME Buy Rent Search Add Vehicles Welcome,Shyam Patel

Add Vehicles

Enter Vehicle Registration No.

The Vehicle is Stolen. You cannot Register it!!!

Report Vehicle to Admin

Fig. 12.2.2 Report vehicle

HOME Buy Rent Reports Search View Profile Welcome, Admin

Stolen Vehicles Reports

#	Registration No	Dealer
1	MH43AD4422	Shyam Patel(shyamp@gmail.com)
2	MH04CG4875	Shyam Patel(shyamp@gmail.com)
3	MH04DN3082	Riya Mehta(riyamehta@gmail.com)

Showing 1 to 3 of 3 rows

Fig. 12.2.4 Admin viewing reports

HOME

Buy Rent

Add Vehicles Welcome Shyam Patel

Add Vehicles

Enter Vehicle Registration No.

Vehicle Registration No.

Type of Vehicle

Bike Car

Brand

Vehicle Type

Model

Manufacturing Year

Used(in years)

Kms Driven

Milage(in KM/Hr)

Vehicle Milage

Price (in ₹)

Vehicle Price

Fuel Type

Petrol Diesel CNG

Purpose

Sell Rent

Allow Inspection of Vehicle

Yes No

Vehicle Image

No file chosen

Fig. 12.2.5 Dealer fills registration details

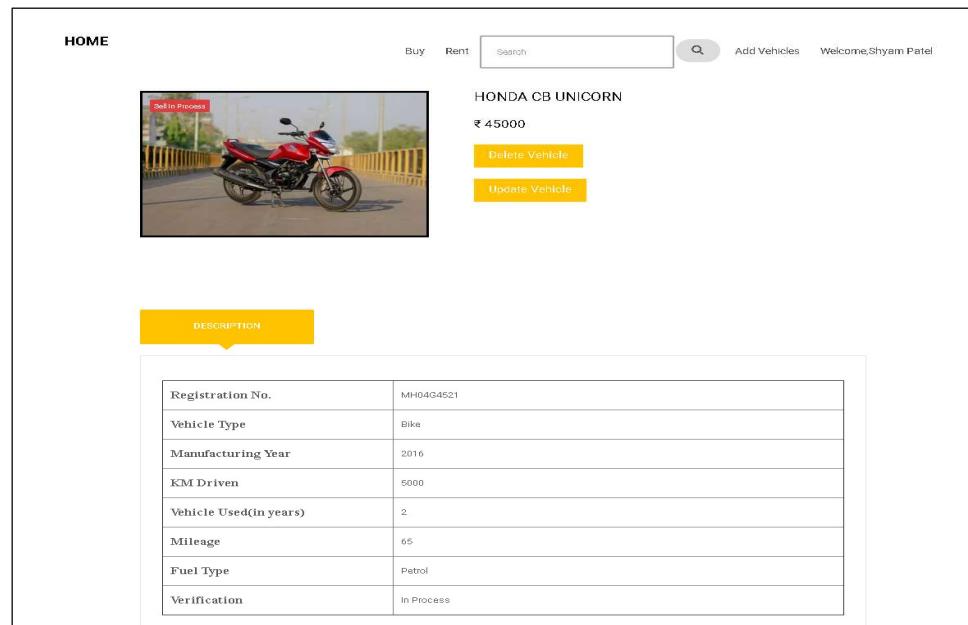


Fig. 12.2.6 Vehicle is successfully added

TC_2: Buy a vehicle

- When a customer selects a vehicle, he has the option to contact dealer using “Contact Dealer” button as shown in Fig. 12.2.7.
- If a customer clicks on “Contact Dealer” button, then a message is sent to Dealer to contact customers looking to buy vehicle as shown in Fig. 12.2.8.
- The Dealer can then contact customer using customer(s) details as shown in Fig. 12.2.9.

