PES University, Bengaluru

(Established under Karnataka Act 16 of 2013)

Department of Computer Science & Engineering

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Object Oriented Analysis and Design with Java - Laboratory

UE20CS352

Mini Project

Report on

Car Rental System

By:

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6th Semester, A section

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.

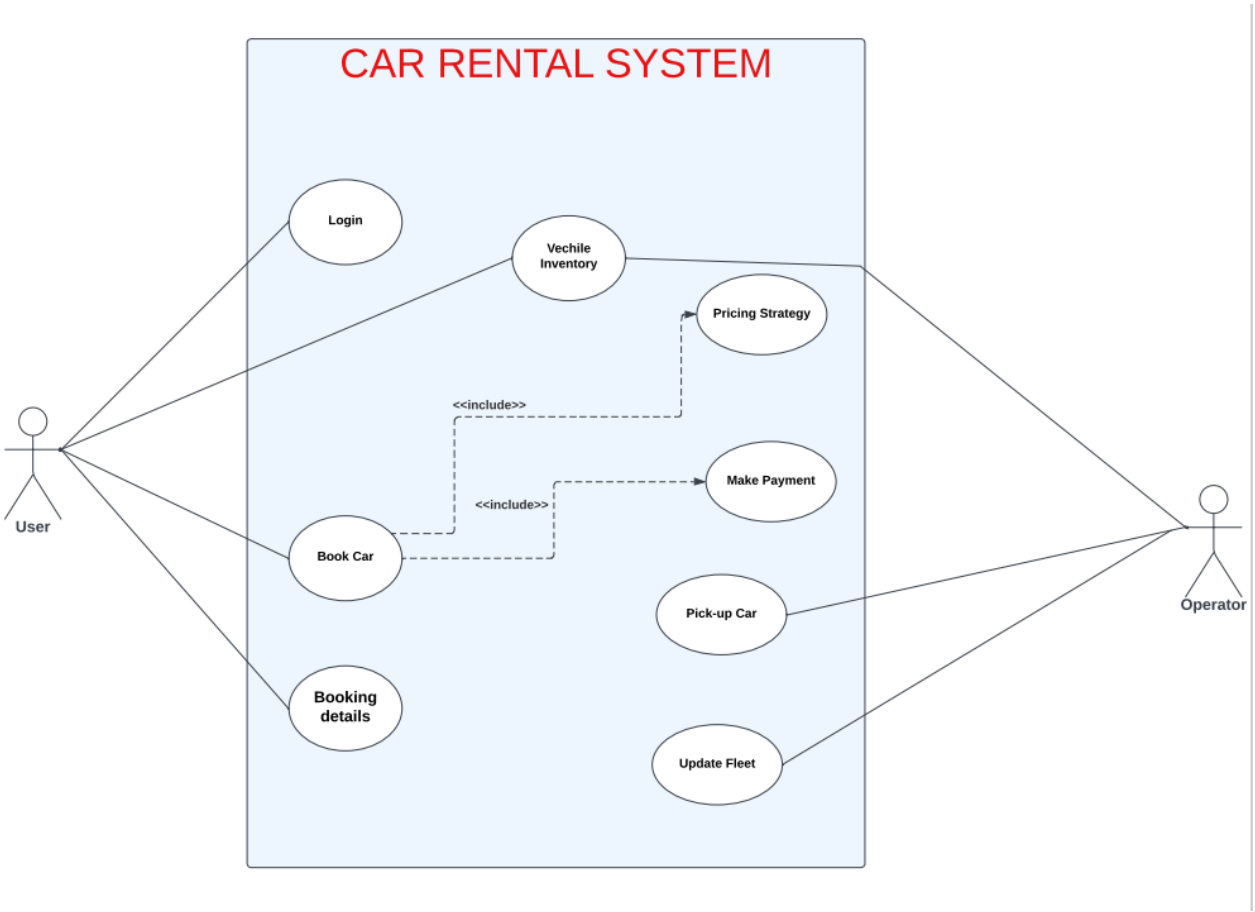
FUNCTIONALITIES

- Car Rental Interface: Clients can visit the website and choose a car of their choice and booking can be done as per their requirements.
- Payment Portal: Order placing and cancellation are maintained by the admin. Amount is generated based on the type of car and duration of rental.

