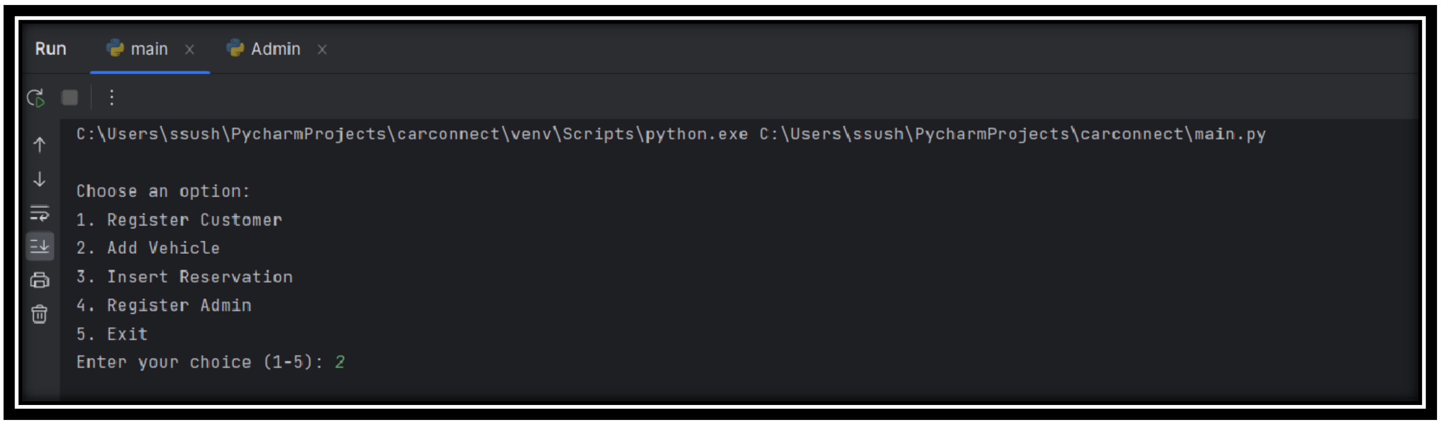
CASE STUDY PYTHON

NAME: - SUSHANT KUMAR SINGH

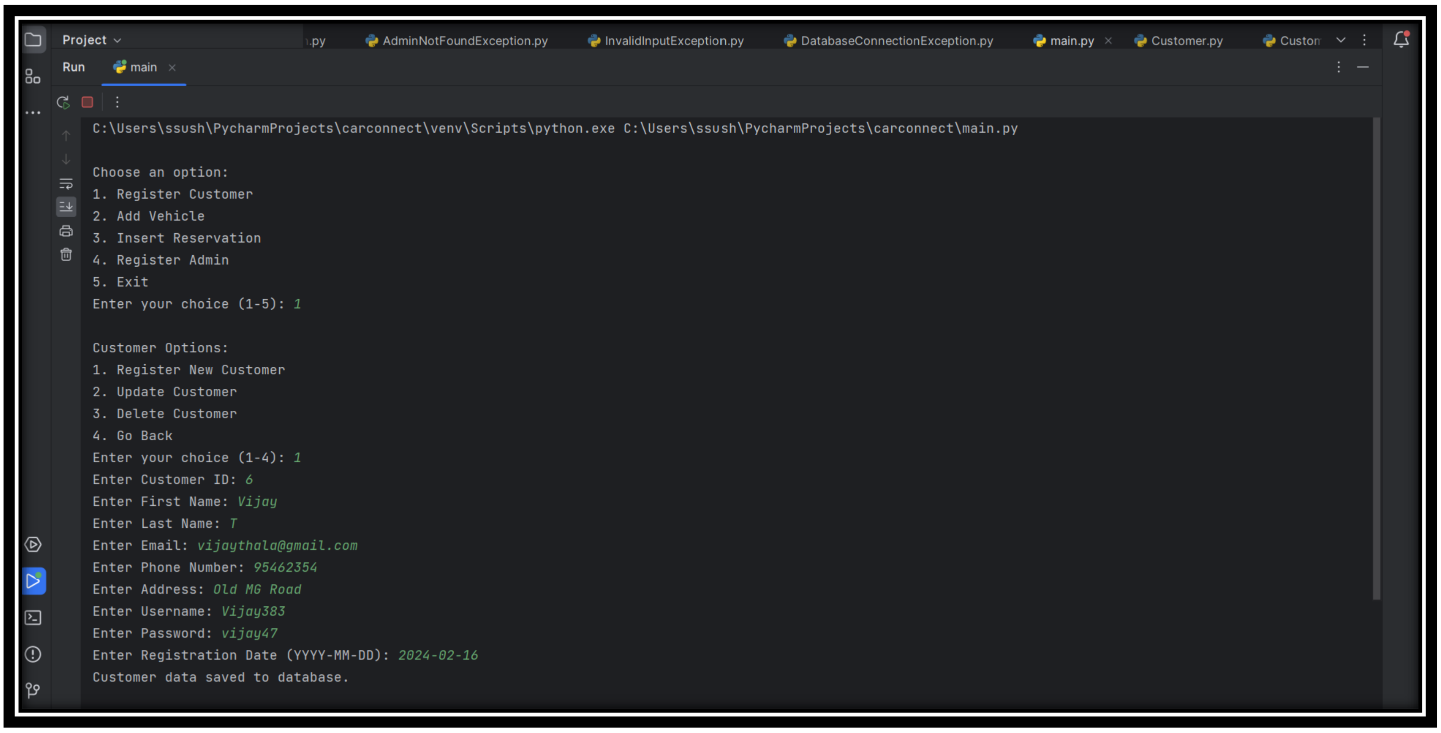
PROJECT:- CarConnect, a Car Rental Platform

Main Menu



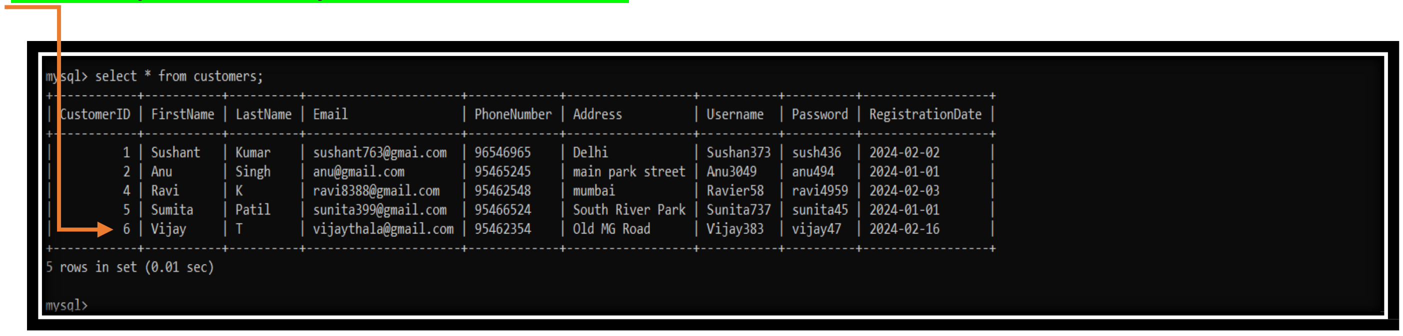
```
C:\Users\ssush\PycharmProjects\carconnect\venv\Scripts\python.exe C:\Users\ssush\PycharmProjects\carconnect\main.py

Choose an option:
1. Register Customer
2. Add Vehicle
3. Insert Reservation
4. Register Admin
5. Exit
Enter your choice (1-5): 2
```

Input/Output given by User for customer table



```
C:\Users\ssush\PycharmProjects\carconnect\venv\Scripts\python.exe C:\Users\ssush\PycharmProjects\carconnect\main.py

Choose an option:
1. Register Customer
2. Add Vehicle
3. Insert Reservation
4. Register Admin
5. Exit
Enter your choice (1-5): 1

Customer Options:
1. Register New Customer
2. Update Customer
3. Delete Customer
4. Go Back
Enter your choice (1-4): 1
Enter Customer ID: 6
Enter First Name: Vijay
Enter Last Name: T
Enter Email: vijaythala@gmail.com
Enter Phone Number: 95462354
Enter Address: Old MG Road
Enter Username: Vijay383
Enter Password: vijay47
Enter Registration Date (YYYY-MM-DD): 2024-02-16
Customer data saved to database.
```

Entered Input successfully saved into our Database



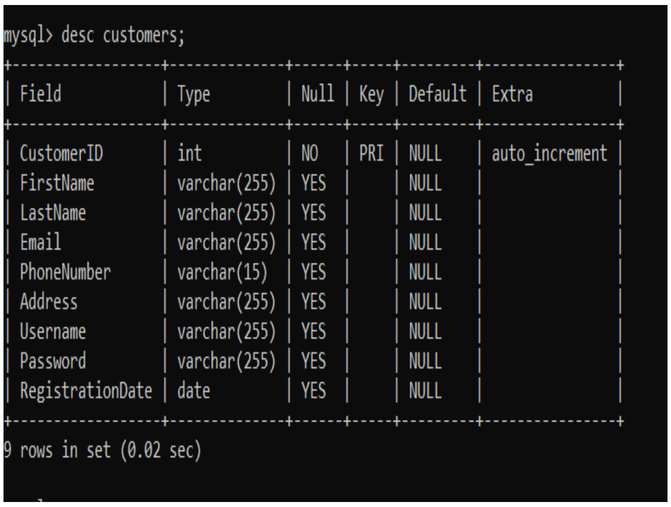
```
mysql> select * from customers;
+------------+-----------+----------+----------------------+-------------+-------------------+-----------+-----------+------------------+
| CustomerID | FirstName | LastName | Email                | PhoneNumber | Address           | Username  | Password  | RegistrationDate |
+------------+-----------+----------+----------------------+-------------+-------------------+-----------+-----------+------------------+
|          1 | Sushant   | Kumar    | sushant763@gmai.com  | 96546965    | Delhi             | Sushan373 | sush436   | 2024-02-02       |
|          2 | Anu       | Singh    | anu@gmail.com        | 95465245    | main park street  | Anu3049   | anu494    | 2024-01-01       |
|          4 | Ravi      | K        | ravi8388@gmail.com   | 95462548    | mumbai            | Ravier58  | ravi4959  | 2024-02-03       |
|          5 | Sumita    | Patil    | sunita399@gmail.com  | 95466524    | South River Park  | Sunita737 | sunita45  | 2024-01-01       |
|          6 | Vijay     | T        | vijaythala@gmail.com | 95462354    | Old MG Road       | Vijay383  | vijay47   | 2024-02-16       |
+------------+-----------+----------+----------------------+-------------+-------------------+-----------+-----------+------------------+
5 rows in set (0.01 sec)

mysql>
```

Create following tables in SQL Schema with appropriate class and write the unit test case for the application.

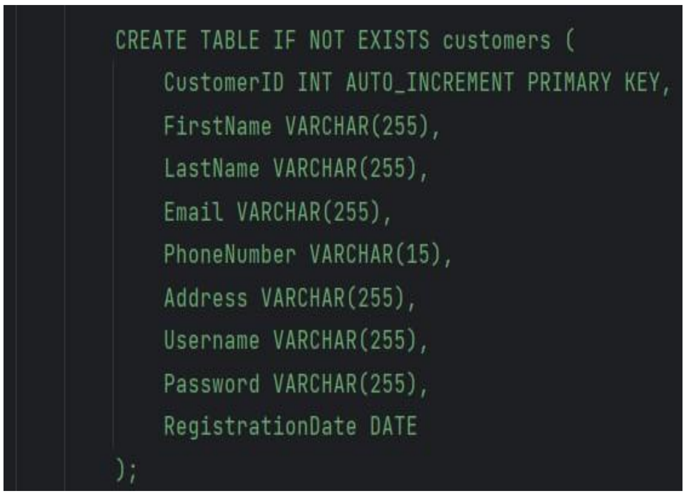
SQL Tables:

1. Customer Table:

- CustomerID (Primary Key): Unique identifier for each customer.
- FirstName: First name of the customer.
- LastName: Last name of the customer.
- Email: Email address of the customer for communication.
- PhoneNumber: Contact number of the customer.
- Address: Customer's residential address.
- Username: Unique username for customer login.
- Password: Securely hashed password for customer authentication.



