



# **PES University, Bengaluru**

(Established under Karnataka Act 16 of 2013)

## **Department of Computer Science & Engineering** **Session: Jan - May 2024**

### **6<sup>TH</sup> SEMESTER- 'A' SECTION**

#### **Object Oriented Analysis and Design with Java - UE21CS352B**

#### **Mini Project**

Mini Project Report on

### **Car Rental System**

Submitted to

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## 1. Project Description

The transport sector faces numerous challenges in urban areas such as:

- **Traffic Congestion and Parking Difficulties:** The lack of adequacy and connectivity offered by public transport has led to extreme growth in the number of automobile owners. However, limited infrastructure has not been able to keep up with the same.
- **Environmental Impacts:** Air and noise pollution are the products of increasing consumption of traditional, unsustainable fuel driven by urban mobility systems. These impede the quality of life and health of the local population.
- **Energy Prices:** High demand for energy resources has led to an exorbitant costs of transportation. This is not feasible on a daily basis, in the longer run.
- **Liability:** Vehicles often require high maintenance and expenditure in terms of repair, insurance, fuel costs and loans.

Our project aims to address the above concerns by proposing a car rental solution. It will provide a platform for people to rent cars for short periods of time. These services are an attractive, cost-effective option for those who do not own cars and make use of it only occasionally - to take a trip with loved ones or to run errands, by offering convenience, mobility, and independence.

The car rental system facilitates booking of a car with just a couple of clicks, includes a plethora of models for different needs and comforts, and delivers and picks up the car from locations around the country.

The purpose of this project is to design a user-friendly system that enables clients to check for availability of vehicles and book/reserve a vehicle, make payments and develop a system to keep track of bookings, reservations and payment transactions. This will help ease fleet and staff management and support a smooth experience.

### FUNCTIONALITIES

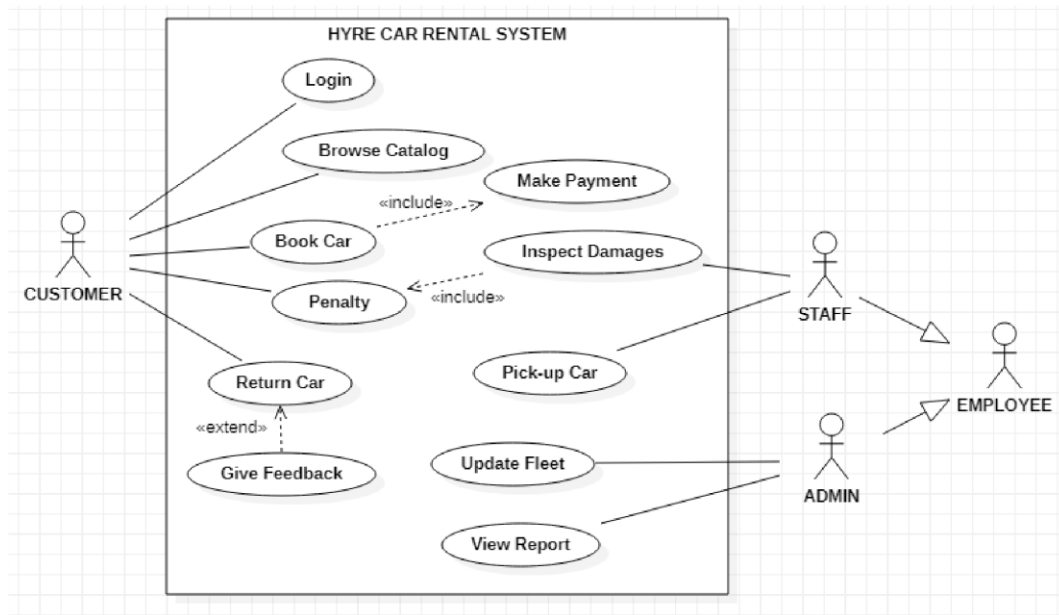
- **Car Rental Interface:** Clients can visit the website and choose a car of their choice and booking can be done as per their requirements. Feedback can also be provided on avail of the car rental service.
- **Payment Portal:** Order placing and cancellation are maintained by the admin. Amount is generated based on the type of car and duration of rental.
- **Staff:** Data about the repair/replacement of any parts of the car are maintained by the staff post inspection on pick up.

**Link to GitHub repository:**

[https://github.com/akiabi1619/OOAJ\\_PROJECT\\_2024](https://github.com/akiabi1619/OOAJ_PROJECT_2024)