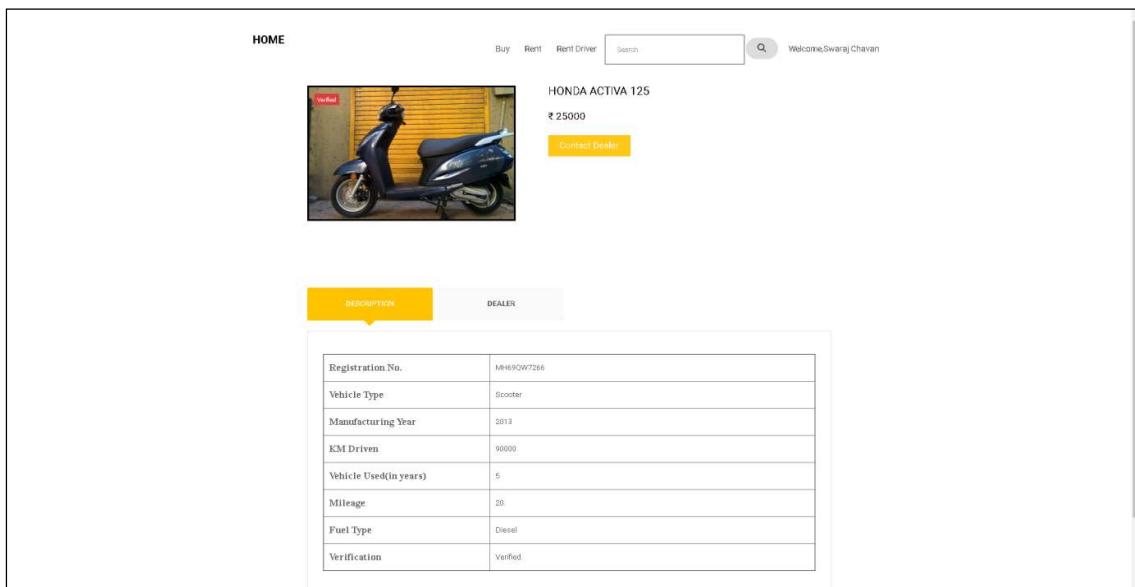


Fig. 12.2.7 Customer contacts Dealer

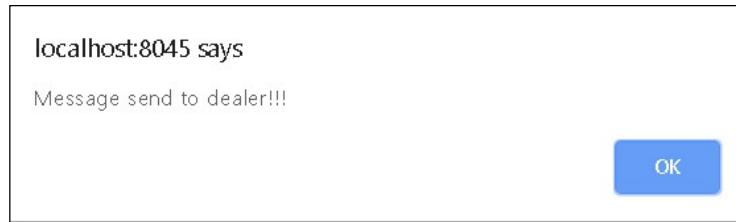


Fig. 12.2.8 Message is sent to Dealer

#	Customer	Vehicle Details	Vehicle	Contact	Email
1	Swaraj Chavan	Vehicle Details		9664814302	swarajchavan55@gmail.com

Showing 1 to 1 of 1 rows

#	Customer	Vehicle Details	Vehicle	Start Date	End Date	Contact	Email	Rent Vehicle	Reject Request
---	----------	-----------------	---------	------------	----------	---------	-------	--------------	----------------

No matching records found

#	Customer	Vehicle Details	Vehicle	Start Date	End Date	Contact	Email
---	----------	-----------------	---------	------------	----------	---------	-------

No matching records found

Fig. 12.2.9 Message received by Dealer

TC_3: Rent a vehicle

- ◆ When a customer selects a vehicle he/she has to select start and end date for renting vehicle as shown in Fig. 12.2.10.
- ◆ If a customer clicks on “Contact Dealer” button, then a message is sent to Dealer to accept / reject customers to rent vehicle as shown in Fig. 12.2.11.
- ◆ The Dealer can then accept/ reject rent request from dealer as shown in Fig. 12.2.12.
- ◆ Then vehicle will be successfully rented as shown in Fig. 12.2.13.