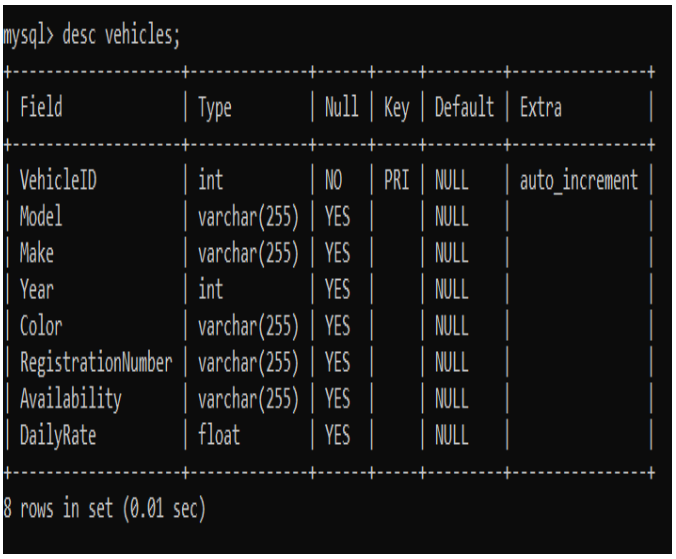
```
mysql> desc customers;
+------------------+--------------+------+-----+---------+----------------+
| Field            | Type         | Null | Key | Default | Extra          |
+------------------+--------------+------+-----+---------+----------------+
| CustomerID       | int          | NO   | PRI | NULL    | auto_increment |
| FirstName        | varchar(255) | YES  |     | NULL    |                |
| LastName         | varchar(255) | YES  |     | NULL    |                |
| Email            | varchar(255) | YES  |     | NULL    |                |
| PhoneNumber      | varchar(15)  | YES  |     | NULL    |                |
| Address          | varchar(255) | YES  |     | NULL    |                |
| Username         | varchar(255) | YES  |     | NULL    |                |
| Password         | varchar(255) | YES  |     | NULL    |                |
| RegistrationDate | date         | YES  |     | NULL    |                |
+------------------+--------------+------+-----+---------+----------------+
9 rows in set (0.02 sec)
```



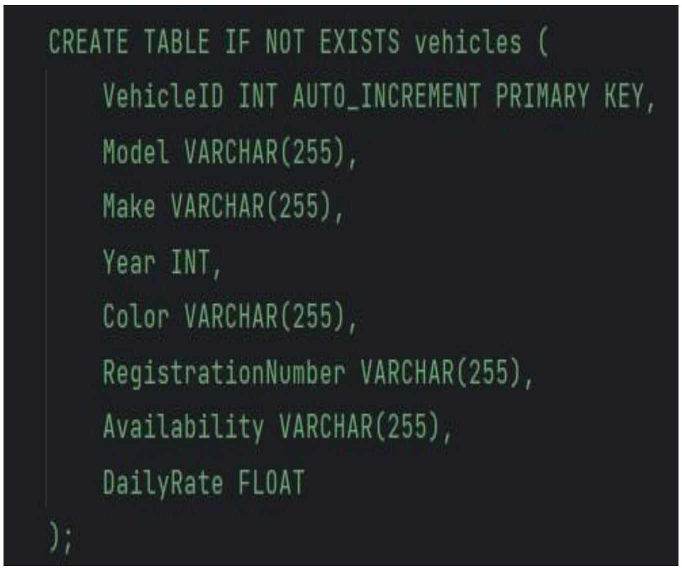
```
CREATE TABLE IF NOT EXISTS customers (
    CustomerID INT AUTO_INCREMENT PRIMARY KEY,
    FirstName VARCHAR(255),
    LastName VARCHAR(255),
    Email VARCHAR(255),
    PhoneNumber VARCHAR(15),
    Address VARCHAR(255),
    Username VARCHAR(255),
    Password VARCHAR(255),
    RegistrationDate DATE
);
```

2. Vehicle Table:

- VehicleID (Primary Key): Unique identifier for each vehicle.
- Model: Model of the vehicle.
- Make: Manufacturer or brand of the vehicle.
- Year: Manufacturing year of the vehicle.
- Color: Color of the vehicle.
- RegistrationNumber: Unique registration number for each vehicle.
- Availability: Boolean indicating whether the vehicle is available for rent.
- DailyRate: Daily rental rate for the vehicle.

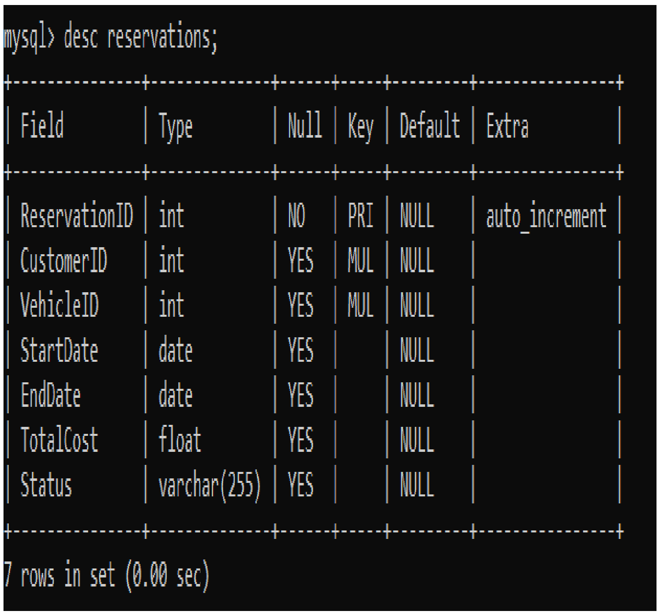


```
mysql> desc vehicles;
+--------------------+--------------+------+-----+---------+----------------+
| Field              | Type         | Null | Key | Default | Extra          |
+--------------------+--------------+------+-----+---------+----------------+
| VehicleID          | int          | NO   | PRI | NULL    | auto_increment |
| Model              | varchar(255) | YES  |     | NULL    |                |
| Make               | varchar(255) | YES  |     | NULL    |                |
| Year               | int          | YES  |     | NULL    |                |
| Color              | varchar(255) | YES  |     | NULL    |                |
| RegistrationNumber | varchar(255) | YES  |     | NULL    |                |
| Availability       | varchar(255) | YES  |     | NULL    |                |
| DailyRate          | float        | YES  |     | NULL    |                |
+--------------------+--------------+------+-----+---------+----------------+
8 rows in set (0.01 sec)
```

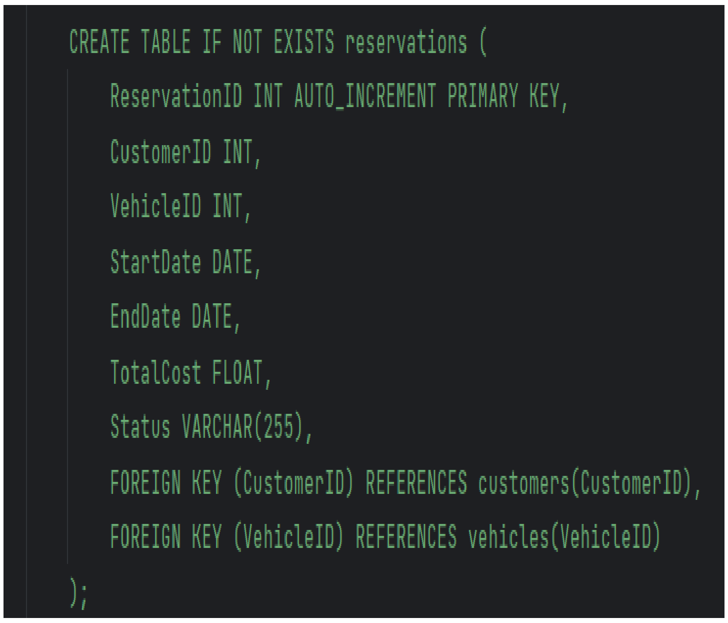


```
CREATE TABLE IF NOT EXISTS vehicles (
    VehicleID INT AUTO_INCREMENT PRIMARY KEY,
    Model VARCHAR(255),
    Make VARCHAR(255),
    Year INT,
    Color VARCHAR(255),
    RegistrationNumber VARCHAR(255),
    Availability VARCHAR(255),
    DailyRate FLOAT
);
```

3. Reservation Table:

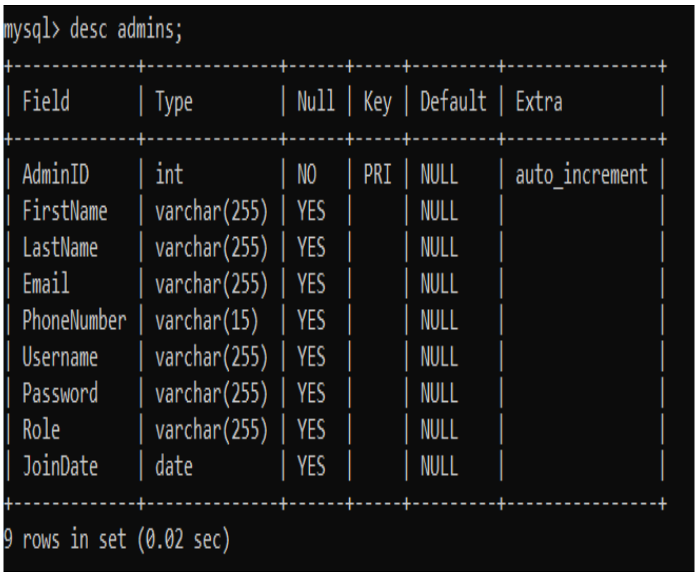


```
mysql> desc reservations;
+---------------+--------------+------+-----+---------+----------------+
| Field         | Type         | Null | Key | Default | Extra          |
+---------------+--------------+------+-----+---------+----------------+
| ReservationID | int          | NO   | PRI | NULL    | auto_increment |
| CustomerID    | int          | YES  | MUL | NULL    |                |
| VehicleID     | int          | YES  | MUL | NULL    |                |
| StartDate     | date         | YES  |     | NULL    |                |
| EndDate       | date         | YES  |     | NULL    |                |
| TotalCost     | float        | YES  |     | NULL    |                |
| Status        | varchar(255) | YES  |     | NULL    |                |
+---------------+--------------+------+-----+---------+----------------+
7 rows in set (0.00 sec)
```

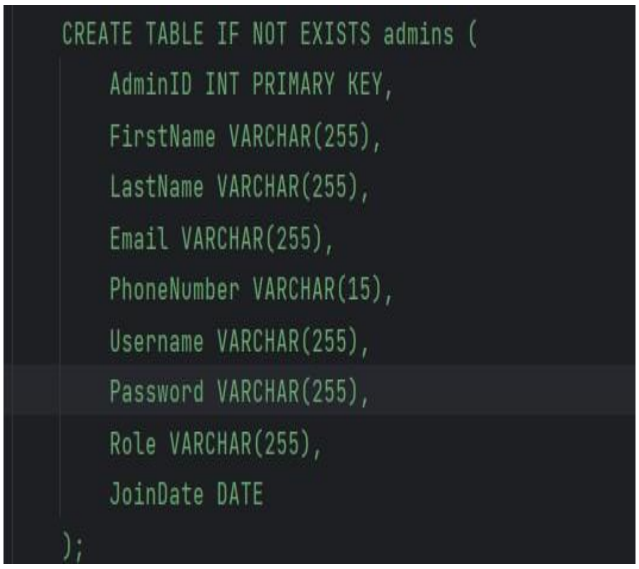


```
CREATE TABLE IF NOT EXISTS reservations (
    ReservationID INT AUTO_INCREMENT PRIMARY KEY,
    CustomerID INT,
    VehicleID INT,
    StartDate DATE,
    EndDate DATE,
    TotalCost FLOAT,
    Status VARCHAR(255),
    FOREIGN KEY (CustomerID) REFERENCES customers(CustomerID),
    FOREIGN KEY (VehicleID) REFERENCES vehicles(VehicleID)
);
```

4) Admin Table



```
mysql> desc admins;
+-------------+--------------+------+-----+---------+----------------+
| Field       | Type         | Null | Key | Default | Extra          |
+-------------+--------------+------+-----+---------+----------------+
| AdminID     | int          | NO   | PRI | NULL    | auto_increment |
| FirstName   | varchar(255) | YES  |     | NULL    |                |
| LastName    | varchar(255) | YES  |     | NULL    |                |
| Email       | varchar(255) | YES  |     | NULL    |                |
| PhoneNumber | varchar(15)  | YES  |     | NULL    |                |
| Username    | varchar(255) | YES  |     | NULL    |                |
| Password    | varchar(255) | YES  |     | NULL    |                |
| Role        | varchar(255) | YES  |     | NULL    |                |
| JoinDate    | date         | YES  |     | NULL    |                |
+-------------+--------------+------+-----+---------+----------------+
9 rows in set (0.02 sec)
```



```
CREATE TABLE IF NOT EXISTS admins (
    AdminID INT PRIMARY KEY,
    FirstName VARCHAR(255),
    LastName VARCHAR(255),
    Email VARCHAR(255),
    PhoneNumber VARCHAR(15),
    Username VARCHAR(255),
    Password VARCHAR(255),
    Role VARCHAR(255),
    JoinDate DATE
);
```

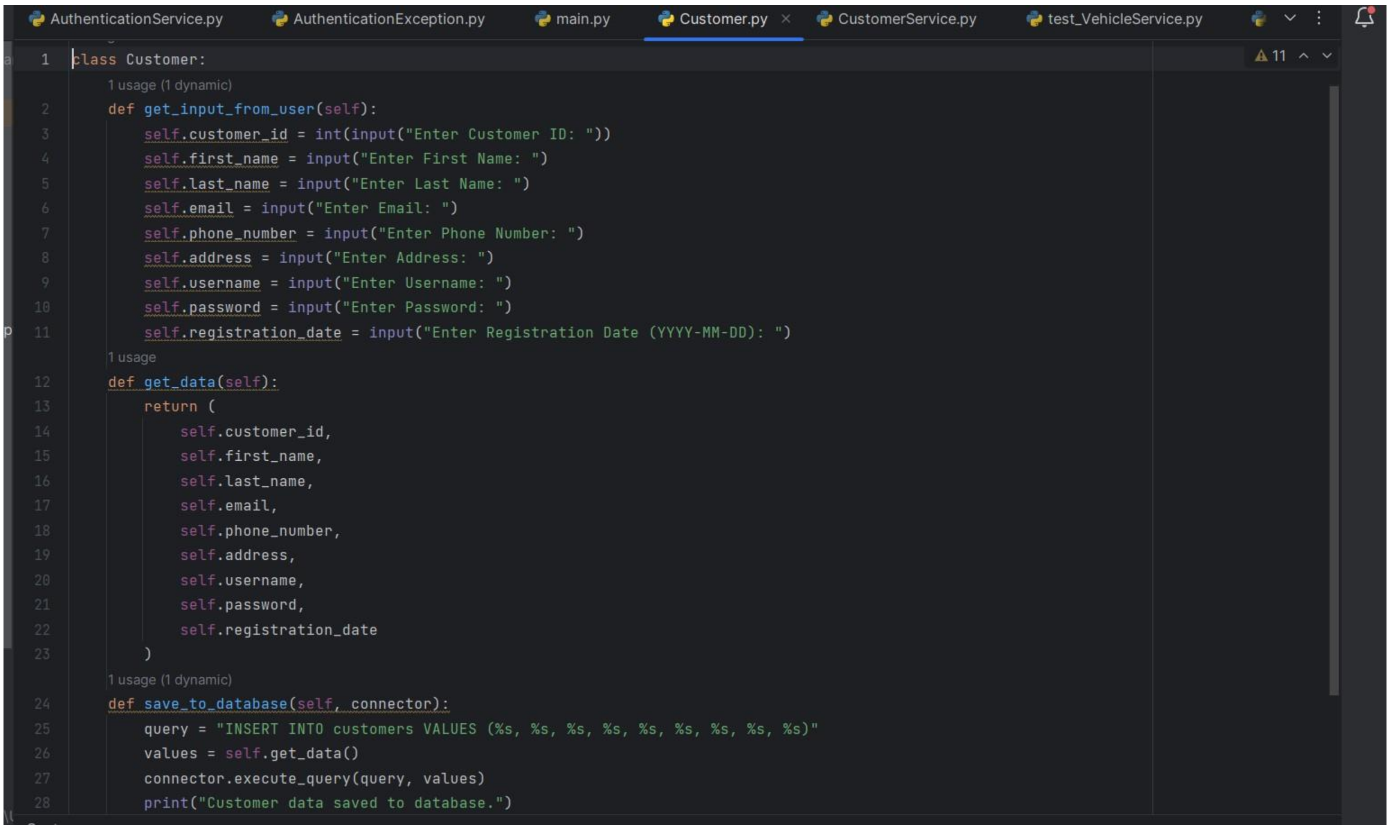
Create the model/entity classes corresponding to the schema within package entity with variables declared private, constructors (default and parametrized) and getters,setters)