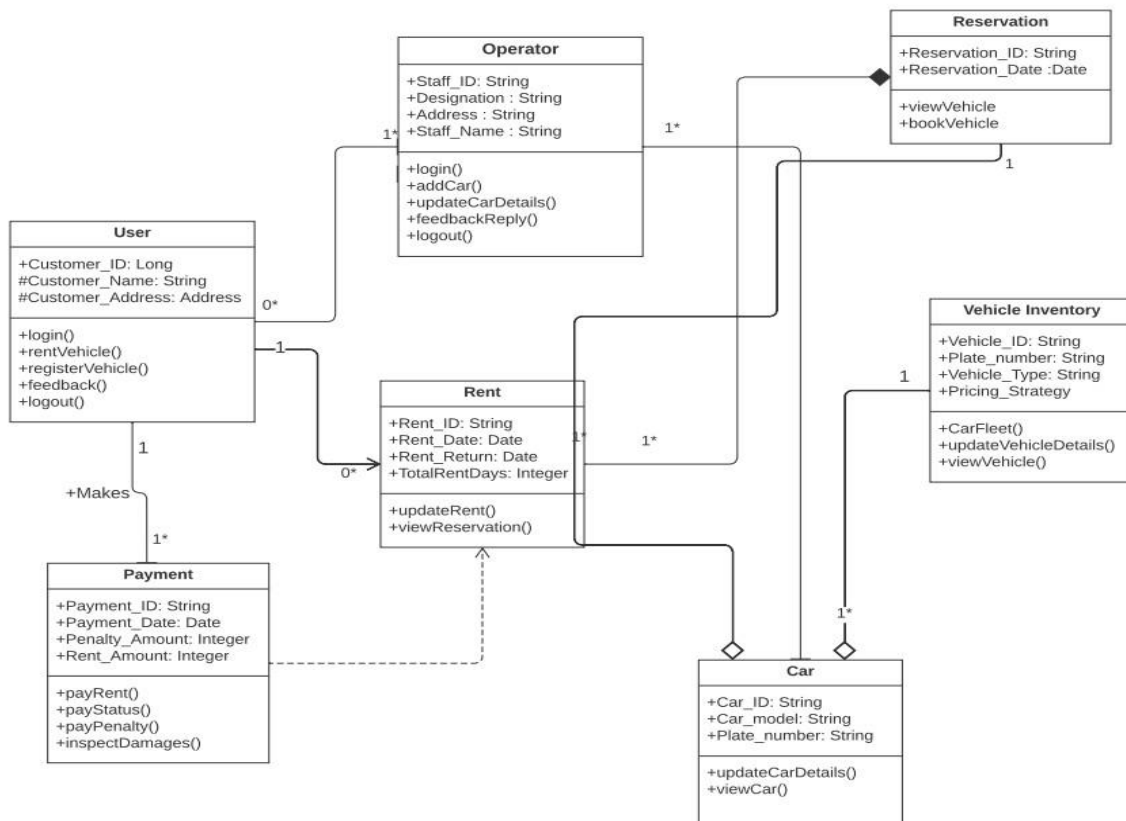
## 2. Analysis and Design Models

### Use Case Diagram

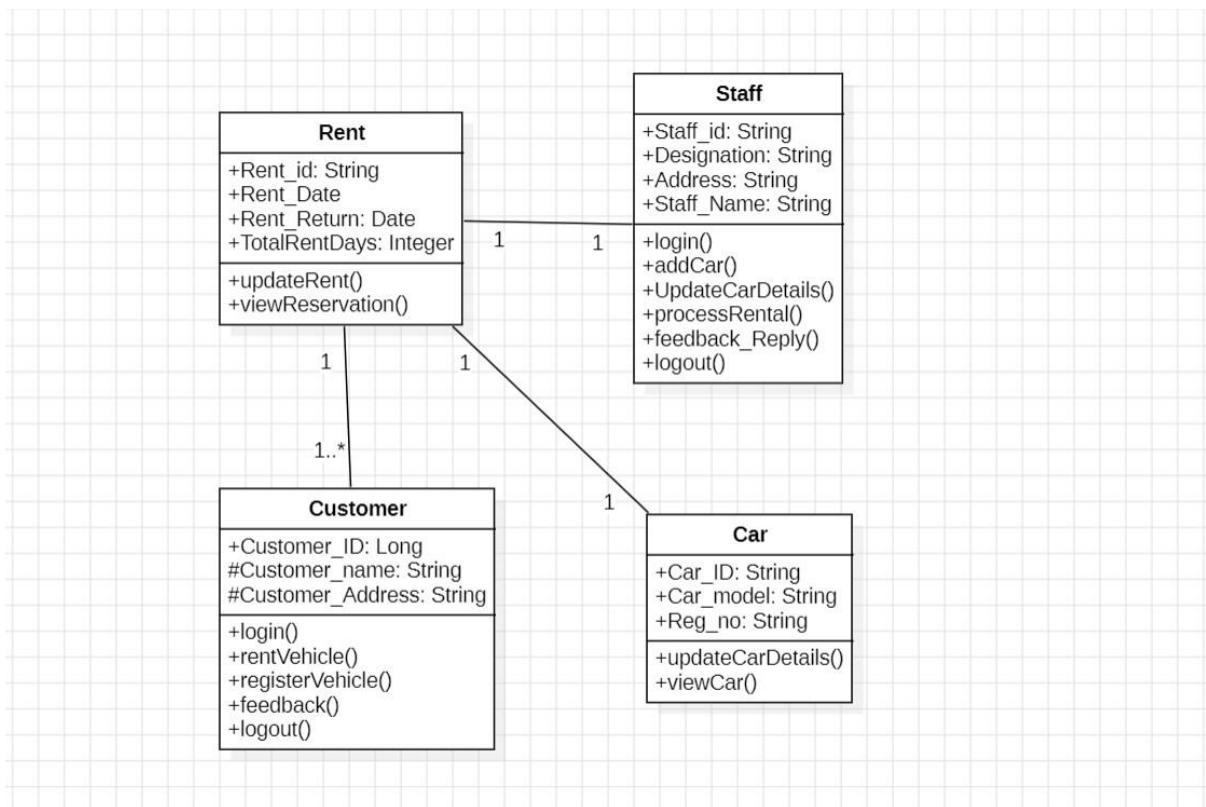


### Class Diagrams

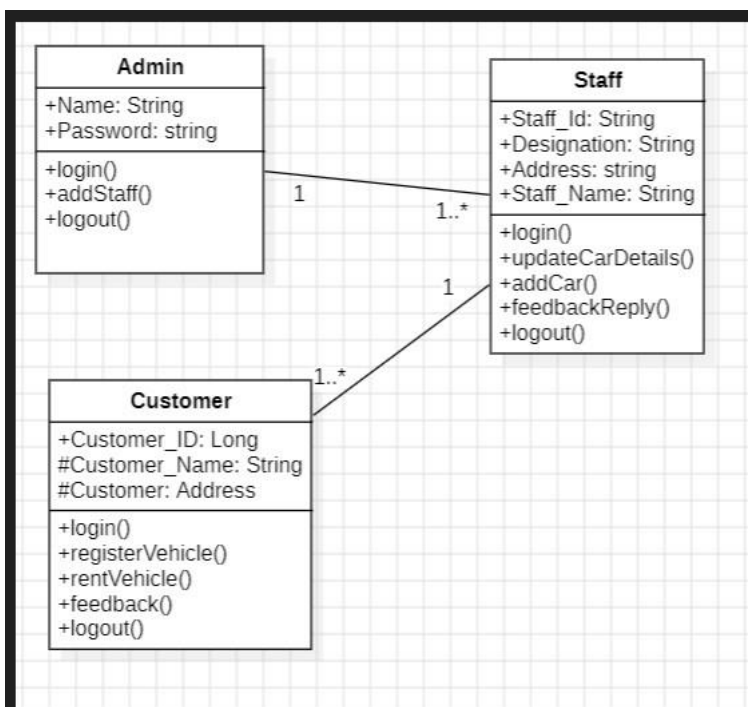
#### Main Class Diagram



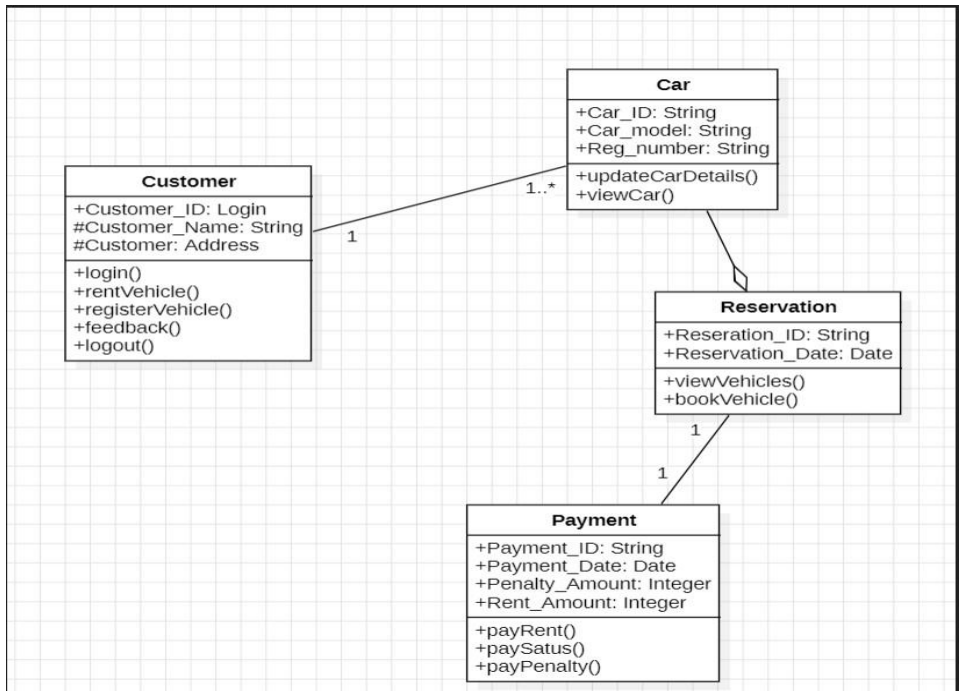