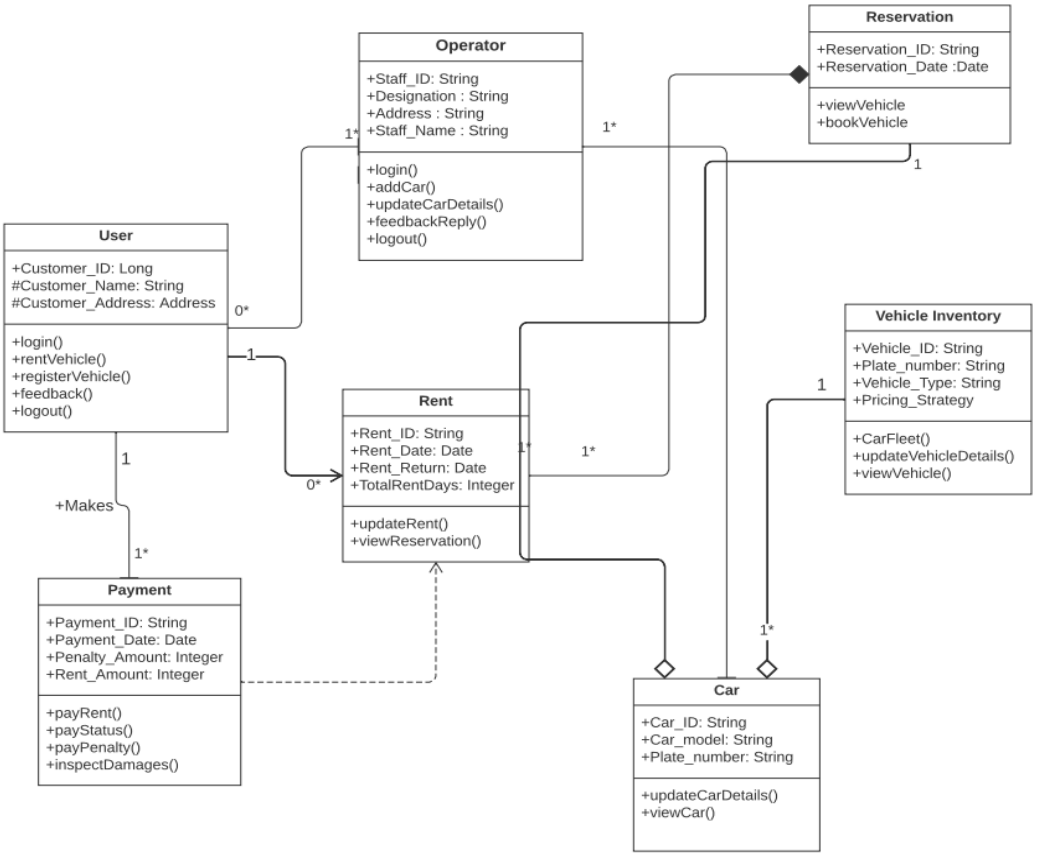
Link to Github repository:
https://github.com/alokkr115/UE20CS352_Mini_Project_Team-A17.git