Classes:

Customer:

• Properties: CustomerID, FirstName, LastName, Email, PhoneNumber, Address, Username, Password, RegistrationDate

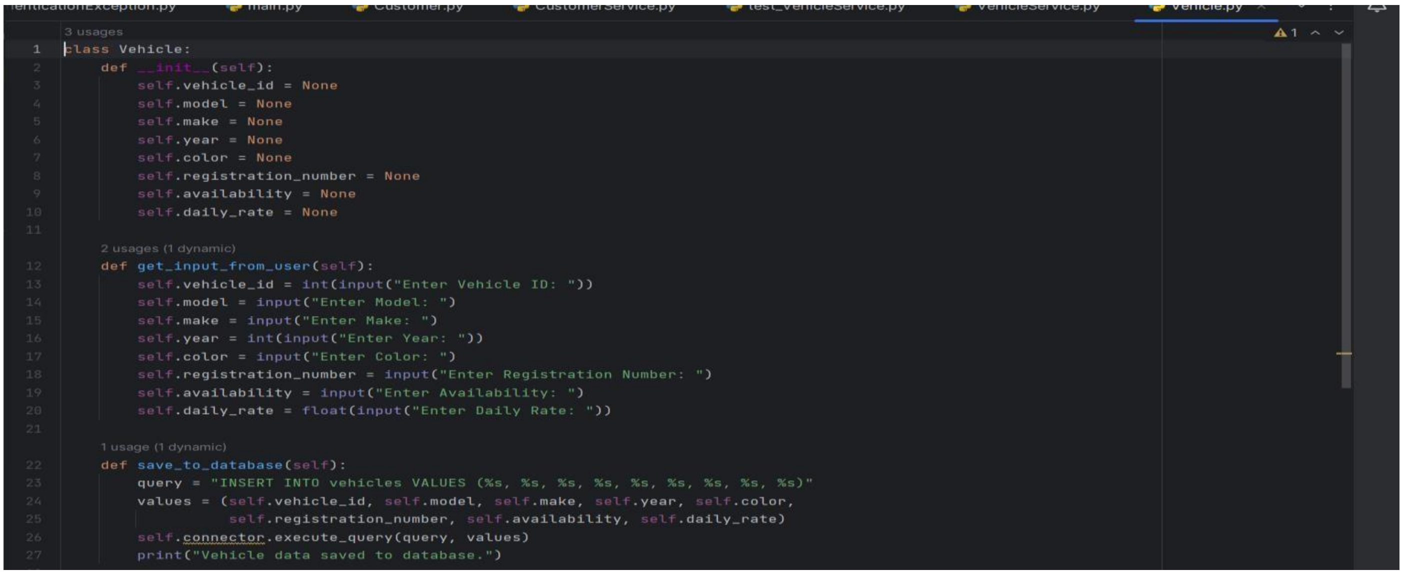
• Methods: Authenticate(password)



```python
class Customer:
    def get_input_from_user(self):
        self.customer_id = int(input("Enter Customer ID: "))
        self.first_name = input("Enter First Name: ")
        self.last_name = input("Enter Last Name: ")
        self.email = input("Enter Email: ")
        self.phone_number = input("Enter Phone Number: ")
        self.address = input("Enter Address: ")
        self.username = input("Enter Username: ")
        self.password = input("Enter Password: ")
        self.registration_date = input("Enter Registration Date (YYYY-MM-DD): ")
    def get_data(self):
        return (
            self.customer_id,
            self.first_name,
            self.last_name,
            self.email,
            self.phone_number,
            self.address,
            self.username,
            self.password,
            self.registration_date
        )
    def save_to_database(self, connector):
        query = "INSERT INTO customers VALUES (%s, %s, %s, %s, %s, %s, %s, %s, %s)"
        values = self.get_data()
        connector.execute_query(query, values)
        print("Customer data saved to database.")
```

Vehicle:

• Properties: VehicleID, Model, Make, Year, Color, RegistrationNumber, Availability, DailyRate

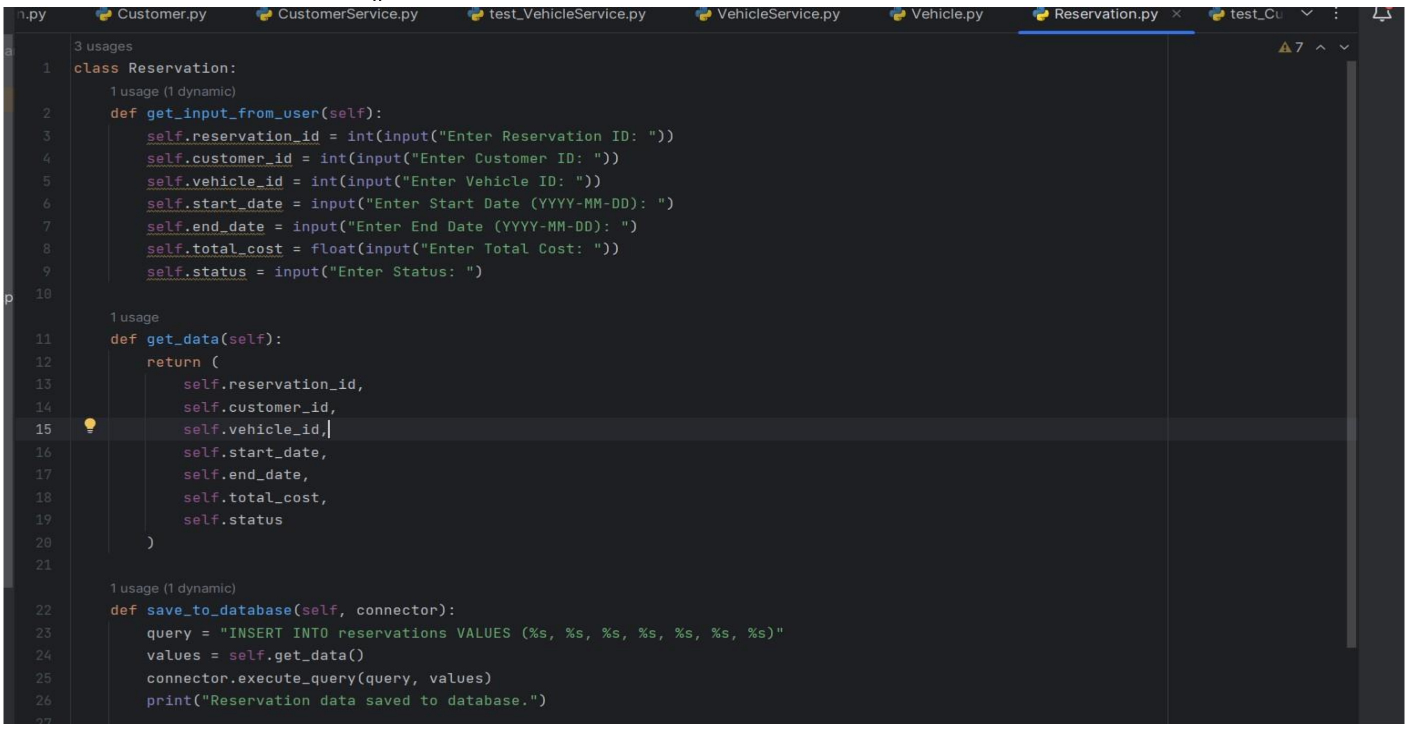


```python
class Vehicle:
    def __init__(self):
        self.vehicle_id = None
        self.model = None
        self.make = None
        self.year = None
        self.color = None
        self.registration_number = None
        self.availability = None
        self.daily_rate = None

    def get_input_from_user(self):
        self.vehicle_id = int(input("Enter Vehicle ID: "))
        self.model = input("Enter Model: ")
        self.make = input("Enter Make: ")
        self.year = int(input("Enter Year: "))
        self.color = input("Enter Color: ")
        self.registration_number = input("Enter Registration Number: ")
        self.availability = input("Enter Availability: ")
        self.daily_rate = float(input("Enter Daily Rate: "))

    def save_to_database(self):
        query = "INSERT INTO vehicles VALUES (%s, %s, %s, %s, %s, %s, %s, %s, %s)"
        values = (self.vehicle_id, self.model, self.make, self.year, self.color,
                  self.registration_number, self.availability, self.daily_rate)
        self.connector.execute_query(query, values)
        print("Vehicle data saved to database.")
```

Reservation:

• Properties: ReservationID, CustomerID, VehicleID, StartDate, EndDate, TotalCost, Status

• Methods: CalculateTotalCost()

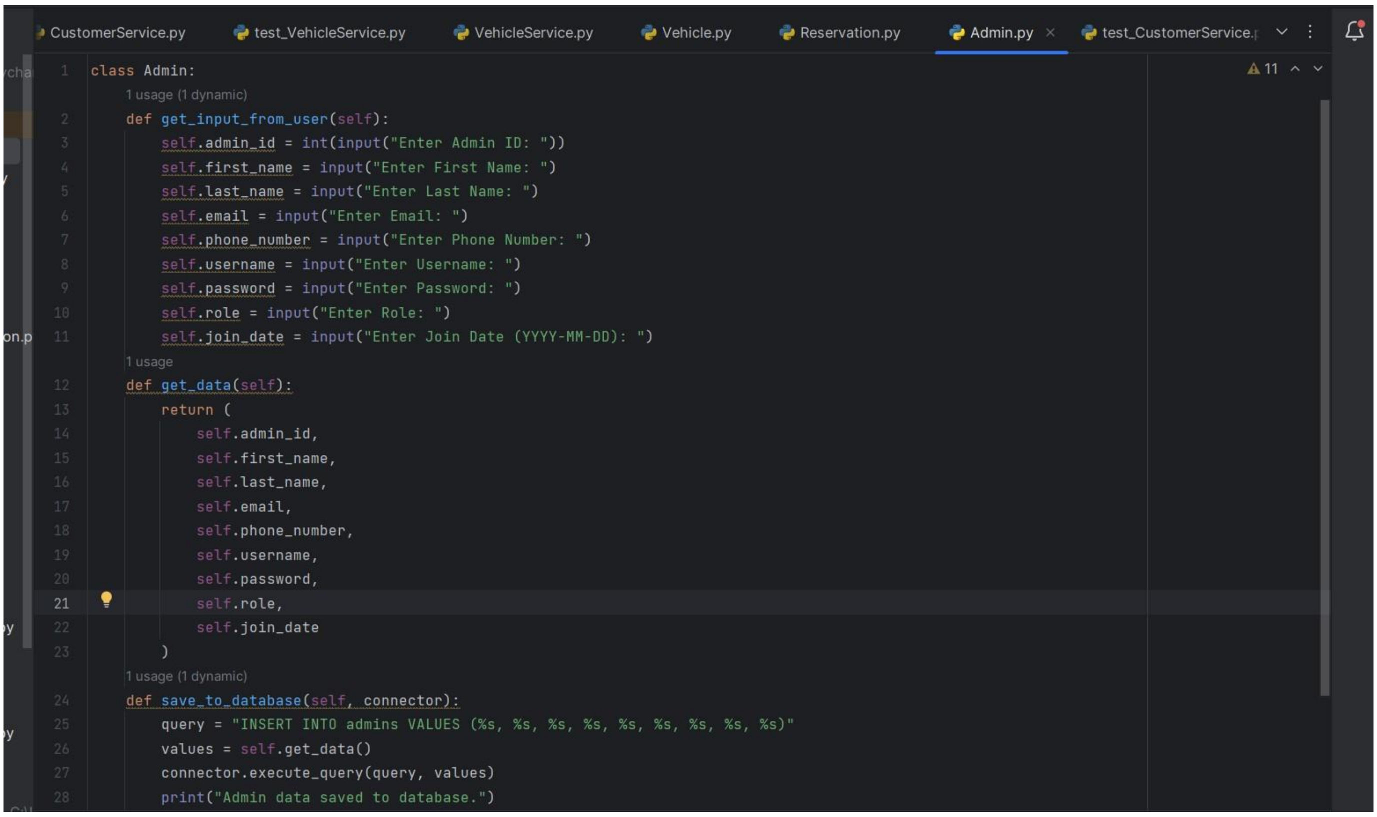


```python
class Reservation:
    def get_input_from_user(self):
        self.reservation_id = int(input("Enter Reservation ID: "))
        self.customer_id = int(input("Enter Customer ID: "))
        self.vehicle_id = int(input("Enter Vehicle ID: "))
        self.start_date = input("Enter Start Date (YYYY-MM-DD): ")
        self.end_date = input("Enter End Date (YYYY-MM-DD): ")
        self.total_cost = float(input("Enter Total Cost: "))
        self.status = input("Enter Status: ")

    def get_data(self):
        return (
            self.reservation_id,
            self.customer_id,
            self.vehicle_id,
            self.start_date,
            self.end_date,
            self.total_cost,
            self.status
        )

    def save_to_database(self, connector):
        query = "INSERT INTO reservations VALUES (%s, %s, %s, %s, %s, %s, %s)"
        values = self.get_data()
        connector.execute_query(query, values)
        print("Reservation data saved to database.")
```

Admin:

• Properties: AdminID, FirstName, LastName, Email, PhoneNumber, Username, Password, Role, JoinDate