## CLASS DIAGRAM FOR RETURNING CAR



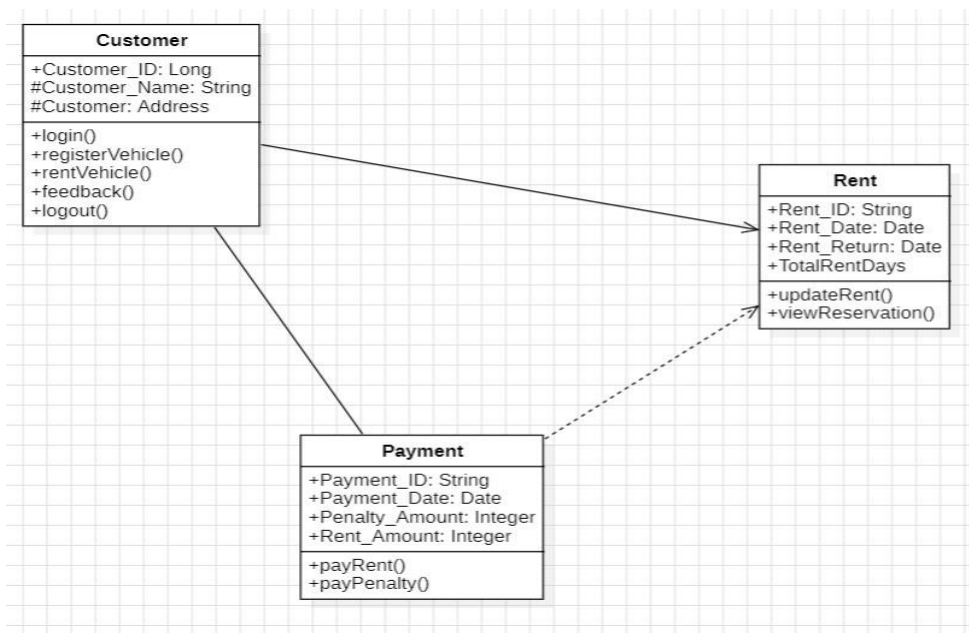
## CLASS DIAGRAM FOR LOGIN



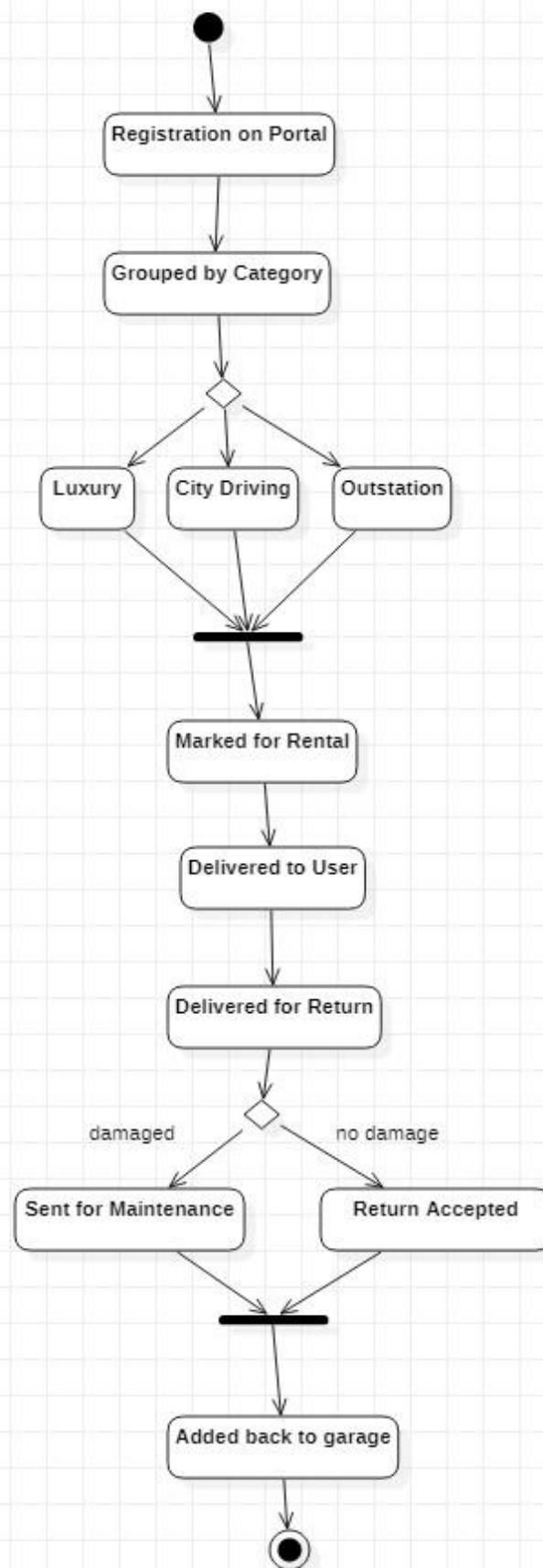
## CLASS DIAGRAM FOR BOOKING CAR



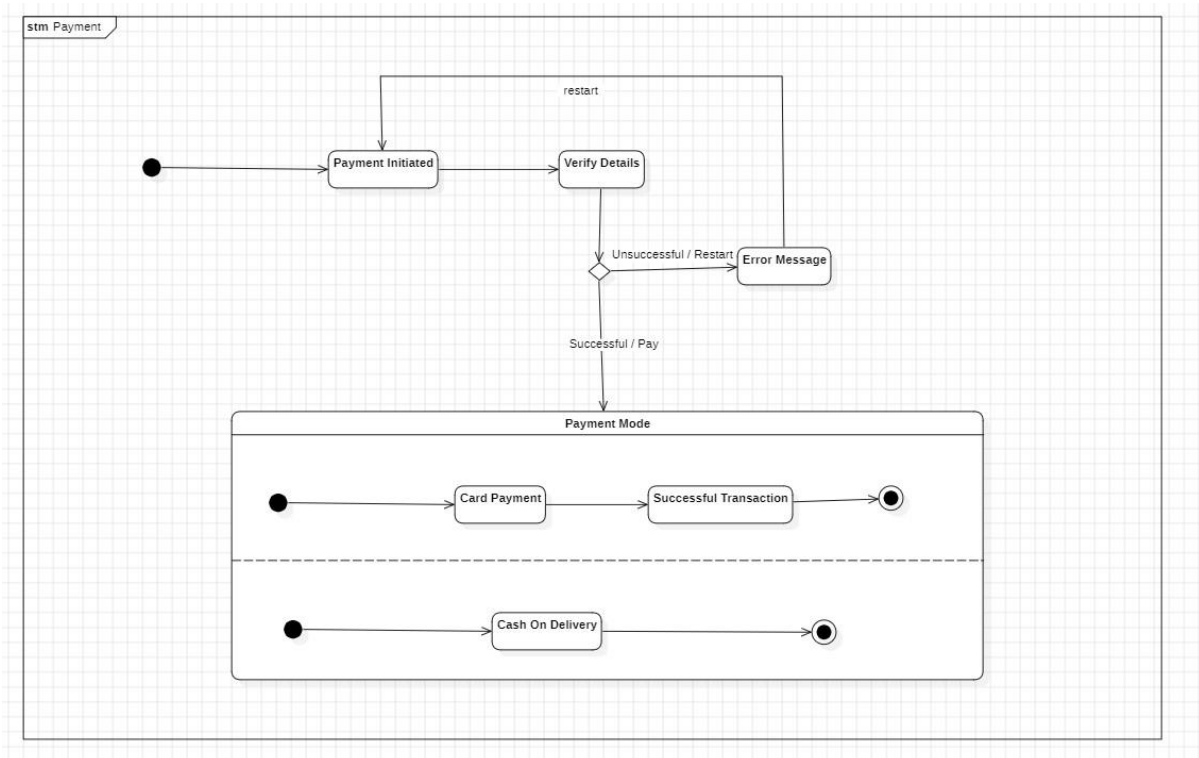
## CLASS DIAGRAM FOR PAYMENT



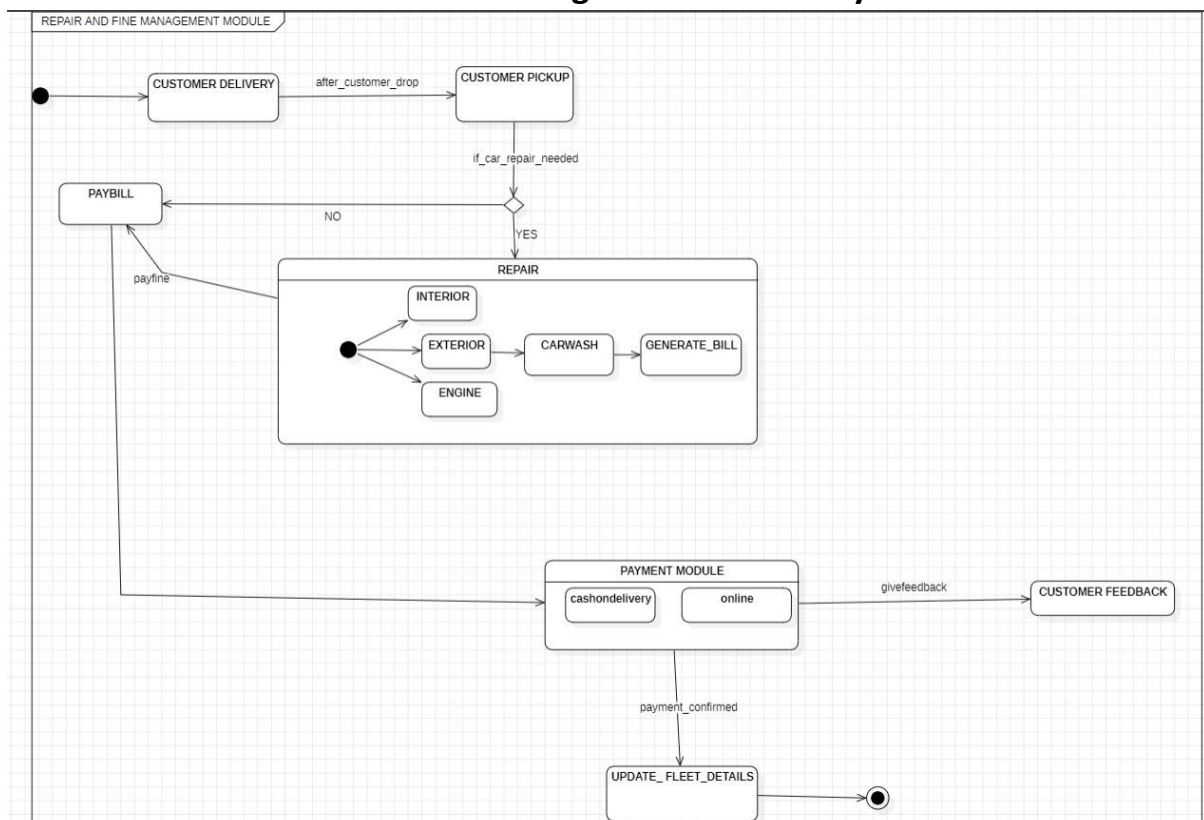