Analysis and Design Models

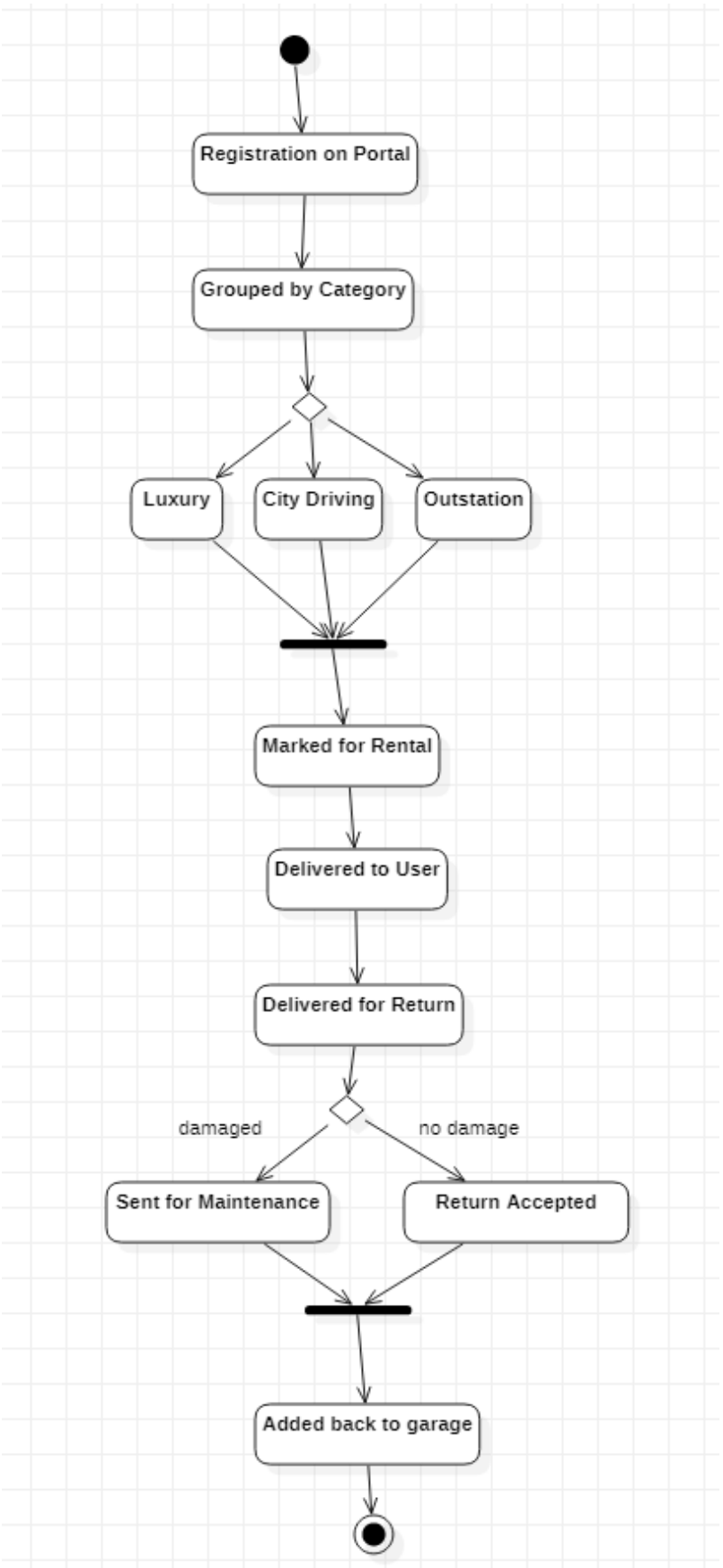
Use Case Diagram



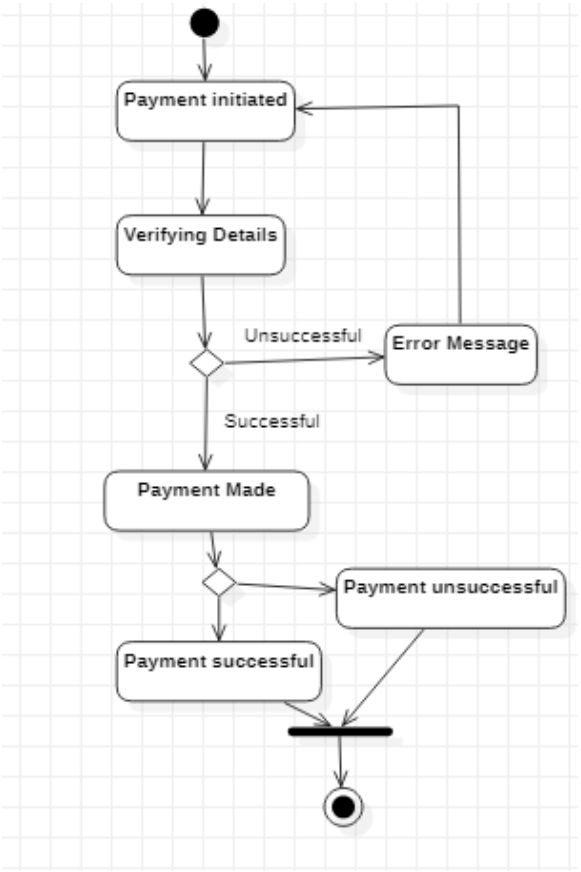
Class Diagram


Reservation
+Reservation_ID: String
+Reservation_Date :Date
+viewVehicle
+bookVehicle
Operator
+Staff_ID: String
+Designation : String
+Address : String
+Staff_Name : String
+login()
+addCar()
+updateCarDetails()
+feedbackReply()
+logout()
User
+Customer_ID: Long
#Customer_Name: String
#Customer_Address: Address
+login()
+rentVehicle()
+registerVehicle()
+feedback()
+logout()
Vehicle Inventory
+Vehicle_ID: String
+Plate_number: String
+Vehicle_Type: String
+Pricing_Strategy
+CarFleet()
+updateVehicleDetails()
+viewVehicle()
Rent
+Rent_ID: String
+Rent_Date: Date
+Rent_Return: Date
+TotalRentDays: Integer
+updateRent()
+viewReservation()
Payment
+Payment_ID: String
+Payment_Date: Date
+Penalty_Amount: Integer
+Rent_Amount: Integer
+payRent()
+payStatus()
+payPenalty()
+inspectDamages()
Car
+Car_ID: String
+Car_model: String
+Plate_number: String
+updateCarDetails()
+viewCar()
1*
1*
1
0*
1
1
0*
1*
1*
1
+Makes
1*
1*