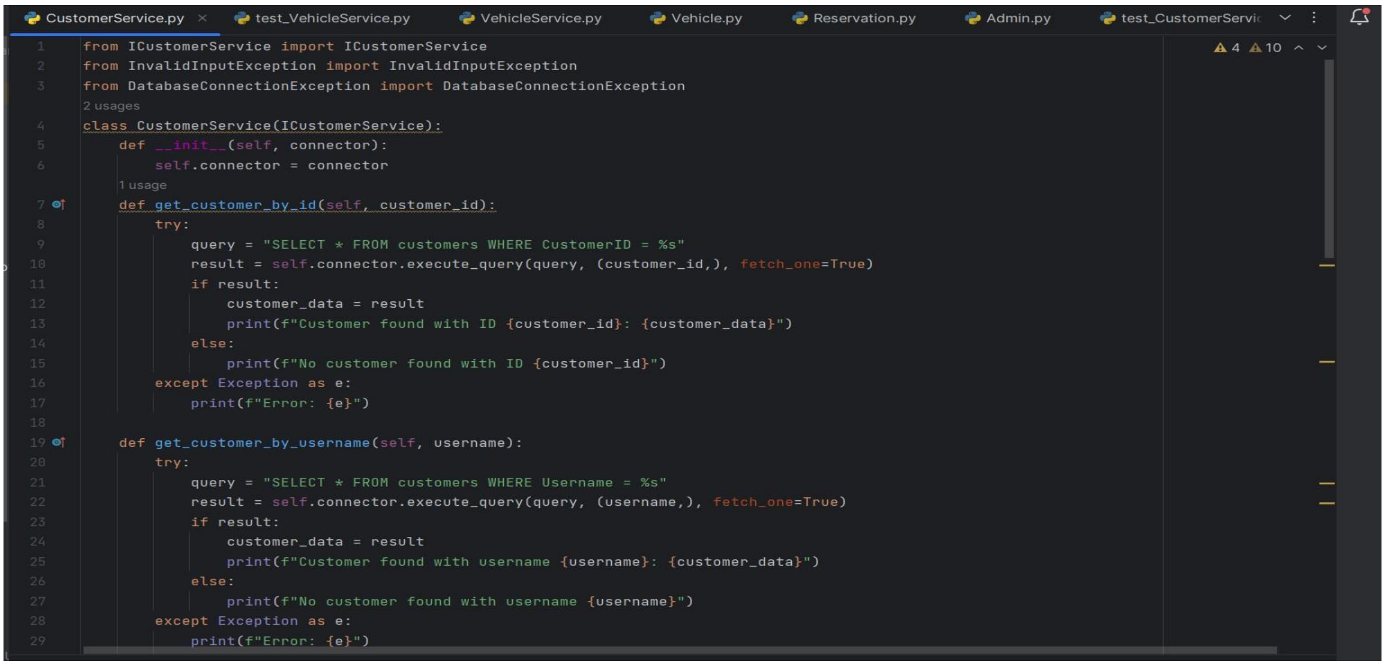
• Methods: Authenticate(password)



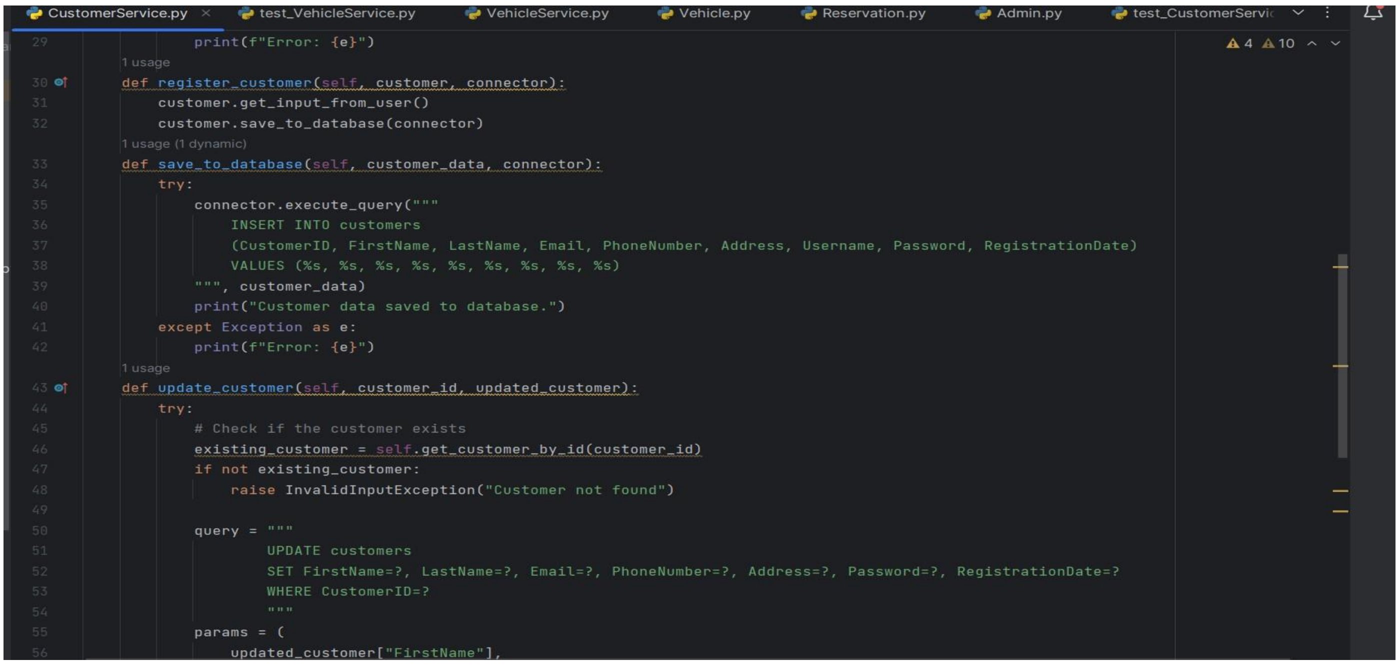
```python
class Admin:
    def get_input_from_user(self):
        self.admin_id = int(input("Enter Admin ID: "))
        self.first_name = input("Enter First Name: ")
        self.last_name = input("Enter Last Name: ")
        self.email = input("Enter Email: ")
        self.phone_number = input("Enter Phone Number: ")
        self.username = input("Enter Username: ")
        self.password = input("Enter Password: ")
        self.role = input("Enter Role: ")
        self.join_date = input("Enter Join Date (YYYY-MM-DD): ")
    def get_data(self):
        return (
            self.admin_id,
            self.first_name,
            self.last_name,
            self.email,
            self.phone_number,
            self.username,
            self.password,
            self.role,
            self.join_date
        )
    def save_to_database(self, connector):
        query = "INSERT INTO admins VALUES (%s, %s, %s, %s, %s, %s, %s, %s, %s)"
        values = self.get_data()
        connector.execute_query(query, values)
        print("Admin data saved to database.")
```

CustomerService (implements ICustomerService):

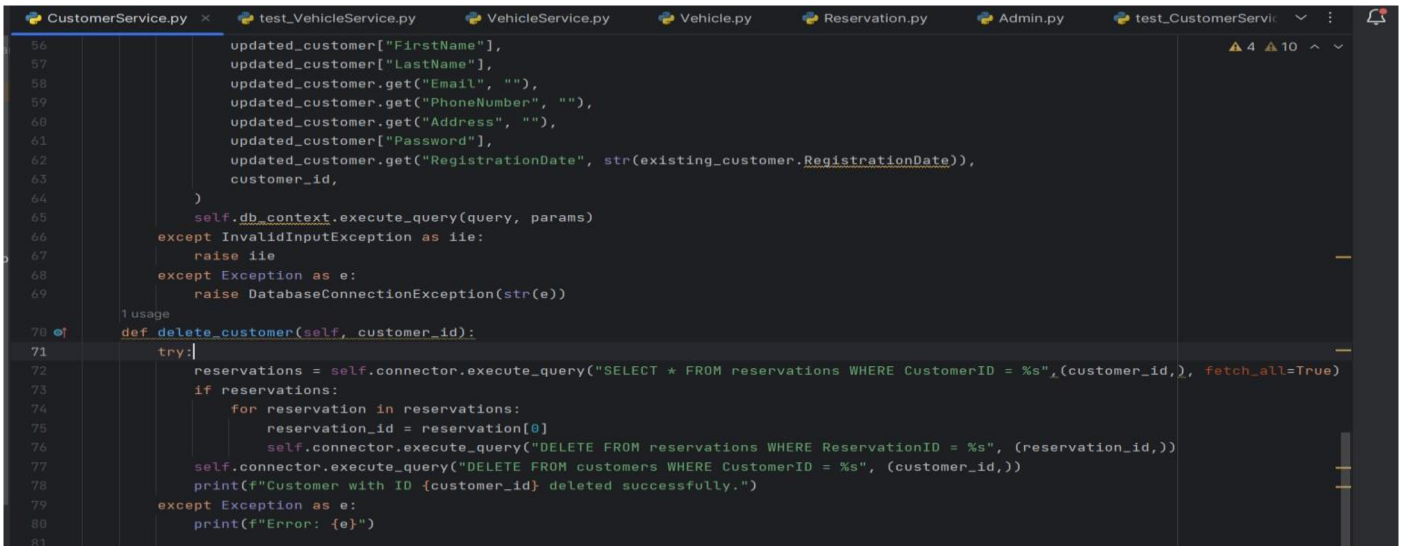
- Methods: GetCustomerById, GetCustomerByUsername, RegisterCustomer, UpdateCustomer, DeleteCustomer



```python
from ICustomerService import ICustomerService
from InvalidInputException import InvalidInputException
from DatabaseConnectionException import DatabaseConnectionException
class CustomerService(ICustomerService):
    def __init__(self, connector):
        self.connector = connector
    def get_customer_by_id(self, customer_id):
        try:
            query = "SELECT * FROM customers WHERE CustomerID = %s"
            result = self.connector.execute_query(query, (customer_id,), fetch_one=True)
            if result:
                customer_data = result
                print(f"Customer found with ID {customer_id}: {customer_data}")
            else:
                print(f"No customer found with ID {customer_id}")
        except Exception as e:
            print(f"Error: {e}")

    def get_customer_by_username(self, username):
        try:
            query = "SELECT * FROM customers WHERE Username = %s"
            result = self.connector.execute_query(query, (username,), fetch_one=True)
            if result:
                customer_data = result
                print(f"Customer found with username {username}: {customer_data}")
            else:
                print(f"No customer found with username {username}")
        except Exception as e:
            print(f"Error: {e}")
```



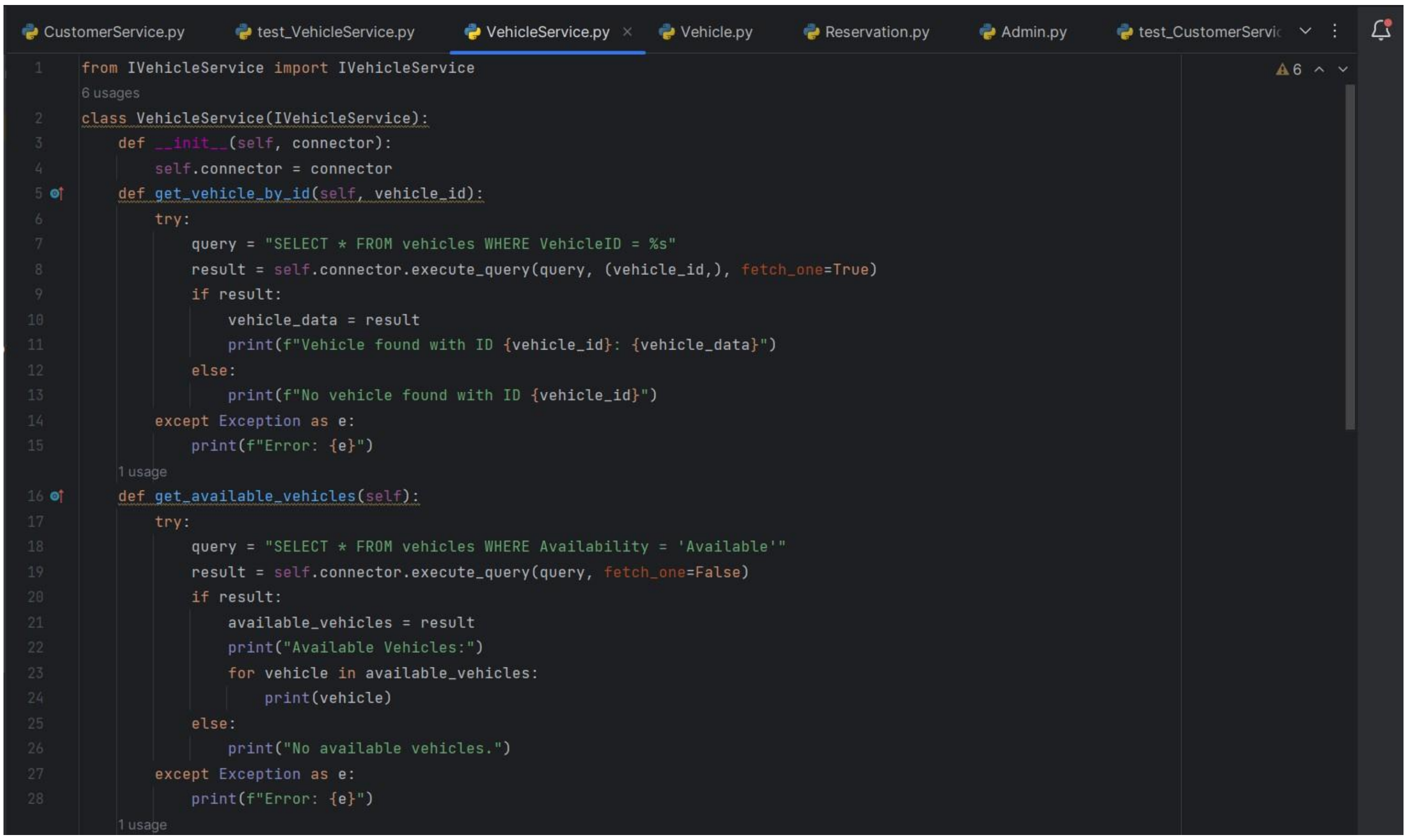
```python
            print(f"Error: {e}")
    def register_customer(self, customer, connector):
        customer.get_input_from_user()
        customer.save_to_database(connector)
    def save_to_database(self, customer_data, connector):
        try:
            connector.execute_query("""
                INSERT INTO customers
                (CustomerID, FirstName, LastName, Email, PhoneNumber, Address, Username, Password, RegistrationDate)
                VALUES (%s, %s, %s, %s, %s, %s, %s, %s, %s)
            """, customer_data)
            print("Customer data saved to database.")
        except Exception as e:
            print(f"Error: {e}")
    def update_customer(self, customer_id, updated_customer):
        try:
            # Check if the customer exists
            existing_customer = self.get_customer_by_id(customer_id)
            if not existing_customer:
                raise InvalidInputException("Customer not found")

            query = """
                UPDATE customers
                SET FirstName=?, LastName=?, Email=?, PhoneNumber=?, Address=?, Password=?, RegistrationDate=?
                WHERE CustomerID=?
                """
            params = (
                updated_customer["FirstName"],
```