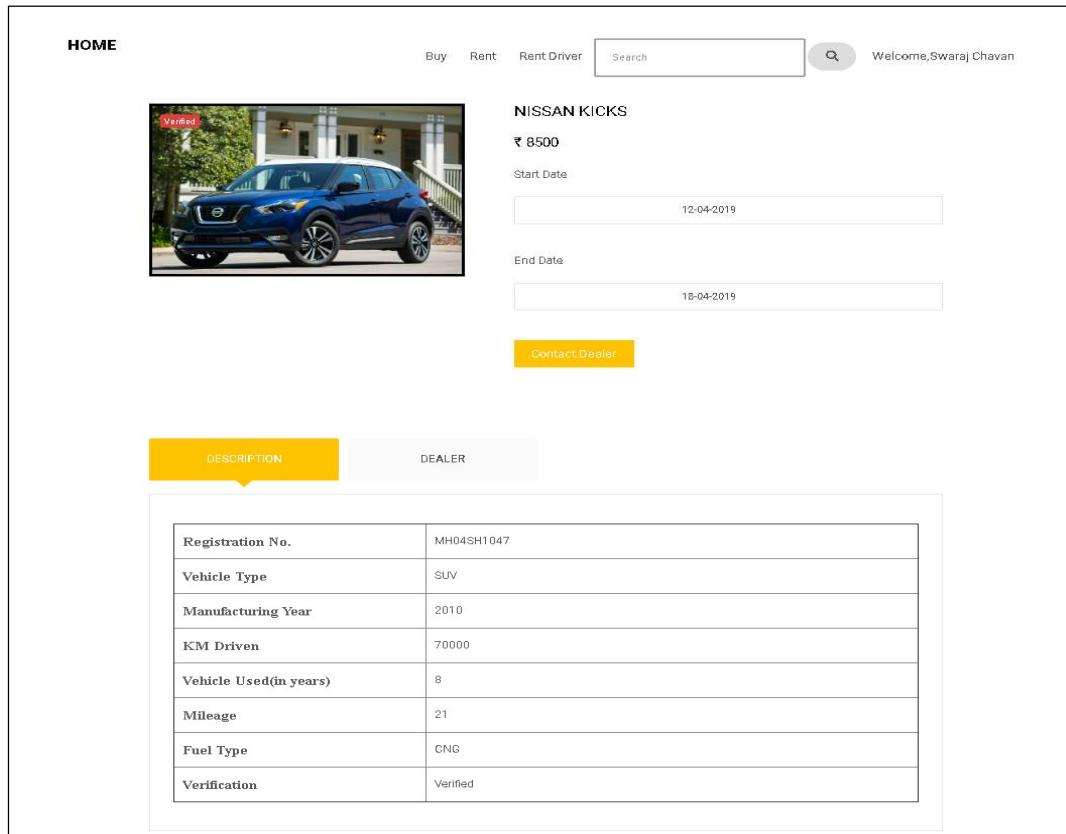


Fig. 12.2.10 Customer contacts Dealer

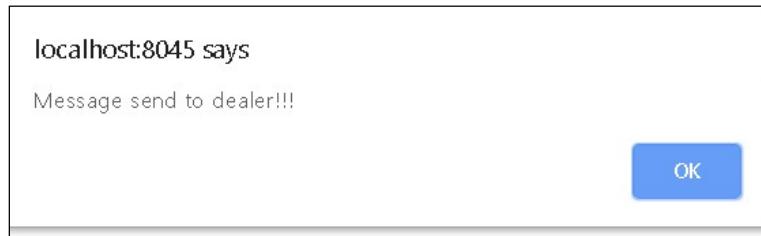


Fig. 12.2.11 Message sent to Dealer

The screenshot displays three tables within a web-based application:

- Buy Vehicle Messages:** A table showing one row of data. The columns are: #, Customer, Vehicle, Contact, and Email. The data is: 1, DeepakNair, Vehicle Details, 7485547848, deepaknair@gmail.com.
- Rent Vehicle Messages:** A table showing one row of data. The columns are: #, Customer, Vehicle Details, Vehicle, Start Date, End Date, Contact, Email, and Rent Vehicle. The data is: 1, Swaraj Chavan, Vehicle Details, MH04SH1047 (Nissan KICKS), 2019-04-12, 2019-04-18, 9664814302, swarajchavan55@gmail.com, Rent.
- Rented Vehicles:** A table showing two rows of data. The columns are: #, Customer, Vehicle Details, Vehicle, Start Date, End Date, Contact, and Email. The data is:

1	Deepak Nair	Vehicle Details	MH04OG2548(Skoda Fabia 1.2)	2019-03-28	2019-04-13	7485547848	deepaknair@gmail.com
2	Misha Patel	Vehicle Details	MH04SH1039(Fiat_Marea)	2019-04-13	2019-04-19	7485722566	mishapatel@gmail.com

Fig. 12.2.12 Request Accepted by Dealer



Fig. 12.2.13 Vehicle successfully rented

TC_4: Hire Driver

- ◆ A customer clicks on “Rent Driver” selects starting date.
- ◆ Customer then selects one of the drivers available on the list as shown in Fig. 12.2.14.
- ◆ A message is sent to a driver if the customer wants to hire him as shown in Fig. 12.2.15.
- ◆ A driver can then accept/reject customer(s) request.

- ◆ Hence, the hiring process is complete.