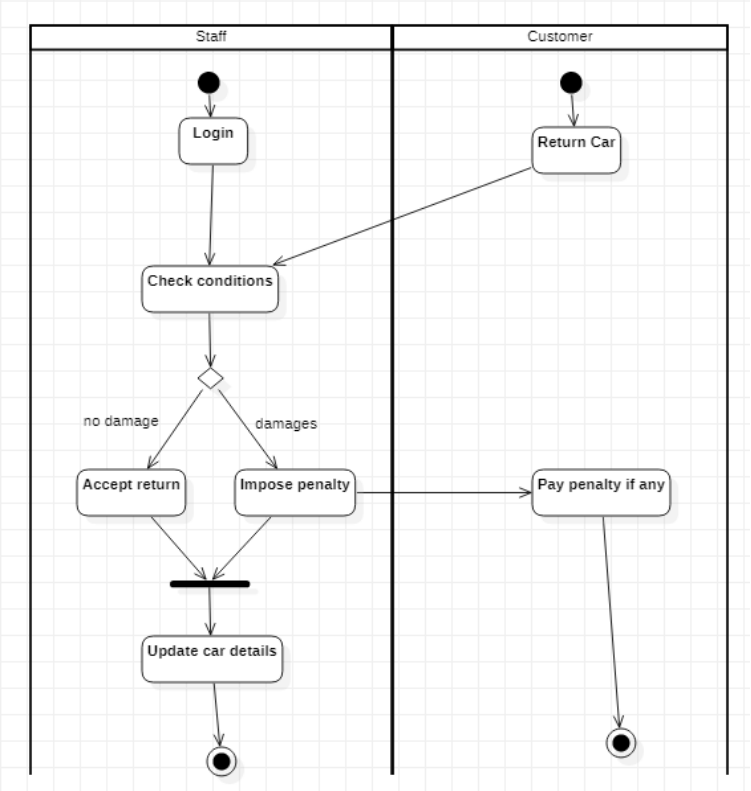
State Diagram-01 - Car



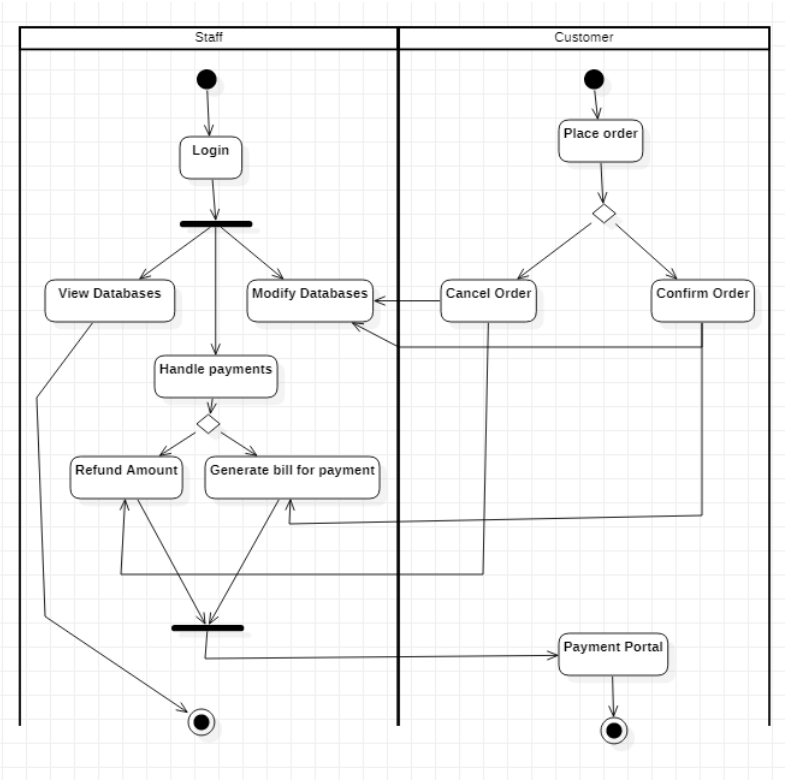
State Diagram-02- Payment



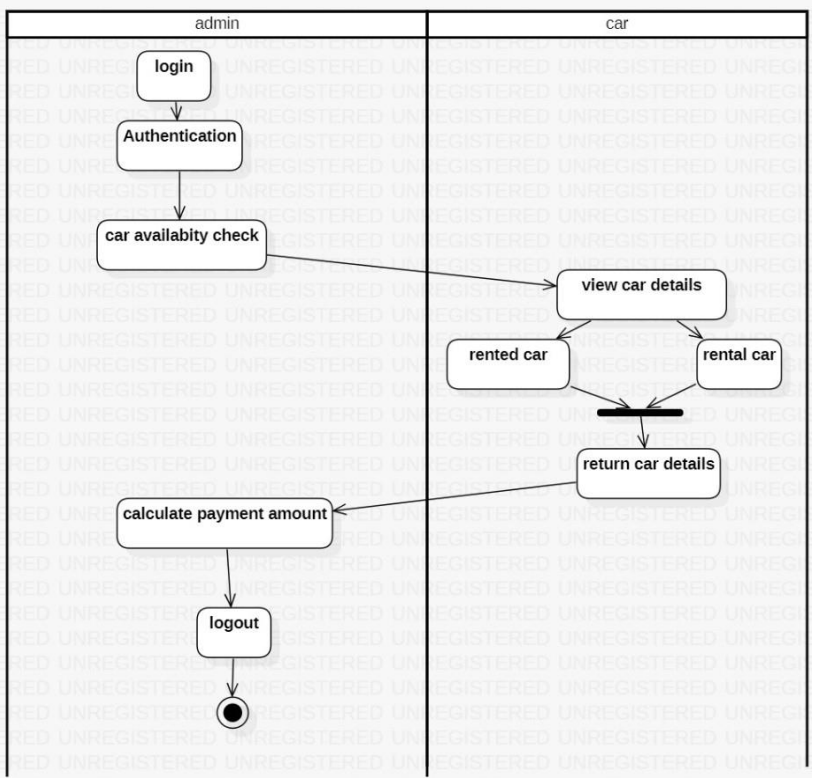
Activity Diagram-01 - Penalty



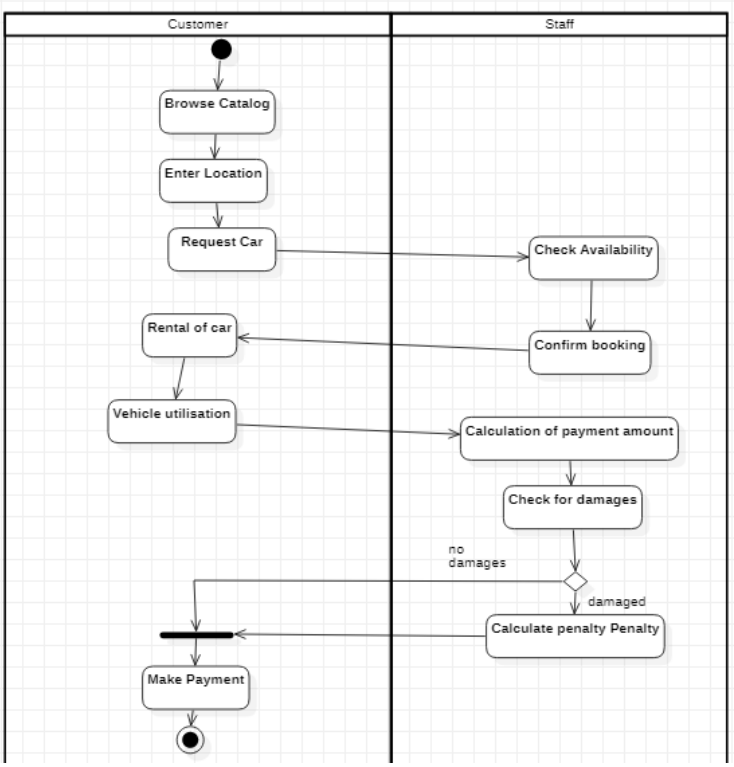
Activity Diagram-02 - Databases



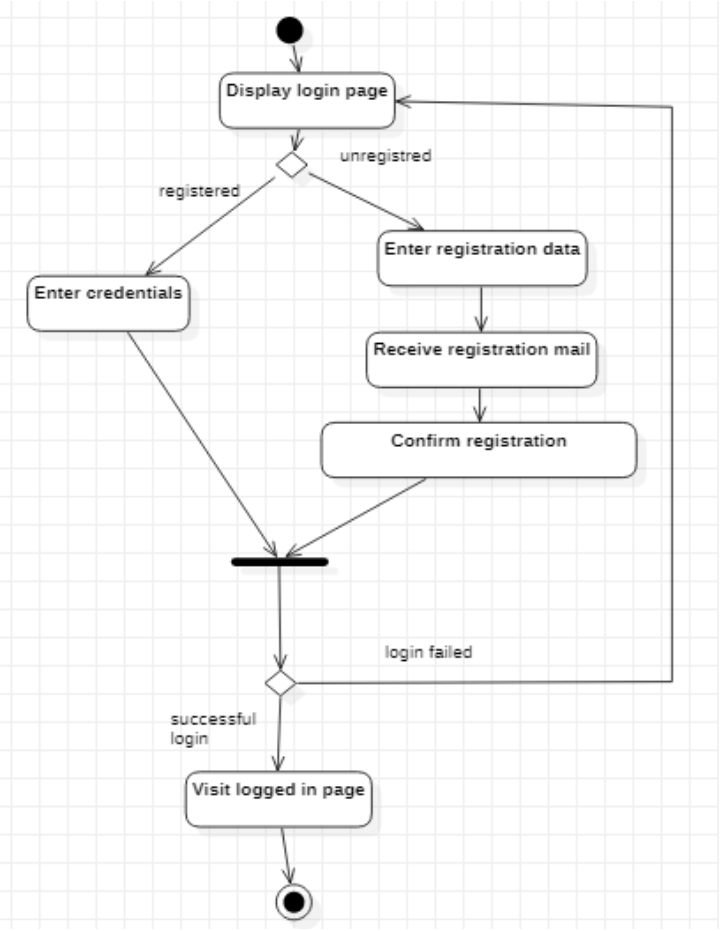
Activity Diagram-03 - Administration



Activity Diagram-04 - Customer Booking



Activity Diagram-05 - Customer Login



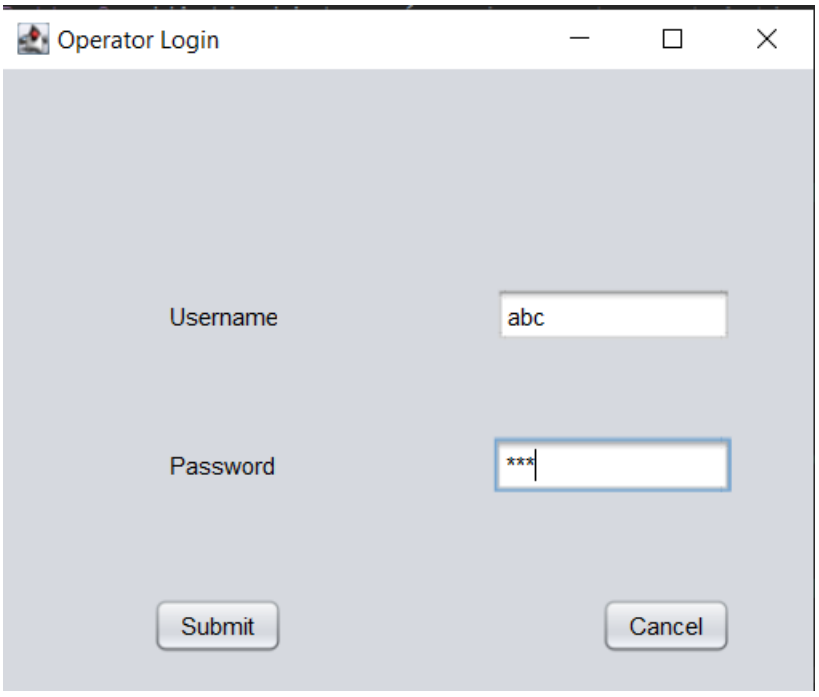
Design Principles and Design Patterns Applied