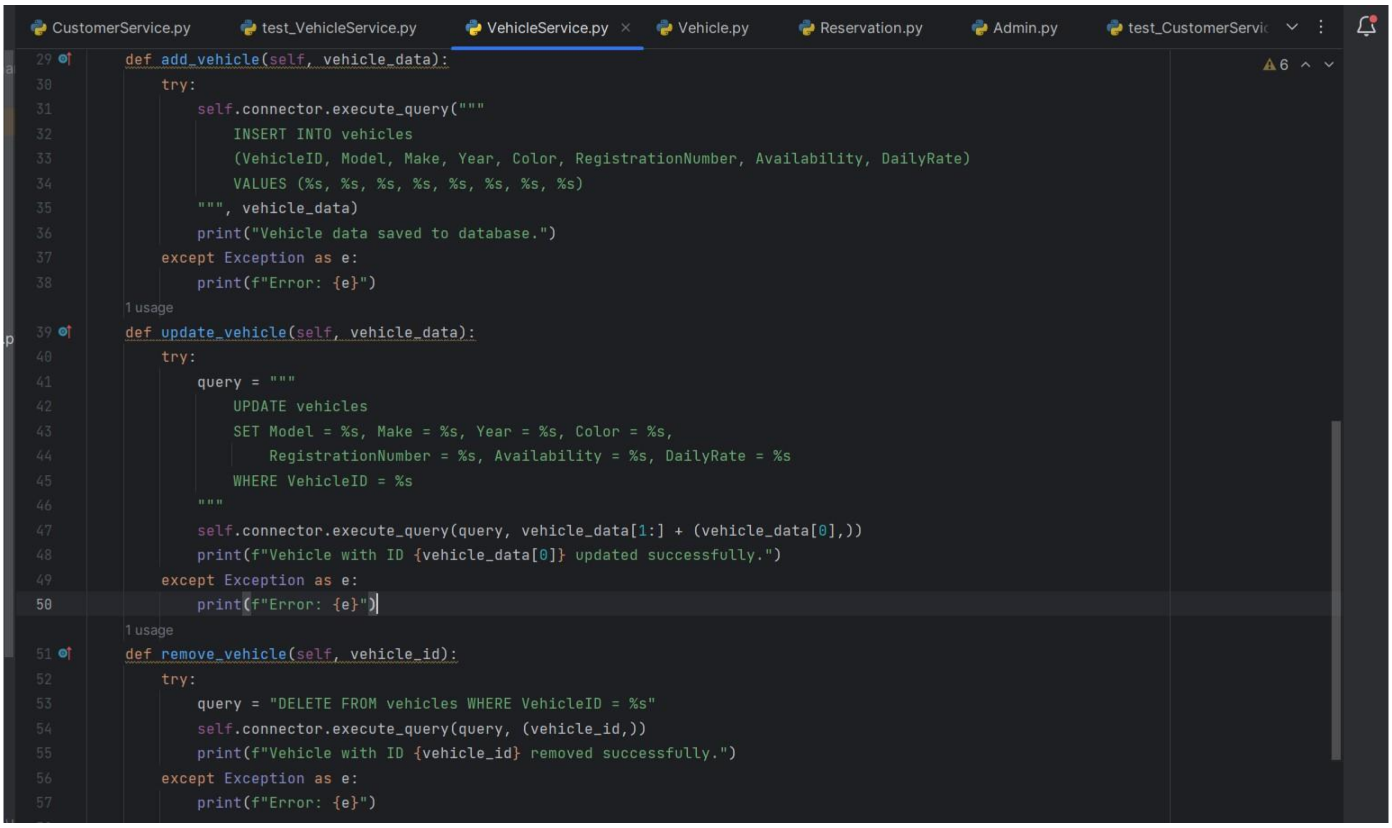
```python
                updated_customer["FirstName"],
                updated_customer["LastName"],
                updated_customer.get("Email", ""),
                updated_customer.get("PhoneNumber", ""),
                updated_customer.get("Address", ""),
                updated_customer["Password"],
                updated_customer.get("RegistrationDate", str(existing_customer.RegistrationDate)),
                customer_id,
            )
            self.db_context.execute_query(query, params)
        except InvalidInputException as iie:
            raise iie
        except Exception as e:
            raise DatabaseConnectionException(str(e))
    def delete_customer(self, customer_id):
        try:
            reservations = self.connector.execute_query("SELECT * FROM reservations WHERE CustomerID = %s",(customer_id,), fetch_all=True)
            if reservations:
                for reservation in reservations:
                    reservation_id = reservation[0]
                    self.connector.execute_query("DELETE FROM reservations WHERE ReservationID = %s", (reservation_id,))
            self.connector.execute_query("DELETE FROM customers WHERE CustomerID = %s", (customer_id,))
            print(f"Customer with ID {customer_id} deleted successfully.")
        except Exception as e:
            print(f"Error: {e}")
```

VehicleService (implements IVehicleService):

- Methods: GetVehicleById, GetAvailableVehicles, AddVehicle, UpdateVehicle, RemoveVehicle



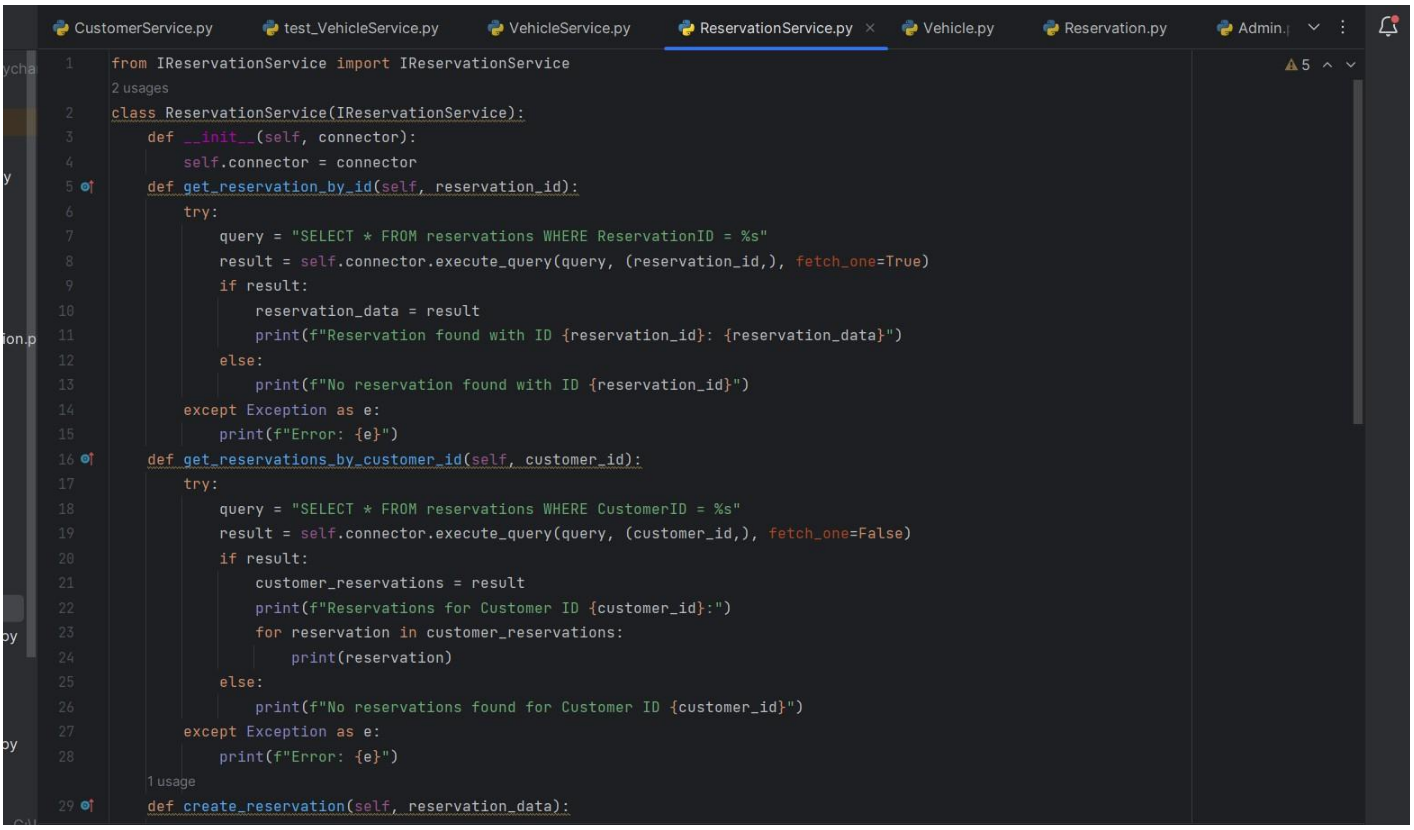
```python
from IVehicleService import IVehicleService

class VehicleService(IVehicleService):
    def __init__(self, connector):
        self.connector = connector
    def get_vehicle_by_id(self, vehicle_id):
        try:
            query = "SELECT * FROM vehicles WHERE VehicleID = %s"
            result = self.connector.execute_query(query, (vehicle_id,), fetch_one=True)
            if result:
                vehicle_data = result
                print(f"Vehicle found with ID {vehicle_id}: {vehicle_data}")
            else:
                print(f"No vehicle found with ID {vehicle_id}")
        except Exception as e:
            print(f"Error: {e}")

    def get_available_vehicles(self):
        try:
            query = "SELECT * FROM vehicles WHERE Availability = 'Available'"
            result = self.connector.execute_query(query, fetch_one=False)
            if result:
                available_vehicles = result
                print("Available Vehicles:")
                for vehicle in available_vehicles:
                    print(vehicle)
            else:
                print("No available vehicles.")
        except Exception as e:
            print(f"Error: {e}")
```



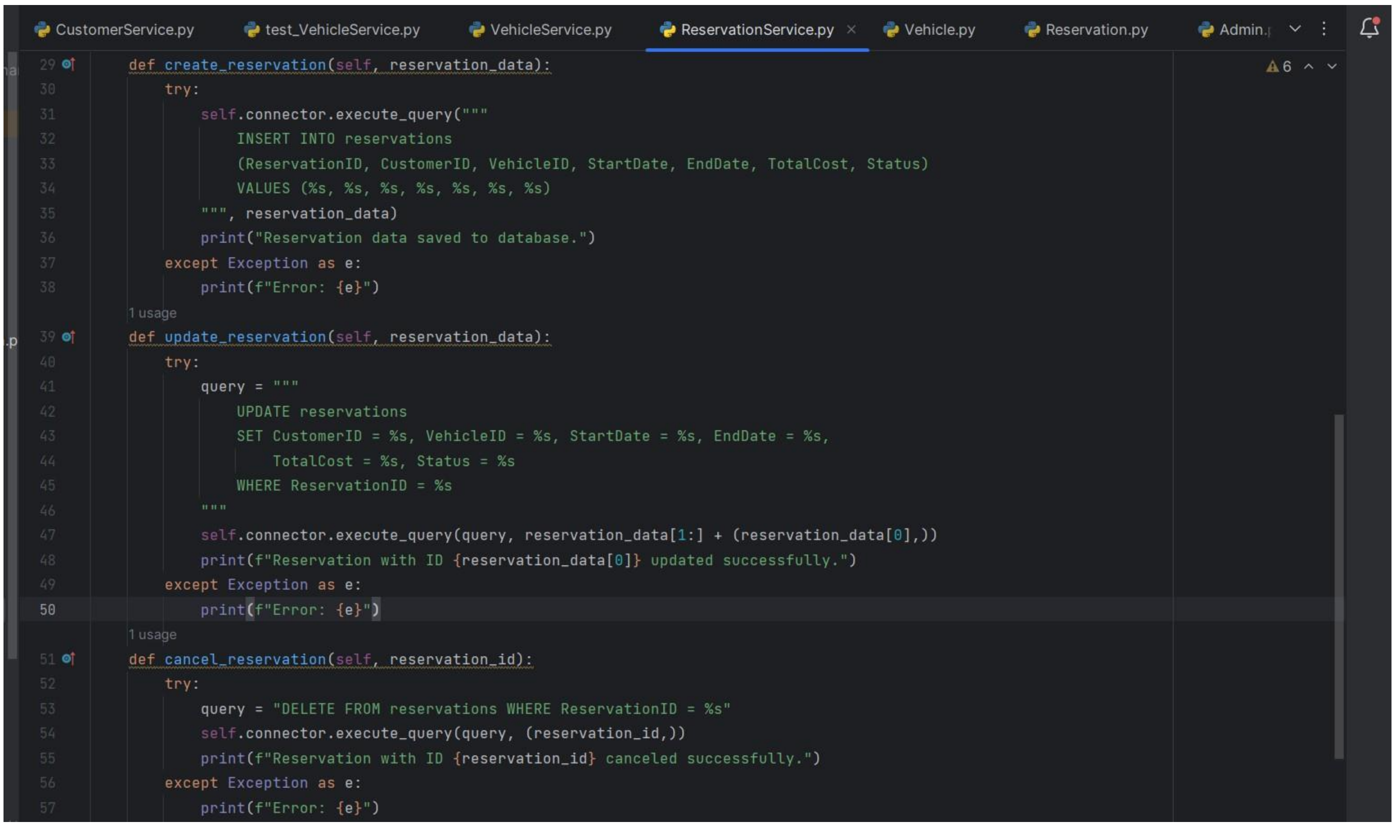
```python
    def add_vehicle(self, vehicle_data):
        try:
            self.connector.execute_query("""
                INSERT INTO vehicles
                (VehicleID, Model, Make, Year, Color, RegistrationNumber, Availability, DailyRate)
                VALUES (%s, %s, %s, %s, %s, %s, %s, %s)
            """, vehicle_data)
            print("Vehicle data saved to database.")
        except Exception as e:
            print(f"Error: {e}")

    def update_vehicle(self, vehicle_data):
        try:
            query = """
                UPDATE vehicles
                SET Model = %s, Make = %s, Year = %s, Color = %s,
                    RegistrationNumber = %s, Availability = %s, DailyRate = %s
                WHERE VehicleID = %s
            """
            self.connector.execute_query(query, vehicle_data[1:] + (vehicle_data[0],))
            print(f"Vehicle with ID {vehicle_data[0]} updated successfully.")
        except Exception as e:
            print(f"Error: {e}")

    def remove_vehicle(self, vehicle_id):
        try:
            query = "DELETE FROM vehicles WHERE VehicleID = %s"
            self.connector.execute_query(query, (vehicle_id,))
            print(f"Vehicle with ID {vehicle_id} removed successfully.")
        except Exception as e:
            print(f"Error: {e}")
```