## State Diagram-01 - Car



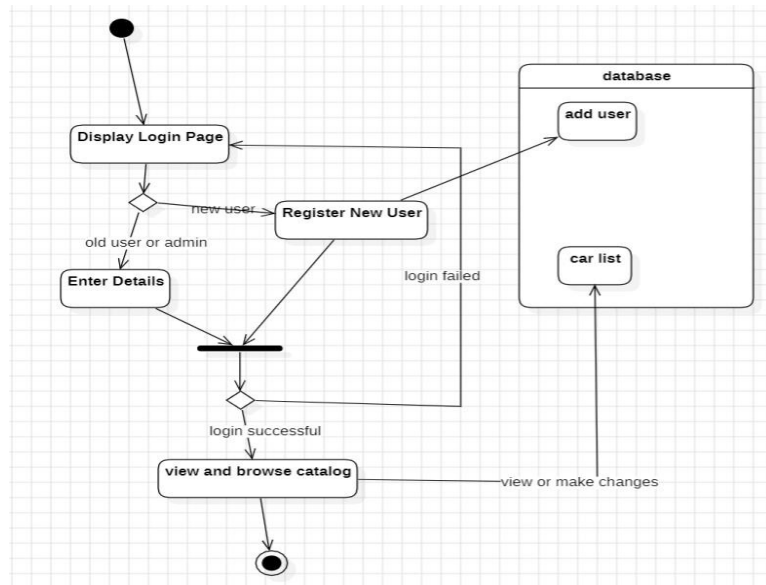
## State Diagram-02- Payment



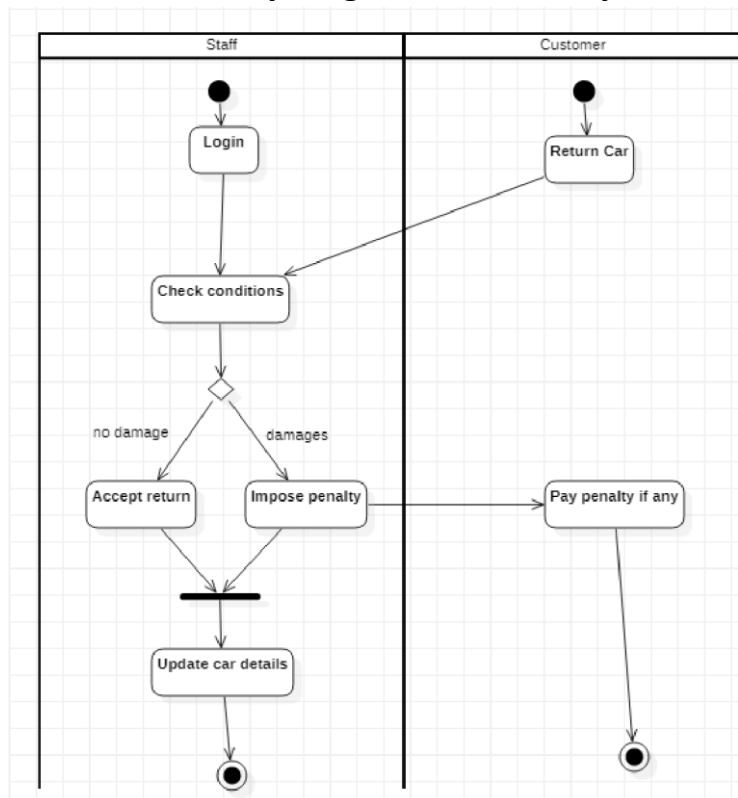
## State Diagram-03- Inventory



## State Diagram-04- Updating Database

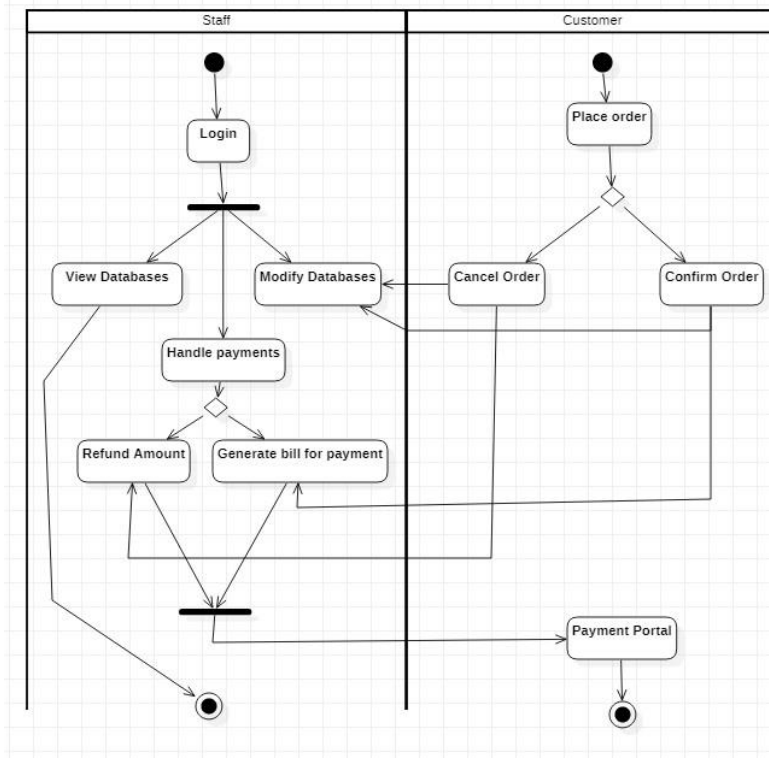


## Activity Diagram-01 - Penalty

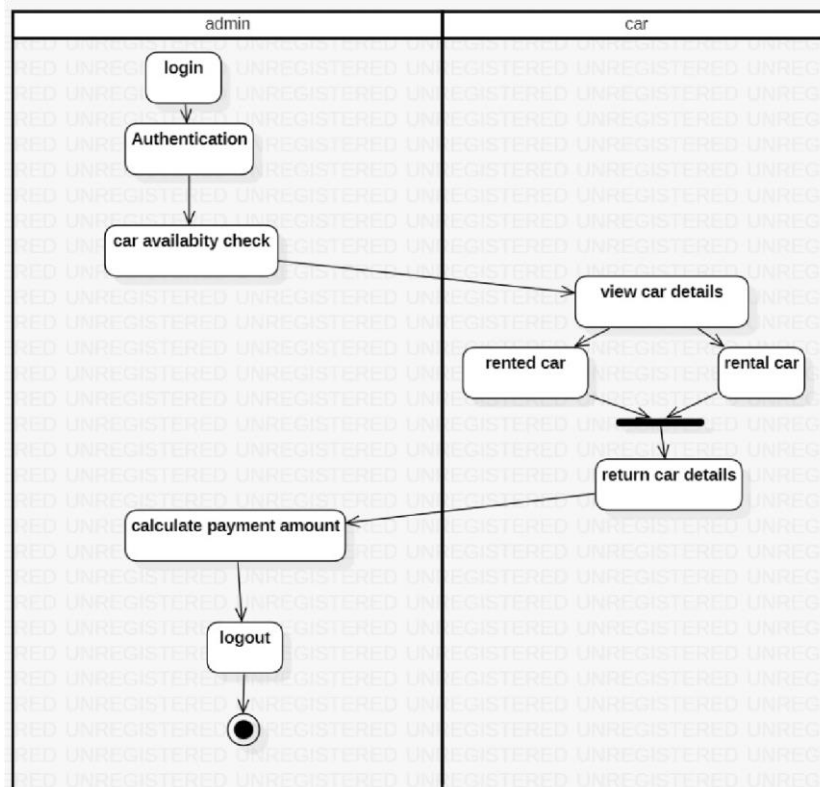