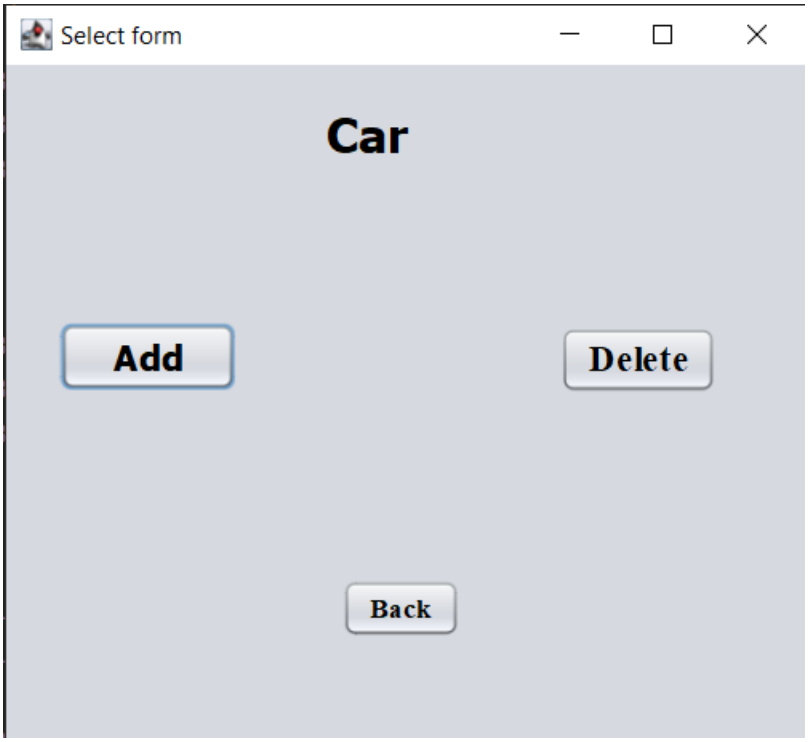
1. **Factory Design Pattern -** Applied to instantiate different models of rental cars. The Vehicle super-class, which is extended by all Car models sub-classes (Audi, Mercedes, Creta, Innova). This allows us to utilise the common methods of the Vehicle super-class.
2. **Decorator Pattern -** Add discounts to booking of rental based on run-time criteria like booking time, additional offers for new users and festive discounts.
3. **Command Pattern -** For user inputs, like submit and cancel button