ReservationService (implements IReservationService):

• Methods: GetReservationById, GetReservationsByCustomerId, CreateReservation, UpdateReservation, CancelReservation



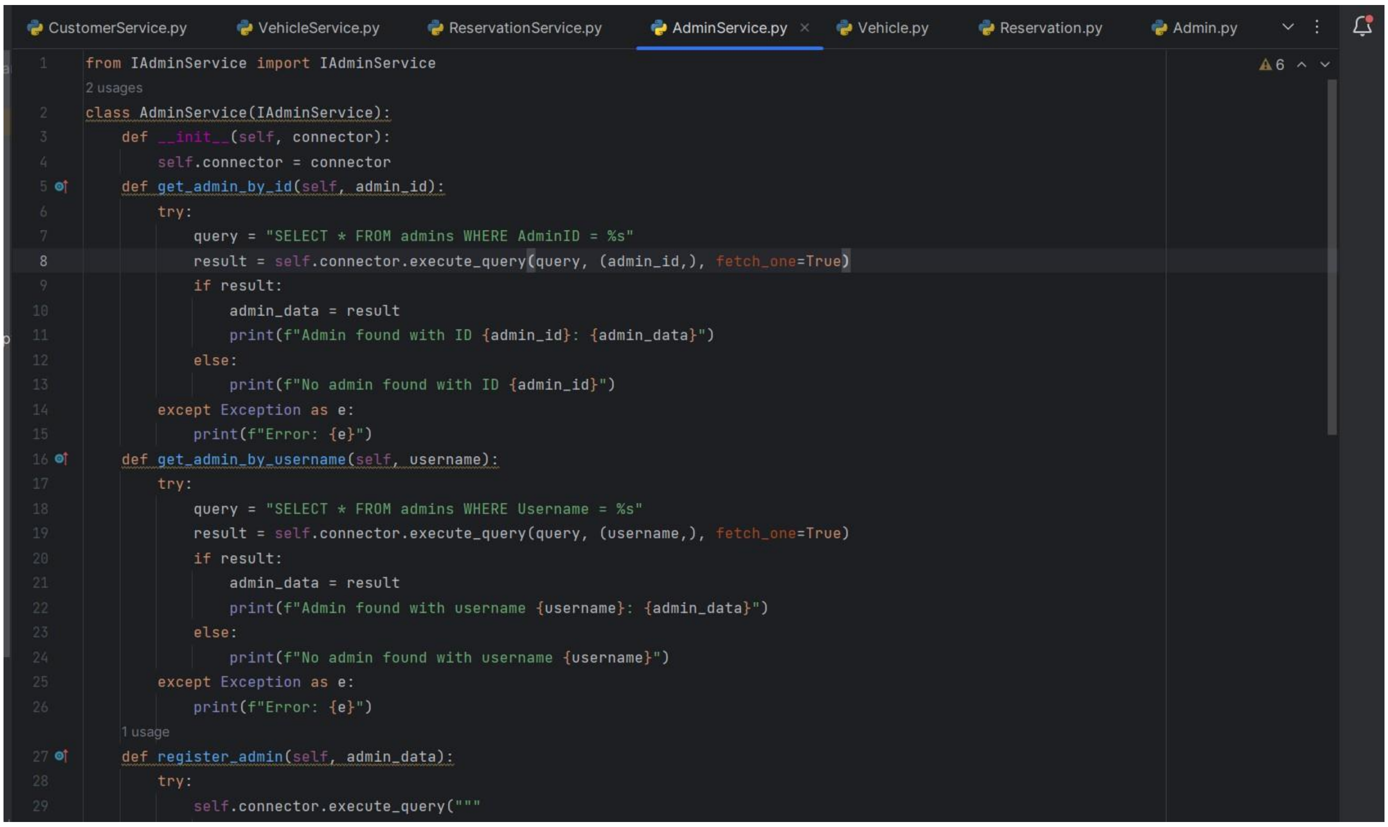
```python
from IReservationService import IReservationService
2 usages
class ReservationService(IReservationService):
    def __init__(self, connector):
        self.connector = connector
    def get_reservation_by_id(self, reservation_id):
        try:
            query = "SELECT * FROM reservations WHERE ReservationID = %s"
            result = self.connector.execute_query(query, (reservation_id,), fetch_one=True)
            if result:
                reservation_data = result
                print(f"Reservation found with ID {reservation_id}: {reservation_data}")
            else:
                print(f"No reservation found with ID {reservation_id}")
        except Exception as e:
            print(f"Error: {e}")
    def get_reservations_by_customer_id(self, customer_id):
        try:
            query = "SELECT * FROM reservations WHERE CustomerID = %s"
            result = self.connector.execute_query(query, (customer_id,), fetch_one=False)
            if result:
                customer_reservations = result
                print(f"Reservations for Customer ID {customer_id}:")
                for reservation in customer_reservations:
                    print(reservation)
            else:
                print(f"No reservations found for Customer ID {customer_id}")
        except Exception as e:
            print(f"Error: {e}")
    1 usage
    def create_reservation(self, reservation_data):
```



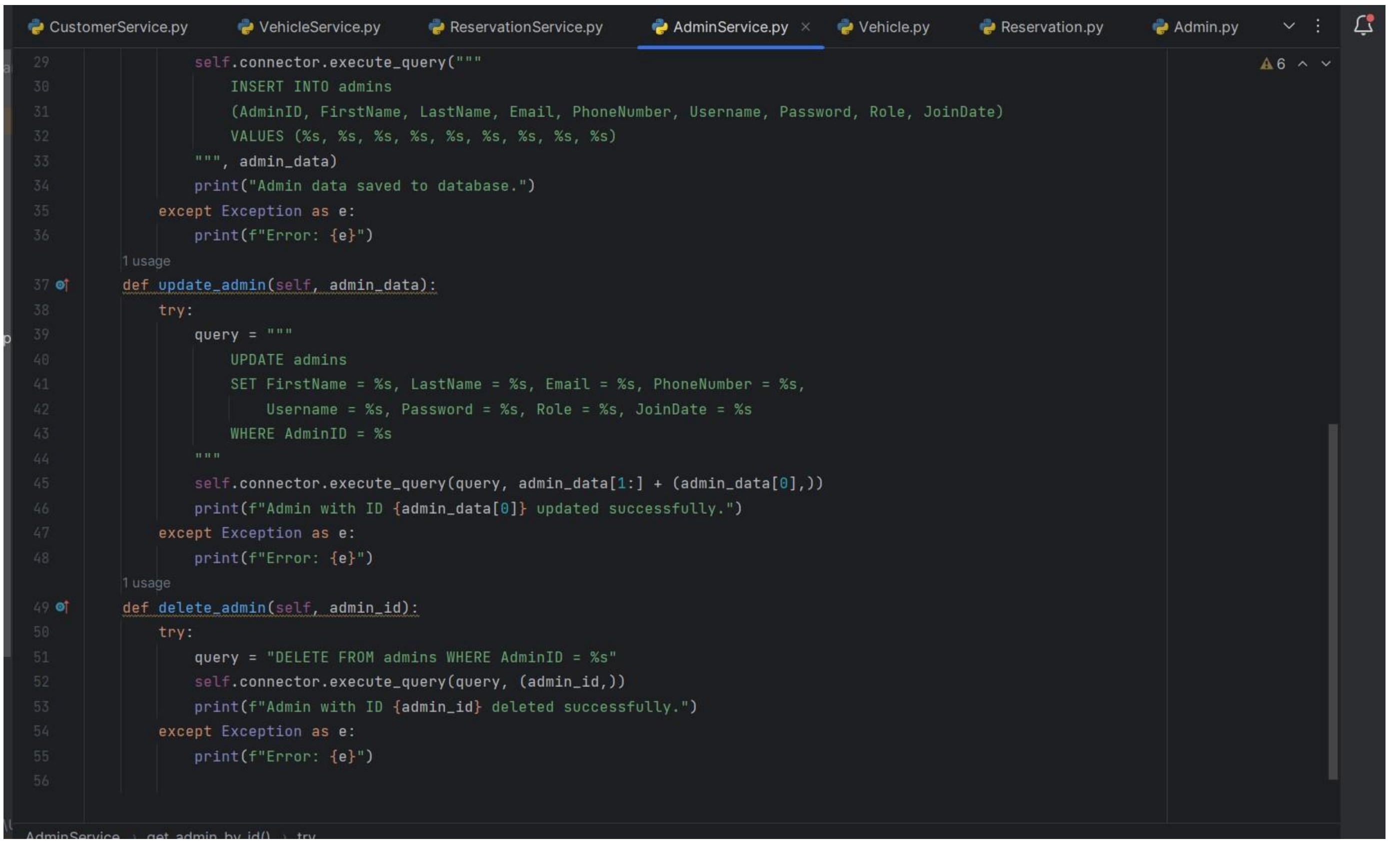
```python
    def create_reservation(self, reservation_data):
        try:
            self.connector.execute_query("""
                INSERT INTO reservations
                (ReservationID, CustomerID, VehicleID, StartDate, EndDate, TotalCost, Status)
                VALUES (%s, %s, %s, %s, %s, %s, %s)
            """, reservation_data)
            print("Reservation data saved to database.")
        except Exception as e:
            print(f"Error: {e}")
    1 usage
    def update_reservation(self, reservation_data):
        try:
            query = """
                UPDATE reservations
                SET CustomerID = %s, VehicleID = %s, StartDate = %s, EndDate = %s,
                    TotalCost = %s, Status = %s
                WHERE ReservationID = %s
            """
            self.connector.execute_query(query, reservation_data[1:] + (reservation_data[0],))
            print(f"Reservation with ID {reservation_data[0]} updated successfully.")
        except Exception as e:
            print(f"Error: {e}")
    1 usage
    def cancel_reservation(self, reservation_id):
        try:
            query = "DELETE FROM reservations WHERE ReservationID = %s"
            self.connector.execute_query(query, (reservation_id,))
            print(f"Reservation with ID {reservation_id} canceled successfully.")
        except Exception as e:
            print(f"Error: {e}")
```

AdminService (implements IAdminService):

• Methods: GetAdminById, GetAdminByUsername, RegisterAdmin, UpdateAdmin, DeleteAdmin



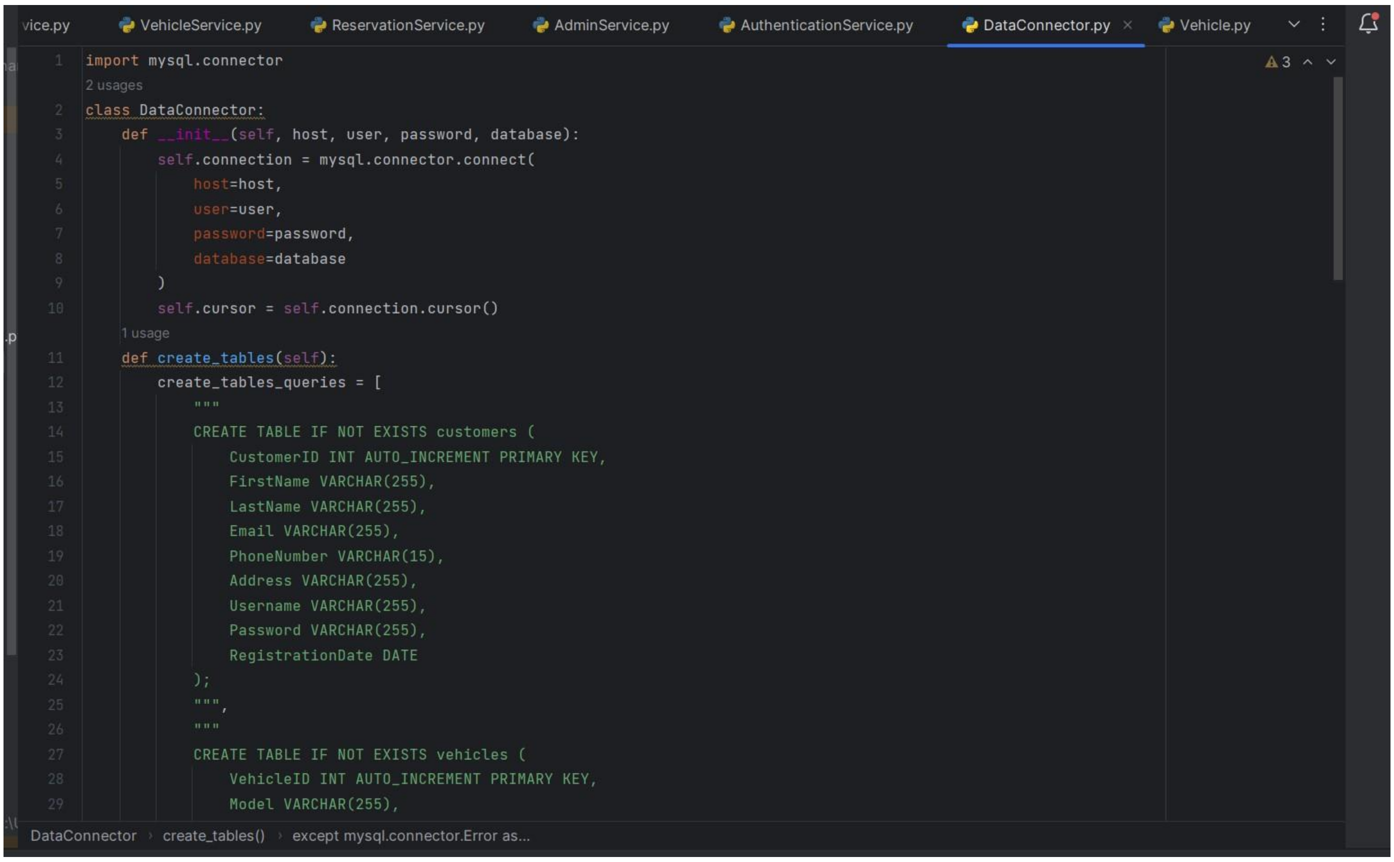
```python
from IAdminService import IAdminService
class AdminService(IAdminService):
    def __init__(self, connector):
        self.connector = connector
    def get_admin_by_id(self, admin_id):
        try:
            query = "SELECT * FROM admins WHERE AdminID = %s"
            result = self.connector.execute_query(query, (admin_id,), fetch_one=True)
            if result:
                admin_data = result
                print(f"Admin found with ID {admin_id}: {admin_data}")
            else:
                print(f"No admin found with ID {admin_id}")
        except Exception as e:
            print(f"Error: {e}")
    def get_admin_by_username(self, username):
        try:
            query = "SELECT * FROM admins WHERE Username = %s"
            result = self.connector.execute_query(query, (username,), fetch_one=True)
            if result:
                admin_data = result
                print(f"Admin found with username {username}: {admin_data}")
            else:
                print(f"No admin found with username {username}")
        except Exception as e:
            print(f"Error: {e}")
    def register_admin(self, admin_data):
        try:
            self.connector.execute_query("""
```