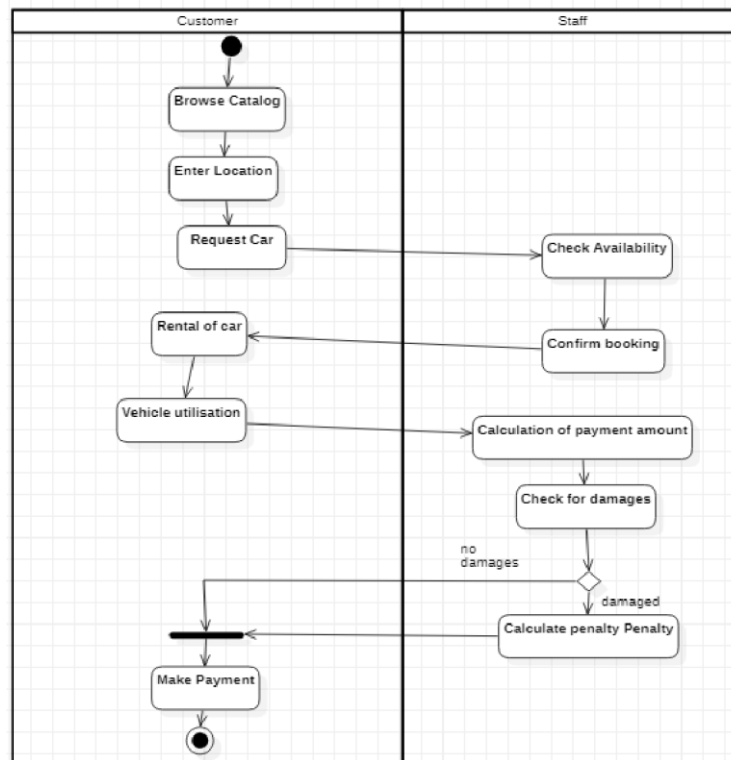
## Activity Diagram-02 - Databases



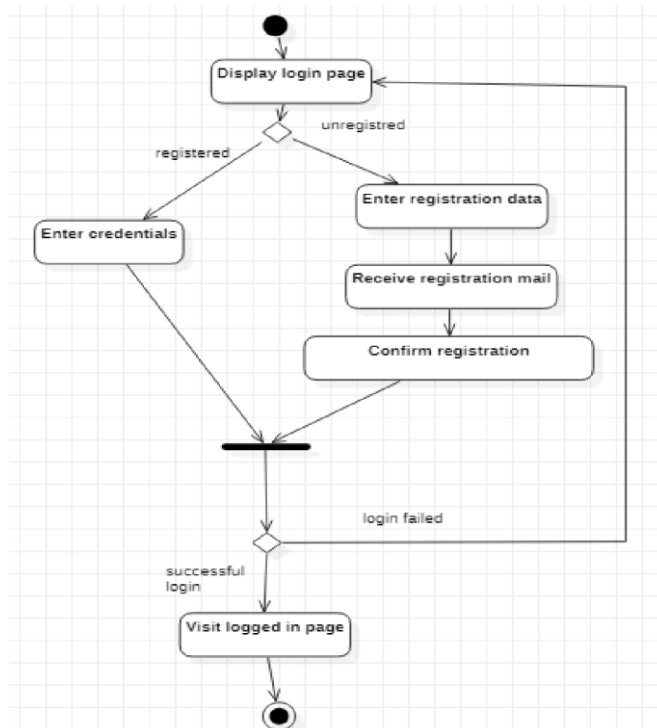
## Activity Diagram-03 - Administration



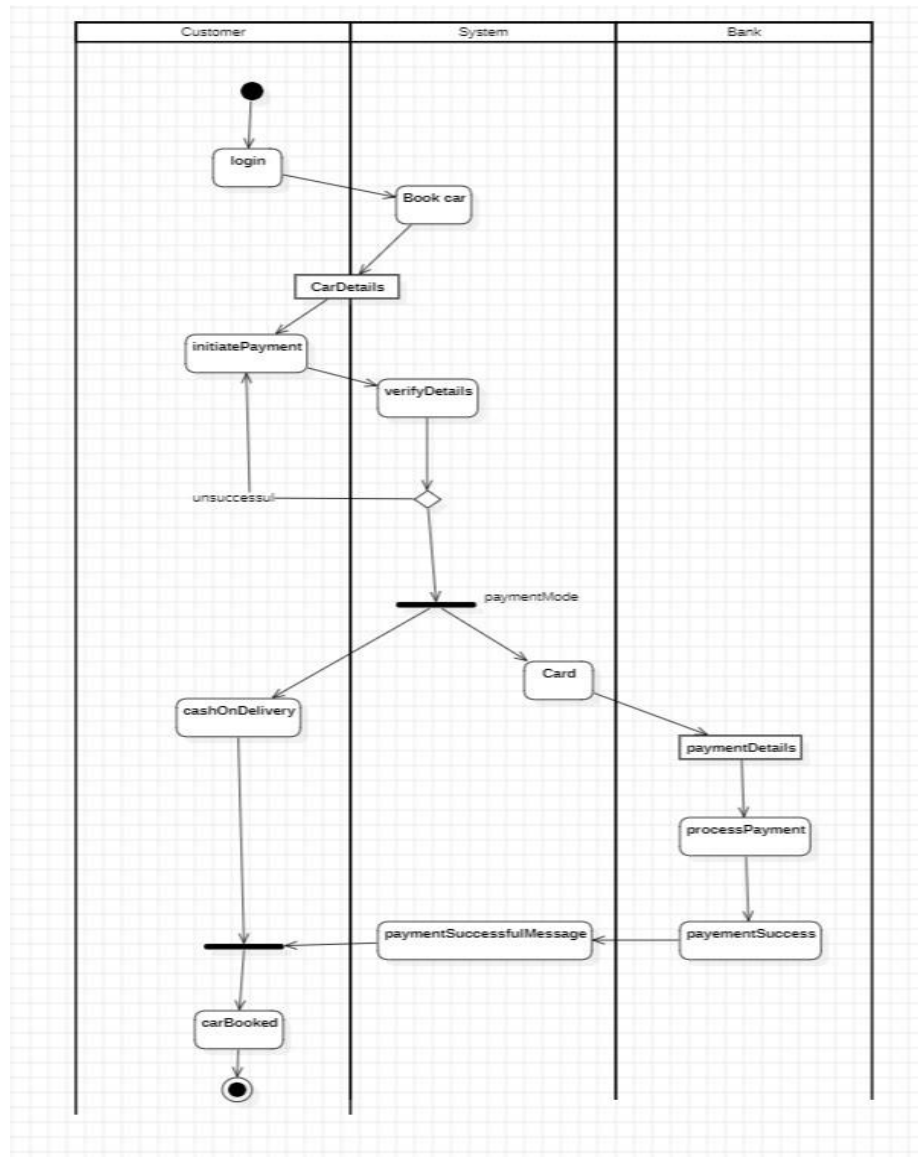
### Activity Diagram-04 - Customer Booking



### Activity Diagram-05 - Customer Login



## Activity Diagram-06 – Payment



### **3. Tools and Frameworks Used:**

#### **a) Design - StarUML**

StarUML is an open source software modelling tool that supports the UML (Unified Modelling Language) framework that can be used to represent use case, activity, state and class diagrams.