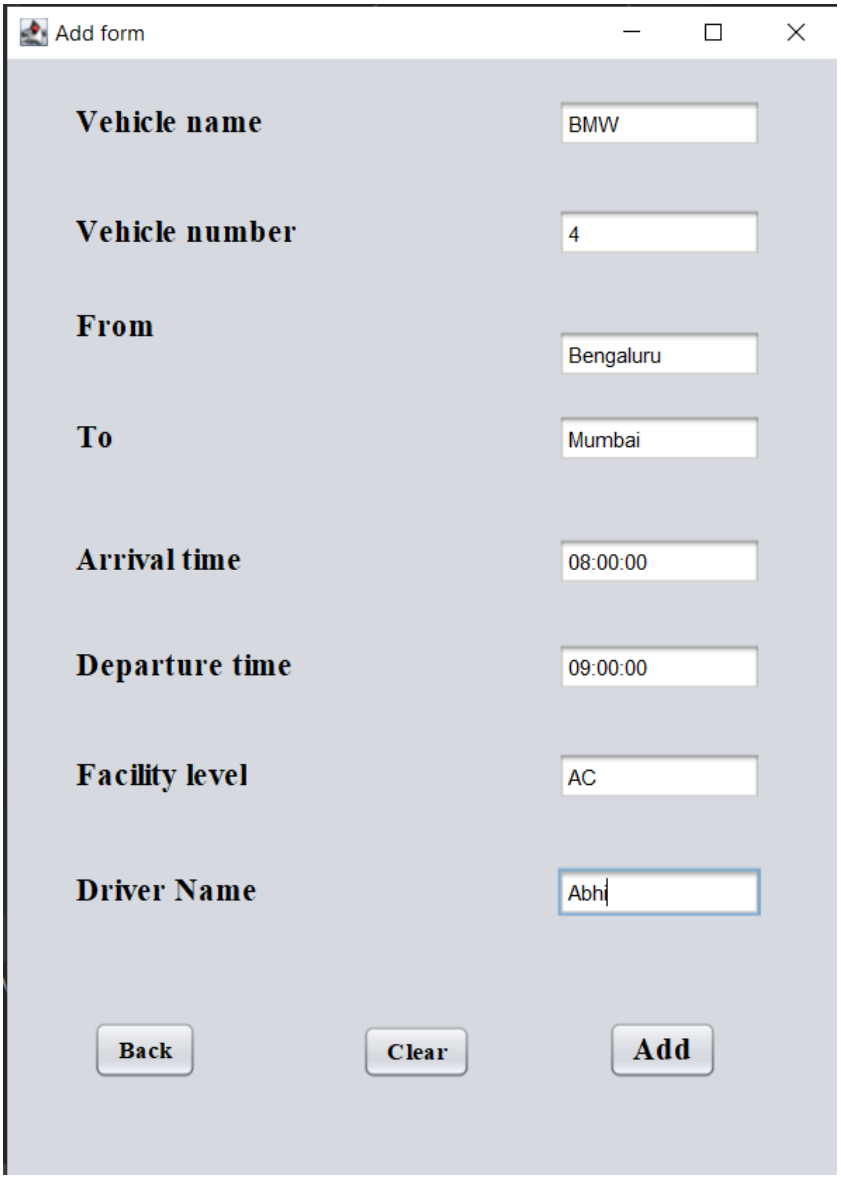
SOLID Design Principles were followed in the development of different parts of this project.