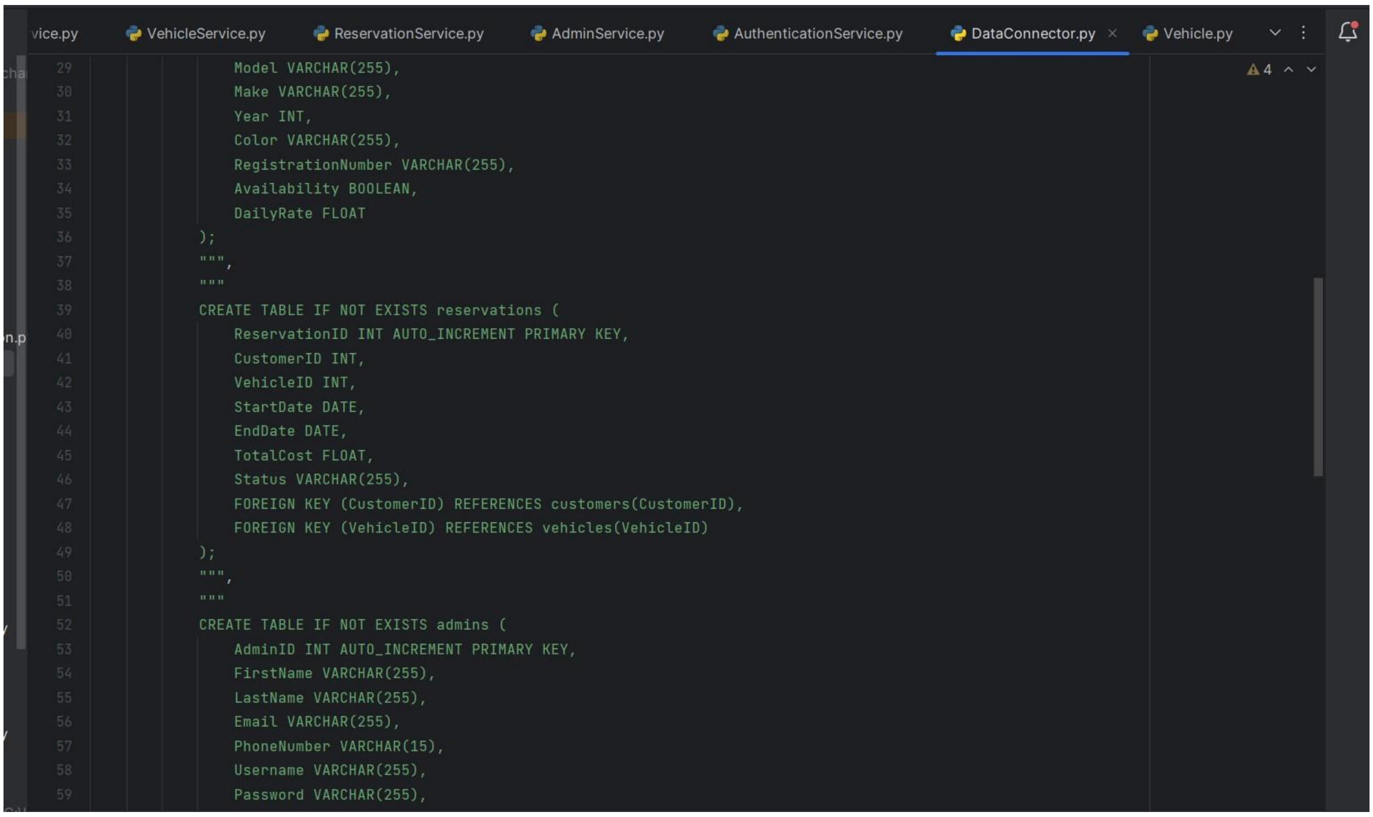
```python
            self.connector.execute_query("""
                INSERT INTO admins
                (AdminID, FirstName, LastName, Email, PhoneNumber, Username, Password, Role, JoinDate)
                VALUES (%s, %s, %s, %s, %s, %s, %s, %s, %s)
            """, admin_data)
            print("Admin data saved to database.")
        except Exception as e:
            print(f"Error: {e}")
    def update_admin(self, admin_data):
        try:
            query = """
                UPDATE admins
                SET FirstName = %s, LastName = %s, Email = %s, PhoneNumber = %s,
                    Username = %s, Password = %s, Role = %s, JoinDate = %s
                WHERE AdminID = %s
            """
            self.connector.execute_query(query, admin_data[1:] + (admin_data[0],))
            print(f"Admin with ID {admin_data[0]} updated successfully.")
        except Exception as e:
            print(f"Error: {e}")
    def delete_admin(self, admin_id):
        try:
            query = "DELETE FROM admins WHERE AdminID = %s"
            self.connector.execute_query(query, (admin_id,))
            print(f"Admin with ID {admin_id} deleted successfully.")
        except Exception as e:
            print(f"Error: {e}")
```

DatabaseConnector:

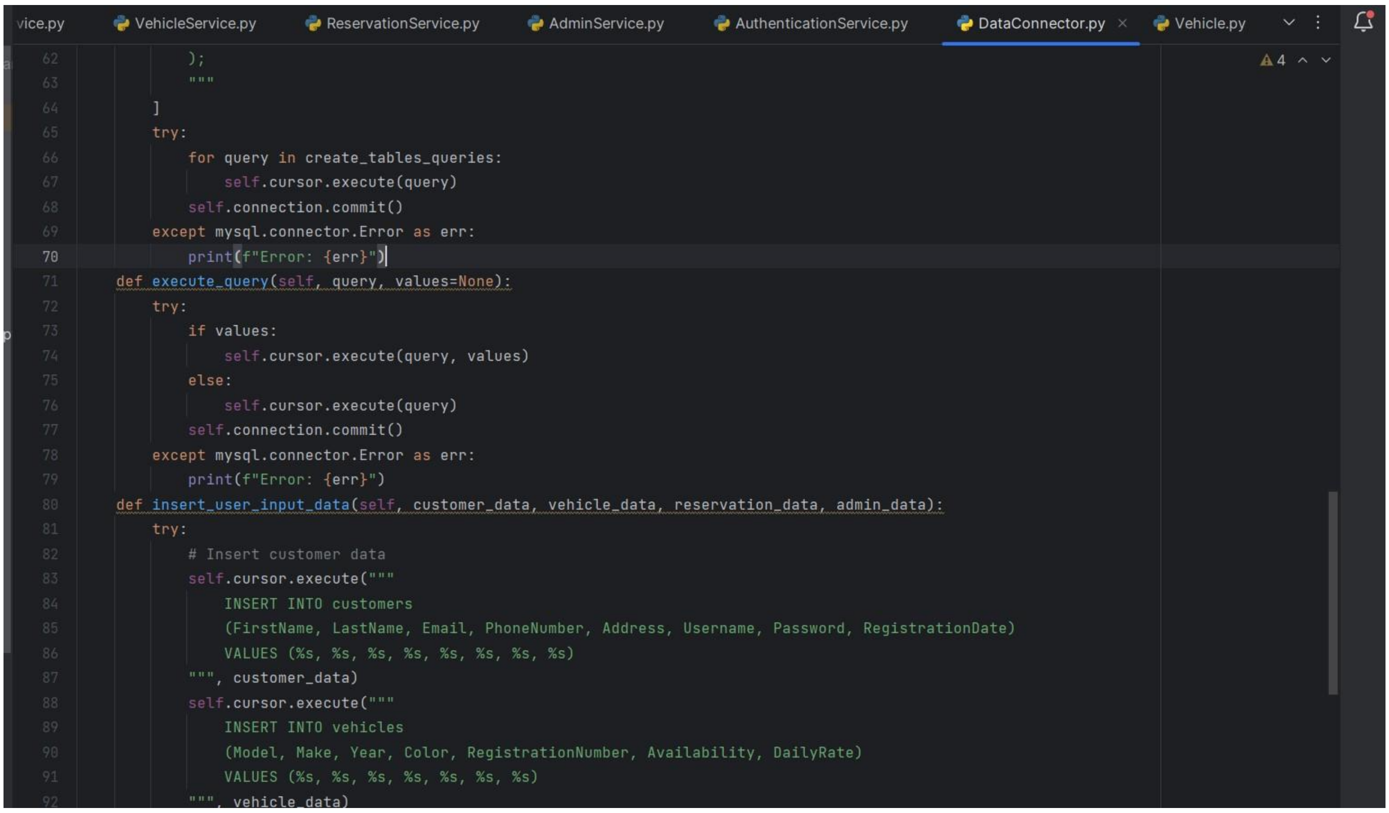
- A class responsible for handling database connections and interactions.



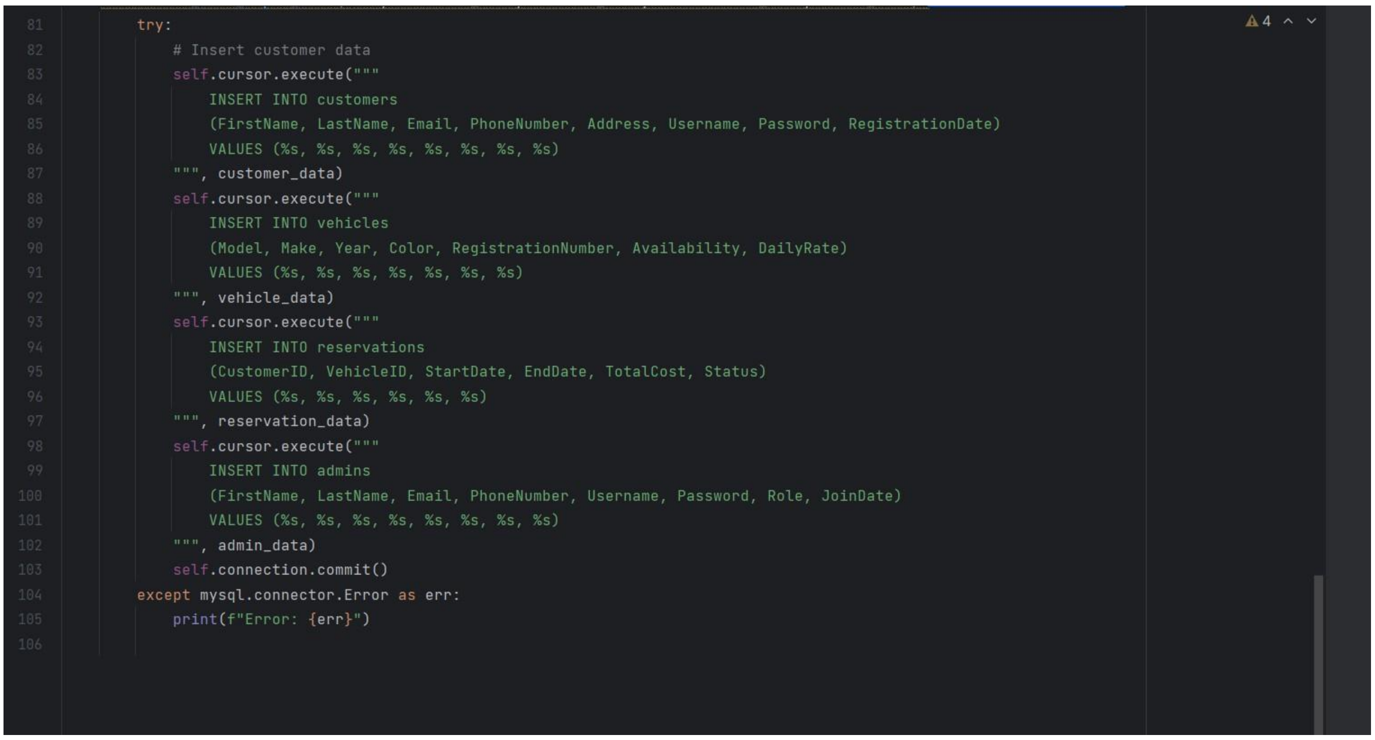
```python
import mysql.connector
2 usages
class DataConnector:
    def __init__(self, host, user, password, database):
        self.connection = mysql.connector.connect(
            host=host,
            user=user,
            password=password,
            database=database
        )
        self.cursor = self.connection.cursor()
    1 usage
    def create_tables(self):
        create_tables_queries = [
            """
            CREATE TABLE IF NOT EXISTS customers (
                CustomerID INT AUTO_INCREMENT PRIMARY KEY,
                FirstName VARCHAR(255),
                LastName VARCHAR(255),
                Email VARCHAR(255),
                PhoneNumber VARCHAR(15),
                Address VARCHAR(255),
                Username VARCHAR(255),
                Password VARCHAR(255),
                RegistrationDate DATE
            );
            """,
            """
            CREATE TABLE IF NOT EXISTS vehicles (
                VehicleID INT AUTO_INCREMENT PRIMARY KEY,
                Model VARCHAR(255),
```



```python
                Model VARCHAR(255),
                Make VARCHAR(255),
                Year INT,
                Color VARCHAR(255),
                RegistrationNumber VARCHAR(255),
                Availability BOOLEAN,
                DailyRate FLOAT
            );
            """,
            """
            CREATE TABLE IF NOT EXISTS reservations (
                ReservationID INT AUTO_INCREMENT PRIMARY KEY,
                CustomerID INT,
                VehicleID INT,
                StartDate DATE,
                EndDate DATE,
                TotalCost FLOAT,
                Status VARCHAR(255),
                FOREIGN KEY (CustomerID) REFERENCES customers(CustomerID),
                FOREIGN KEY (VehicleID) REFERENCES vehicles(VehicleID)
            );
            """,
            """
            CREATE TABLE IF NOT EXISTS admins (
                AdminID INT AUTO_INCREMENT PRIMARY KEY,
                FirstName VARCHAR(255),
                LastName VARCHAR(255),
                Email VARCHAR(255),
                PhoneNumber VARCHAR(15),
                Username VARCHAR(255),
                Password VARCHAR(255),
```