The screenshot shows a web application interface titled 'HOME'. At the top, there are navigation links: 'Buy', 'Rent', 'Rent Driver', a search bar with a magnifying glass icon, and a welcome message 'Welcome,Swaraj Chavan'. Below this, the title 'Rent Driver' is displayed. A form field labeled 'Enter Date' contains the value '12-04-2019'. A yellow button labeled 'Get Driver' is positioned below the date input. To the right of the date input is another search bar. A table below the search bars lists one driver: #1 Kunal Mehta, with 'View Details' and 'Send Request to Rent' buttons next to it.

#	Driver	View Details	Send Request to Rent
1	Kunal Mehta	Details	Rent

Fig. 12.2.14 Customer searches available Driver

The screenshot shows a web application interface titled 'HOME'. At the top, there are links: 'View Messages', 'View Schedule', and a welcome message 'Welcome,Kunal Mehta'. Below this, the title 'Request to Rent' is displayed. A table lists a single request: #1 Swaraj Chavan, Date 2019-04-12, Contact 9664814302, with 'Accept' and 'Reject' buttons. Below the table, a message says 'Showing 1 to 2 of 2 rows'.

#	Customer	Date	Contact	Accept	Reject
1	Swaraj Chavan	2019-04-12	9664814302	Accept	Reject

Fig. 12.2.15 Driver accepts request

Chapter 13

Result Analysis

13.1 Result of Apriori algorithm:

- ◆ When a customer clicks on any of the two options shown in Fig. 13.1.1 Apriori algorithm starts working.
- ◆ The algorithm works for rent recommendations as well as buy recommendation.
- ◆ The algorithm accesses data from buy dataset and rent dataset shown in Fig. 13.1.2 and Fig. 13.1.3.
- ◆ Apriori algorithm then finds similar users according to choices made by them (frequent itemset).
- ◆ The algorithm then finds association rules and recommends the vehicles according to their Lift as shown in Fig. 13.1.4.



Fig. 13.1.1 Customer homepage

Vehicle Recommendation System					
	id	user	vehicle	value	
<input type="checkbox"/>	1	deepaknair@gmail.com	3	1	
<input type="checkbox"/>	2	deepaknair@gmail.com	7	1	
<input type="checkbox"/>	3	deepaknair@gmail.com	23	1	
<input type="checkbox"/>	4	deepaknair@gmail.com	25	1	
<input type="checkbox"/>	5	deepaknair@gmail.com	47	1	
<input type="checkbox"/>	6	deepaknair@gmail.com	69	1	
<input type="checkbox"/>	7	deepaknair@gmail.com	89	1	
<input type="checkbox"/>	8	deepaknair@gmail.com	4	1	
<input type="checkbox"/>	9	deepaknair@gmail.com	22	1	
<input type="checkbox"/>	10	deepaknair@gmail.com	23	1	
<input type="checkbox"/>	11	mishapatel@gmail.com	24	1	
<input type="checkbox"/>	12	mishapatel@gmail.com	27	1	
<input type="checkbox"/>	13	mishapatel@gmail.com	7	1	
<input type="checkbox"/>	14	mishapatel@gmail.com	9	1	
<input type="checkbox"/>	15	mishapatel@gmail.com	67	1	

Fig. 13.1.2 buy dataset

				id	user	vehicle	value
<input type="checkbox"/>				1	deepaknair@gmail.com	12	1
<input type="checkbox"/>				2	deepaknair@gmail.com	15	1
<input type="checkbox"/>				3	deepaknair@gmail.com	36	1
<input type="checkbox"/>				4	deepaknair@gmail.com	39	1
<input type="checkbox"/>				5	deepaknair@gmail.com	18	1
<input type="checkbox"/>				6	deepaknair@gmail.com	55	1
<input type="checkbox"/>				7	deepaknair@gmail.com	74	1
<input type="checkbox"/>				8	mishapatel@gmail.com	19	1
<input type="checkbox"/>				9	mishapatel@gmail.com	34	1
<input type="checkbox"/>				10	mishapatel@gmail.com	32	1
<input type="checkbox"/>				11	mishapatel@gmail.com	37	1
<input type="checkbox"/>				12	mishapatel@gmail.com	78	1
<input type="checkbox"/>				13	mishapatel@gmail.com	97	1
<input type="checkbox"/>				14	mishapatel@gmail.com	15	1
<input type="checkbox"/>				15	mishapatel@gmail.com	11	1
<input type="checkbox"/>				16	mishapatel@gmail.com	11	1
<input type="checkbox"/>				17	mishapatel@gmail.com	11	1
<input type="checkbox"/>				18	swarajchavan55@gmail.com	51	1
<input type="checkbox"/>				19	swarajchavan55@gmail.com	50	1
<input type="checkbox"/>				20	swarajchavan55@gmail.com	53	1
<input type="checkbox"/>				21	mishapatel@gmail.com	53	1