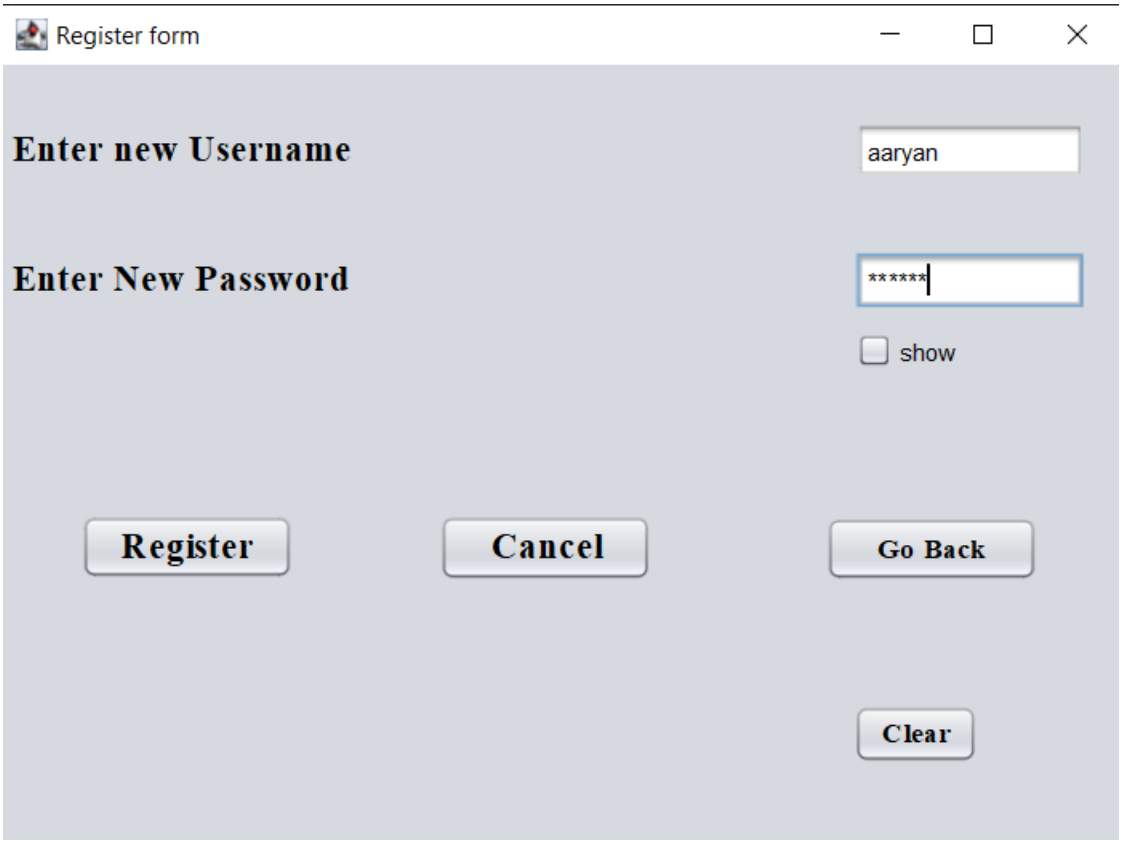
- Single Responsibility Principle: Every class in the design has a single responsibility. For example, the Payment class is responsible only for getting and setting the data of the Payment Object (details like payment id, amount, and payment status).
- Liskov Substitution Principle (LSP) - The Customer class can be substituted with any of its derived classes without affecting the correctness of the program.