#### **b) Version Control - GitHub**

GitHub is an online software development platform used for storing, tracking, and collaborating on software projects. It enables developers to upload their own code files and view changes made by other developers.

#### **c) IDE - Apache NetBeans**

NetBeans is an integrated development environment for Java. It allows Java web or desktop applications to be developed from a set of modular software components called modules.

#### **d) Database - MySQL**

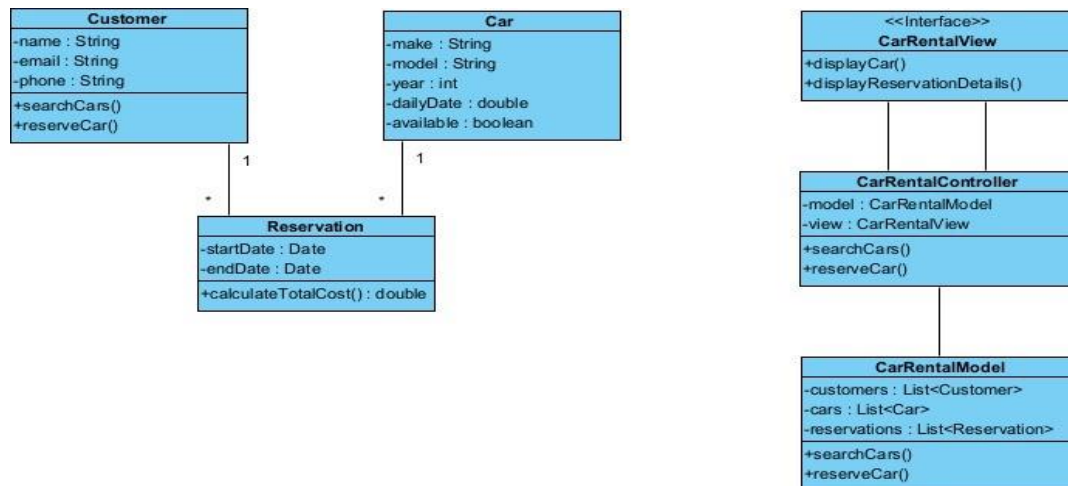
MySQL is an open-source relational database management system based on Structured Query Language. The application is used for a wide range of purposes, including data warehousing, e-commerce, and logging applications.

#### **e) GUI - Swing**

Swing is a GUI widget toolkit for Java. It is part of Oracle's Java Foundation Classes – an API for providing a graphical user interface for Java programs.

## 4. Design Principles and Design Patterns Applied

### MVC Diagram(to give an idea)



## DESIGN PATTERNS

1. **Factory Pattern** - Applied to instantiate different models of rental cars. The Vehicle super-class, which is extended by all Car models sub-classes (Audi, Mercedes, Creta, Innova). This allows us to utilise the common methods of the Vehicle super-class. **(AAKAASH K, SEAN S)**

2. **Proxy Pattern** –

- Register\_user uses a proxy pattern to validate or authenticates the data entered during user registration. **(AARON S)**
- In the Payments module, we use protection proxy patterns to connect to database\_proxy object which creates an actual database connection object to connect to the database for securely. **(AAKAASH K)**

3. **Command Pattern** – This pattern is implemented in the reservation\_logic part of our project. It contains an invoker class allowing parameterization of clients with different requests. **(TEJAS B)**
4. **Builder Pattern** – This pattern is used in adding car to fleet. Since the adding fleet part requires building complex object part by part. **(SEAN S)**

### **SOLID Design Principles**

**Single Responsibility Principle:** Every major module(**reservation ,inventory ,payment**) in the design has a single responsibility. For example, the Payment class is responsible only for getting and setting the data of the Payment Object (details like payment id, amount, and payment status). **(SEAN S , TEJAS B, AARON S)**

**Open -Close Principle:** The **Payment module** has been implemented using an interface and credit\_card and debit\_card uses the interface to create objects of the same. Hence , its easy for us to add more modes of payment and this improves the extensibility of the payment interface.**(AAKAASH K)**

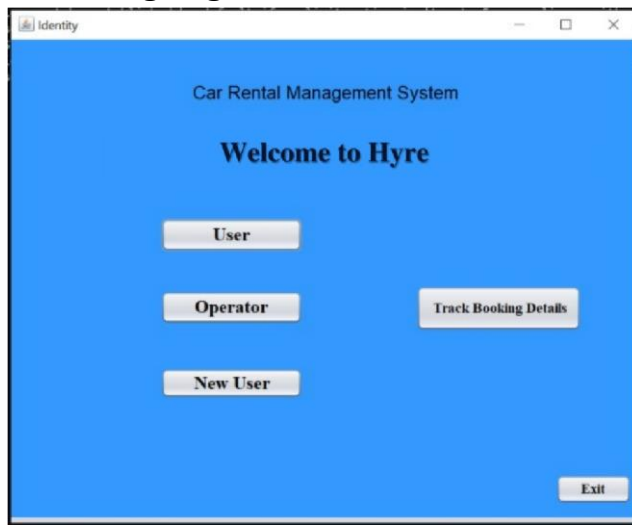
### **GRASP Principles**

**Controller:** We have separated the user interface from the business logic using the concept of cont rollers

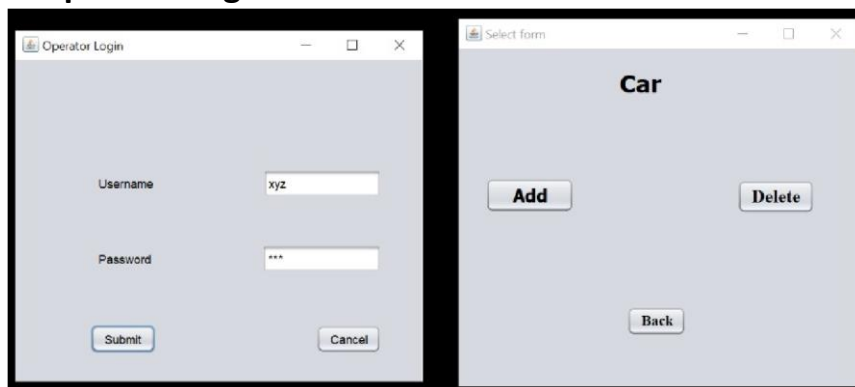
We have 3 controllers: **Payment ,Reservation and Operator controller** in our project.