Fig. 13.1.3 rent dataset

```
Apriori Recommendations:
1: ['23', '25', '3', '26'] with lift of 12.0
2: ['47', '25', '4'] with lift of 12.0
3: ['47', '25', '3', '4'] with lift of 12.0
4: ['25', '3', '89', '4'] with lift of 12.0
5: ['47', '25', '3', '89'] with lift of 12.0
6: ['47', '25', '4', '22'] with lift of 12.0
7: ['25', '47', '22', '89'] with lift of 12.0
8: ['47', '25', '4', '89'] with lift of 12.0
9: ['47', '25', '3'] with lift of 12.0
10: ['25', '47', '22'] with lift of 12.0
23,25,3,26,47,4,89,22
Done
Done
```

Fig. 13.1.4 Result of Buy recommendation

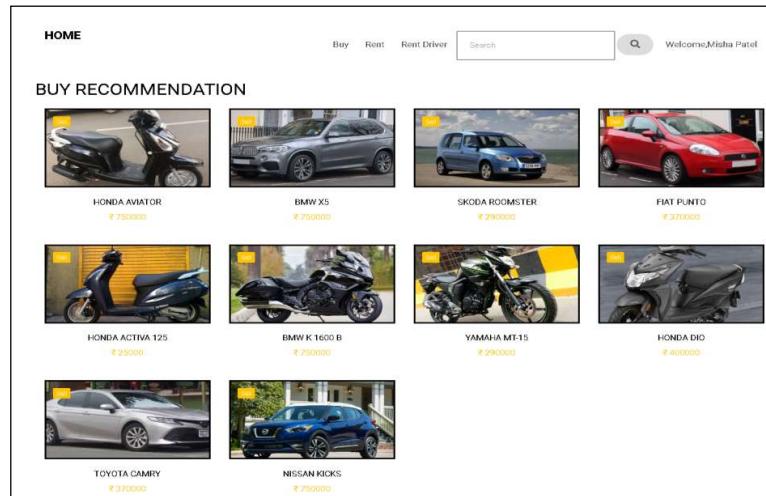


Fig. 13.1.5 Customers view of recommendation

Chapter 14

Advantages and Limitations

14.1 Advantages:

- ◆ Buying a used vehicle, you have a variety of choices available to you. This is an important decision and it can make a big difference in your finances.
- ◆ When you buy a used vehicle, it is easier to save up and pay cash. You can also review the Consumer Reports and choose a model that has been performing well.
- ◆ Buying a used vehicle is that you let someone else take the biggest depreciation hit on the car

14.2 Limitations:

- ◆ The disadvantage of buying used vehicles buying a generally does not come with a warranty.
- ◆ Most new cars will have very few repairs in the first few years, so you can focus only on the maintenance of the car which is not there in used vehicles.
- ◆ The new cars will have the latest technology, which will mean that you may find cars with better gas mileage and lower emissions which is contrary to used vehicles.

Chapter 15

Applications and Future Enhancement

15.1 Applications:

- ◆ Collect, save, and analyse data provided by site visitors.
- ◆ Gives Best Choices to user related to their product.
- ◆ Provides both cars and bikes at one place.
- ◆ Provides user friendly platform

15.2 Future Enhancement:

- ◆ Can be extended by adding other vehicles like trucks, tempos etc.
- ◆ Can be available for other cities.

Chapter 16

Conclusion

There is a growing market for used vehicles in India, which in-turn possesses danger of fraud with the customer. The system provides a fraud-resistant environment for trade. It acts as a medium for trade between a customer and a used vehicle dealer. The proposed system can be essential in eliminating frauds from the system before they reach to customer, providing customer with risk free options to Buy, Sell & Rent Used Vehicles. While searching for used vehicles online, a customer could miss out on many good choices, therefore a recommendation could be an essential tool. The system recommends vehicles to a customer that were most liked by other customers based on the features of a vehicle. This recommendation system ensures that customer gets best possible choices and does not miss out anything.

Chapter 17

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Chapter 18

Appendix

- ◆ DFD – Data Flow Diagram
- ◆ E-R – Entity Relationship
- ◆ App – Application
- ◆ JDK - Java Development Kit
- ◆ SDK - Software Development Kit
- ◆ API - Application Program Interface
- ◆ AVR - Automatic Vehicle Recommender
- ◆ CF - Collaborative Filtering

Chapter 19

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