- **Application Screenshots**



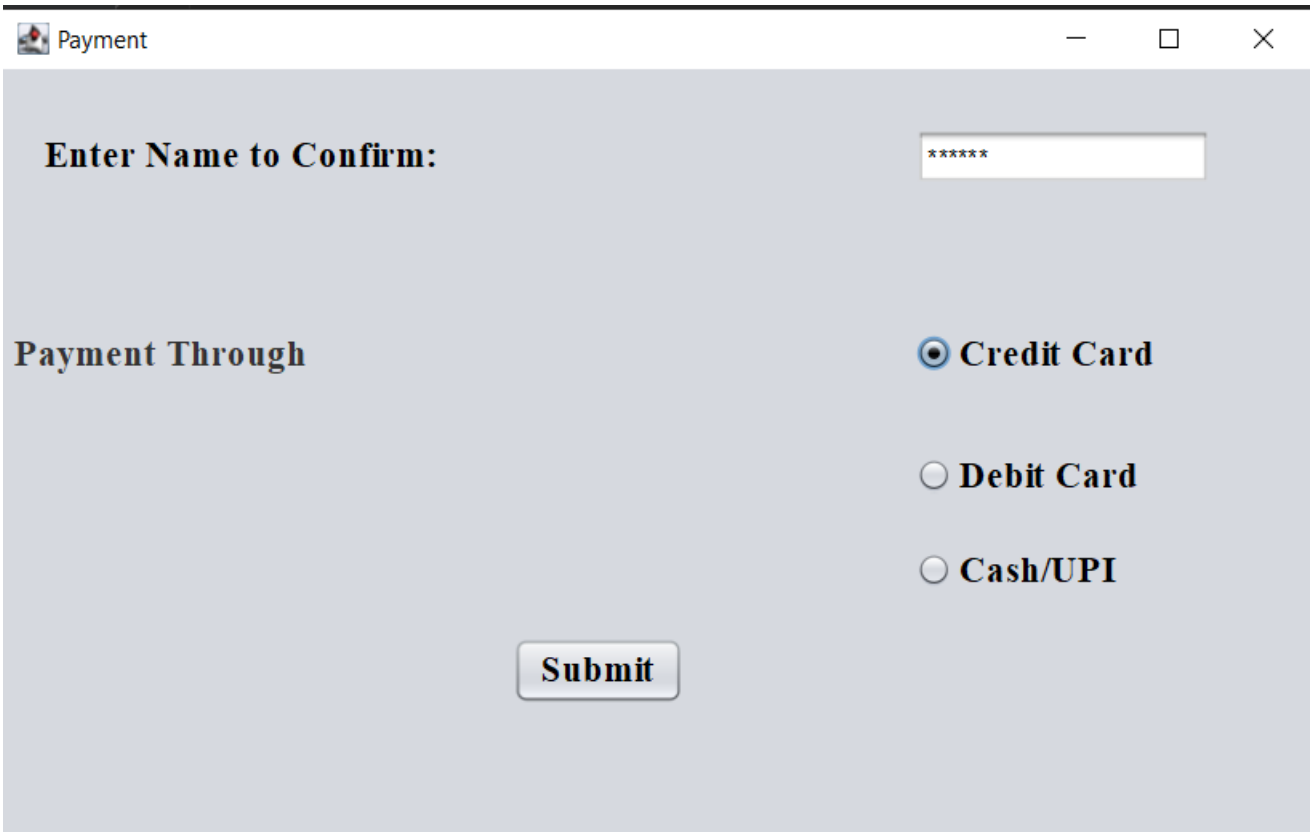

Select form
Car
Add
Delete
Back

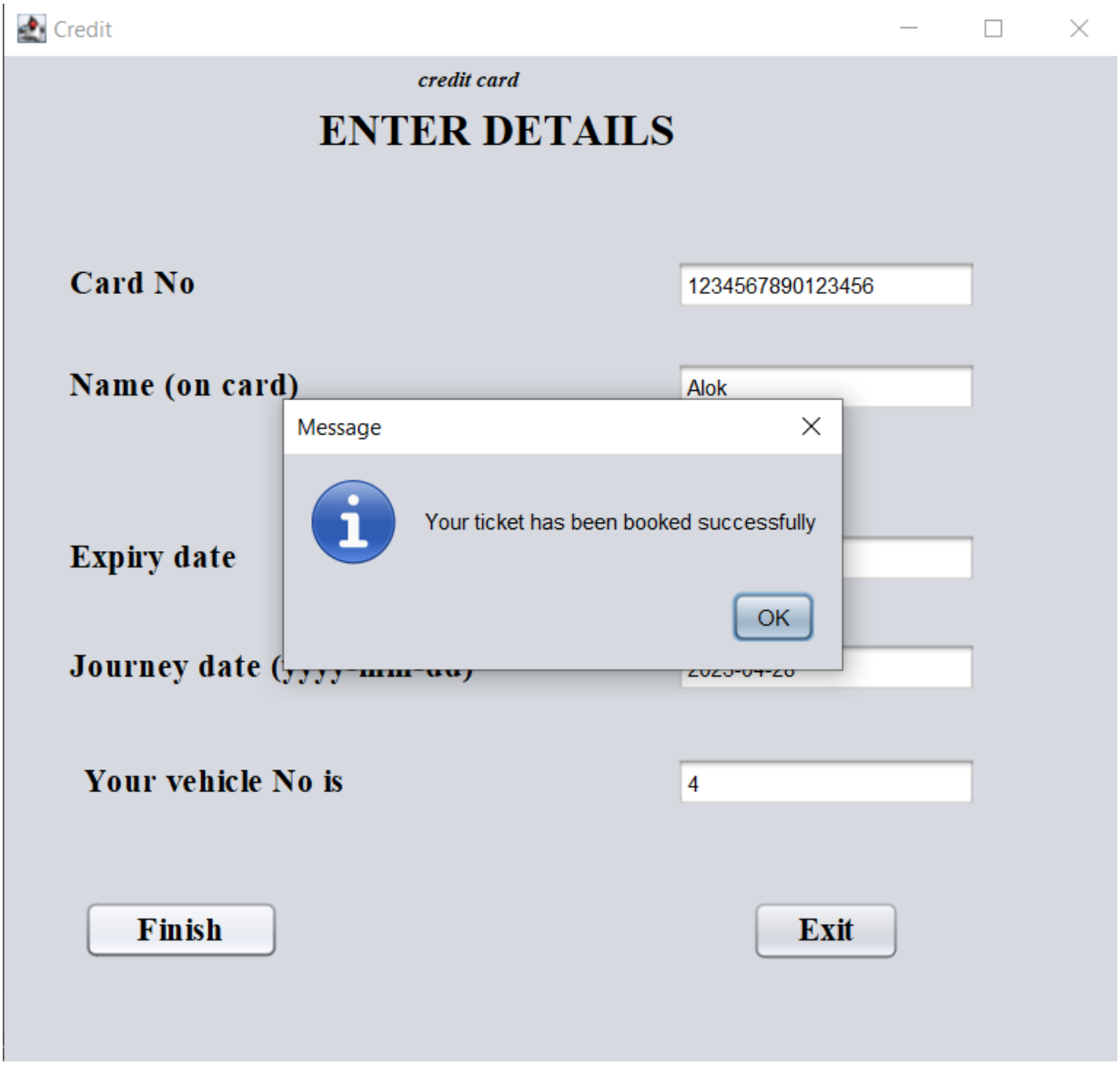

Add form
Vehicle name
BMW
Vehicle number
4
From
Bengaluru
To
Mumbai
Arrival time
08:00:00
Departure time
09:00:00
Facility level
AC
Driver Name
Abhi
Back
Clear
Add


Register form
Enter new Username
aaryan
Enter New Password
******
show
Register
Cancel
Go Back
Clear


Selection form
MENU OF AVAILABLE CARS
Vehicle Number
Vehicle Name
Facility Level
4
BMW
AC
Message
Please Remember the Vehicle Number of the car you would like to book!
OK
Sign Out
Cancel
Book


Resertvation
ENTER DETAILS
Name
Aditya
Phone No
9898989898
From
Bangalore
To
Mumbai
Journey Date (yyyy-mm-dd)
2023-04-28
Facility Level
Ac
No of seats required
5
Enter Vehicle No.
4
Cost
5000
Done


Payment
Enter Name to Confirm:
******
Payment Through
Credit Card
Debit Card
Cash/UPI
Submit


Credit
credit card
ENTER DETAILS
Card No
1234567890123456
Name (on card)
Alok
Message
Your ticket has been booked successfully
OK
Expiry date
Journey date (yyyy-mm-dd)
2023-04-26
Your vehicle No is
4
Finish
Exit