## 5. Application Screenshots

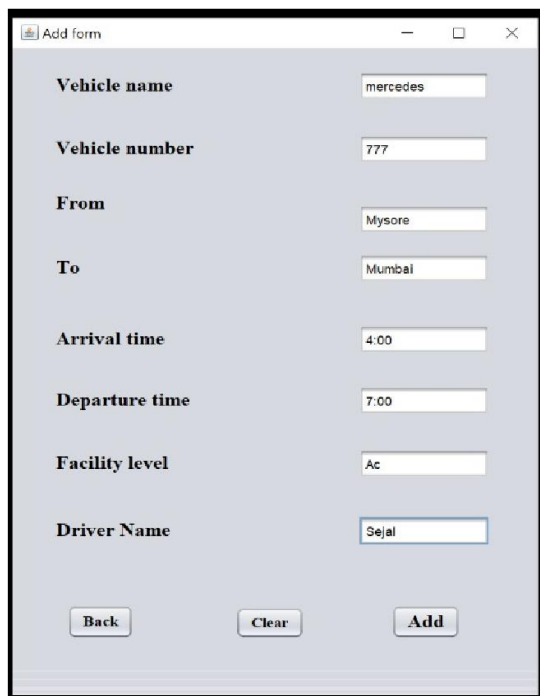
### 1. Landing Page



### 2. Operator Login



### 3. Add Car to Fleet



The 'Add form' window contains the following fields and values:

Field	Value
Vehicle name	mercedes
Vehicle number	777
From	Mysore
To	Mumbai
Arrival time	4:00
Departure time	7:00
Facility level	Ac
Driver Name	Sejal

Buttons at the bottom: Back, Clear, Add.

### 4. Remove Car from Fleet



The 'Delete' window shows the 'Vehicle Number' field with the value '777'. A 'Delete' button is present. A 'Message' dialog box is displayed in the foreground with the following content:

**Message**

 Vehicle has been successfully deleted

Buttons: OK, Go Back.



## 5. User Functionality


Selection form

**MENU OF AVAILABLE CARS**

Vehicle Number	Vehicle Name	Facility Level
333	nano	non-Ac
770	audi	Ac

☒ SHOW AVAILABLE CARS

Message

 Please Remember the Vehicle Number of the car you would like to book!

## 6. Car Booking

Reservation

**ENTER DETAILS**

**Name**

**Phone No**

**From**

**To**

**Journey Date (yyyy-mm-dd)**

**Facility Level**

**No of seats required**

**Enter Vehicle No.**

**Cost**

## 7. Payment

Credit

credit card

ENTER DETAILS

Card No

9876543210789065

Name (on card)

Gopal Kumar

Expiry date

2028-10-13

Journey date (yyyy-mm-dd)

2022-10-10


Your vehicle No is

777

Finish

Exit

Message



Your ticket has been booked succesfully! Thank You for Choosing Us and please check your vehicle Number!

OK

## 8. Database Update

```
mysql> show tables;
+-----+
| Tables_in_e_reservations |
+-----+
| bill                      |
| card                     |
| credit                   |
| debit                    |
| details                   |
| ope                      |
| user                     |
| vehicles                  |
+-----+
8 rows in set (0.05 sec)
```

```
mysql> select * from details;
+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| name   | from_place | to_place | facility_level | price | phno   | qty_seats | journey_date | vehicle_no |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| Zayn   | Delhi      | Mumbai  | AC             | 2000.00 | 9898989802 | 2         | 2022-04-03   | 753        |
| priya  | Bangalore  | Mumbai  | non-ac         | 4000.00 | 7890477771 | 4         | 2022-03-01   | 007        |
| priyaa | Mumbai    | Bangalore | AC             | 4000.00 | 789477333 | 4         | 2022-09-20   | 017        |
| maurya | Delhi      | Mumbai  | AC             | 1000.00 | 1209384765 | 1         | 2022-08-08   | 770        |
| Gopal  | Mysore     | Mumbai  | AC             | 2000.00 | 6758393788 | 2         | 2022-10-10   | 777        |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+
```

```
mysql> select * from details;
+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| name   | from_place | to_place | facility_level | price | phno   | qty_seats | journey_date | vehicle_no |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| Zayn   | Delhi      | Mumbai  | AC             | 2000.00 | 9898989802 | 2         | 2022-04-03   | 753        |
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| Gopal  | Mysore     | Mumbai  | AC             | 2000.00 | 6758393788 | 2         | 2022-10-10   | 777        |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+
5 rows in set (0.00 sec)
```

```
mysql> select * from ope;
+-----+-----+
| username | password |
+-----+-----+
| abc      | abc      |
| xyz      | xyz      |
| jkl      | jkl      |
+-----+-----+
3 rows in set (0.00 sec)
```

```
mysql> select * from user;
+-----+-----+
| username | password |
+-----+-----+
| priya    | priya    |
| sejai    | sejai    |
| sheetal  | sheetal  |
+-----+-----+
```

```
mysql> select * from vehicles;
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| vehicle_name | vehicle_no | from_place | destination | arrival_time | departure_time | facility_level | cost | Driver_name | status |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| creta        | 007        | Bangalore  | Mumbai      | 03:00:00     | 05:00:00      | AC             | NULL | shyam       | BOOKED |
| innova       | 017        | Mumbai     | Bangalore   | 03:00:00     | 05:00:00      | AC             | NULL | Priya       | BOOKED |
| nano         | 333        | Mumbai     | Bangalore   | 10:30:00     | 12:30:00      | non-ac         | NULL | sejal       | availabl |
| Audi         | 753        | Delhi      | Mumbai      | 11:00:00     | 09:00:00      | AC             | NULL | Ram         | BOOKED |
| audi         | 770        | Delhi      | Mumbai      | 04:00:00     | 05:00:00      | AC             | NULL | sheetal     | BOOKED |
| mercedes     | 777        | Mysore     | Mumbai      | 04:00:00     | 07:30:00      | AC             | NULL | Maurya      | BOOKED |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
```

```
mysql> select * from bill;
+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| name   | vehicle_no | driver_name | from_place | destination | departure_time | arrival_time | price | vehicle_name |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| Zayn   | 753        | rohan       | Delhi      | Mumbai      | 04:00:00      | 07:30:00     | 2000.00 | mercedes     |
| priya  | 007        | rahul       | Bangalore  | Mumbai      | 07:00:00      | 08:30:00     | 4000.00 | audi         |
| priyaa | 017        | rahul       | Mumbai     | Bangalore   | 07:00:00      | 08:30:00     | 4000.00 | audi         |
| maurya | 770        | rohan       | Delhi      | Mumbai      | 09:00:00      | 10:00:00     | 1000.00 | honda        |
| Golap Kumar | 777      | Maurya      | Mysore     | Mumbai      | 04:00:00      | 07:30:00     | 2000.00 | mercedes     |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+
```

## 5.Team member contributions

## AAKAASH K- PAYMENT INTERFACE (CREDIT, DEBIT), REPORT

## AARON-INVENTORY MANAGEMENT AND LOGIN

## TEJAS -RESERVATION

## SEAN- ADMIN CONTROLS

[illegible]