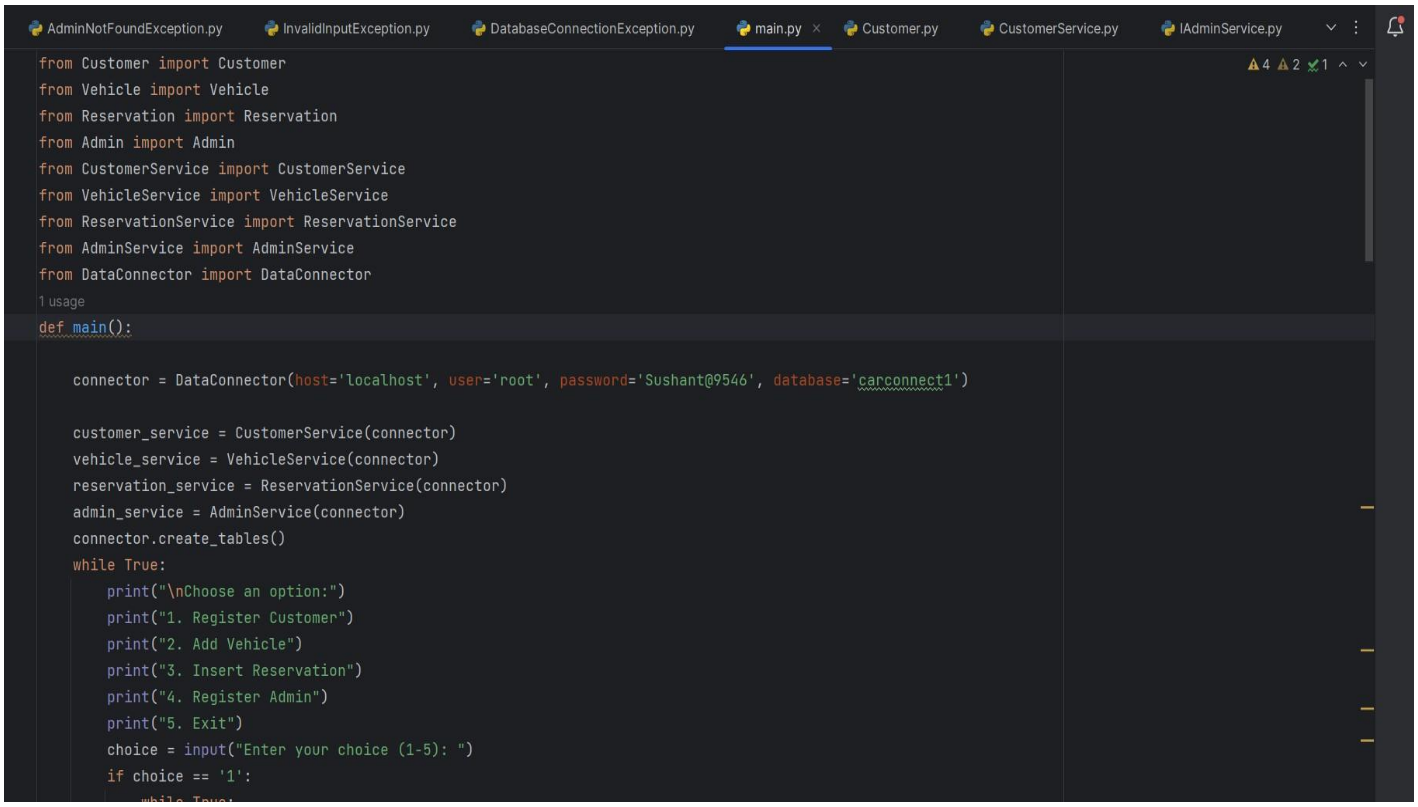


```python
            );
            """
        ]
        try:
            for query in create_tables_queries:
                self.cursor.execute(query)
            self.connection.commit()
        except mysql.connector.Error as err:
            print(f"Error: {err}")
    def execute_query(self, query, values=None):
        try:
            if values:
                self.cursor.execute(query, values)
            else:
                self.cursor.execute(query)
            self.connection.commit()
        except mysql.connector.Error as err:
            print(f"Error: {err}")
    def insert_user_input_data(self, customer_data, vehicle_data, reservation_data, admin_data):
        try:
            # Insert customer data
            self.cursor.execute("""
                INSERT INTO customers
                (FirstName, LastName, Email, PhoneNumber, Address, Username, Password, RegistrationDate)
                VALUES (%s, %s, %s, %s, %s, %s, %s, %s)
            """, customer_data)
            self.cursor.execute("""
                INSERT INTO vehicles
                (Model, Make, Year, Color, RegistrationNumber, Availability, DailyRate)
                VALUES (%s, %s, %s, %s, %s, %s, %s)
            """, vehicle_data)
```

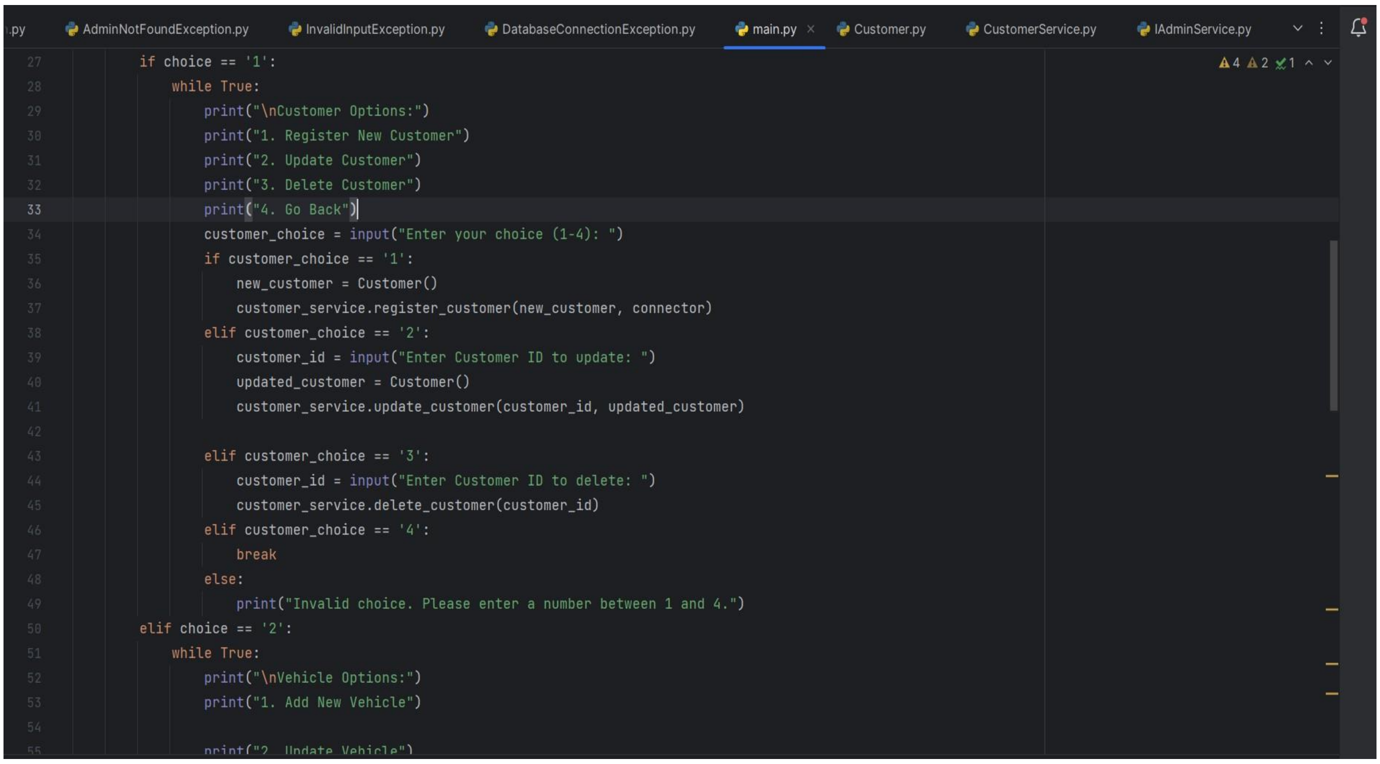


```python
        try:
            # Insert customer data
            self.cursor.execute("""
                INSERT INTO customers
                (FirstName, LastName, Email, PhoneNumber, Address, Username, Password, RegistrationDate)
                VALUES (%s, %s, %s, %s, %s, %s, %s, %s)
            """, customer_data)
            self.cursor.execute("""
                INSERT INTO vehicles
                (Model, Make, Year, Color, RegistrationNumber, Availability, DailyRate)
                VALUES (%s, %s, %s, %s, %s, %s, %s)
            """, vehicle_data)
            self.cursor.execute("""
                INSERT INTO reservations
                (CustomerID, VehicleID, StartDate, EndDate, TotalCost, Status)
                VALUES (%s, %s, %s, %s, %s, %s)
            """, reservation_data)
            self.cursor.execute("""
                INSERT INTO admins
                (FirstName, LastName, Email, PhoneNumber, Username, Password, Role, JoinDate)
                VALUES (%s, %s, %s, %s, %s, %s, %s, %s)
            """, admin_data)
            self.connection.commit()
        except mysql.connector.Error as err:
            print(f"Error: {err}")

```

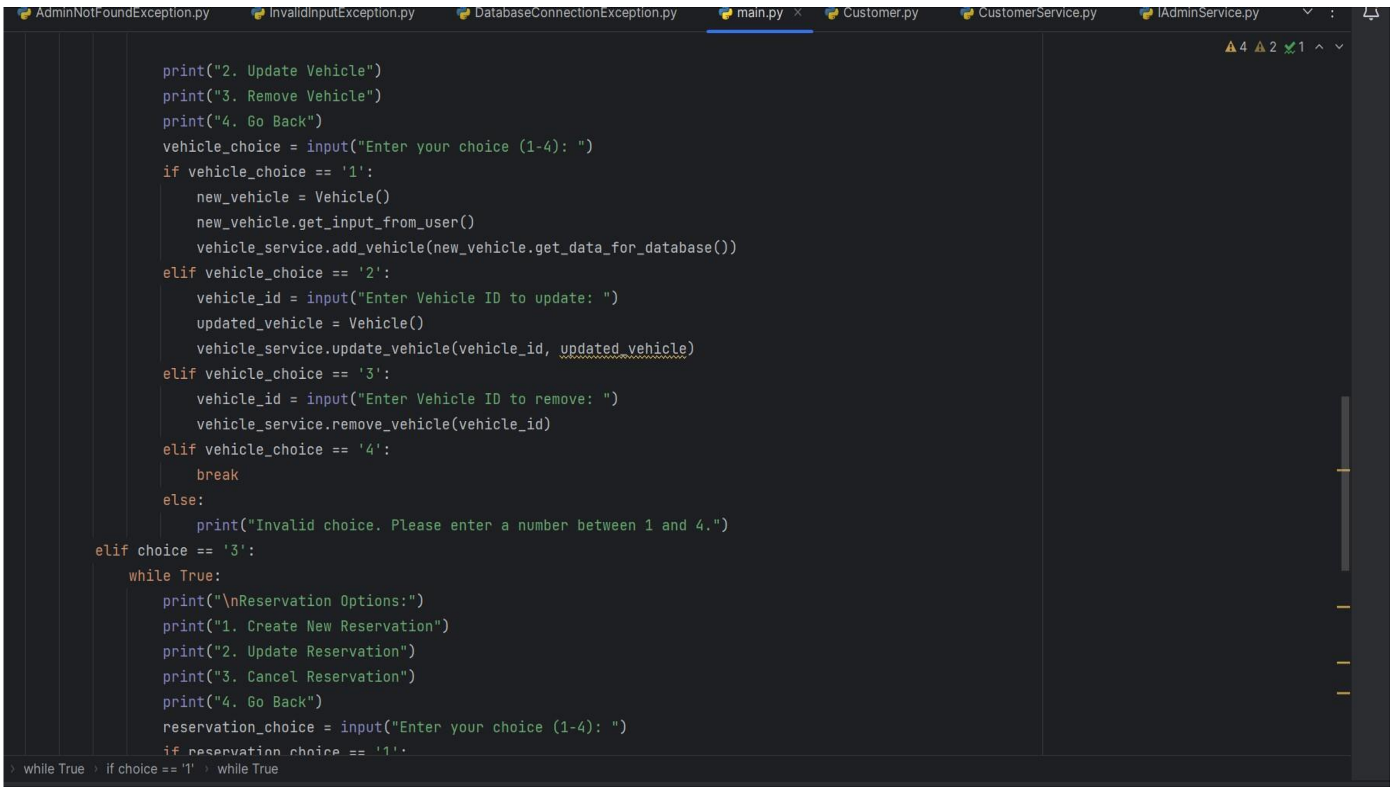
Main.py Class



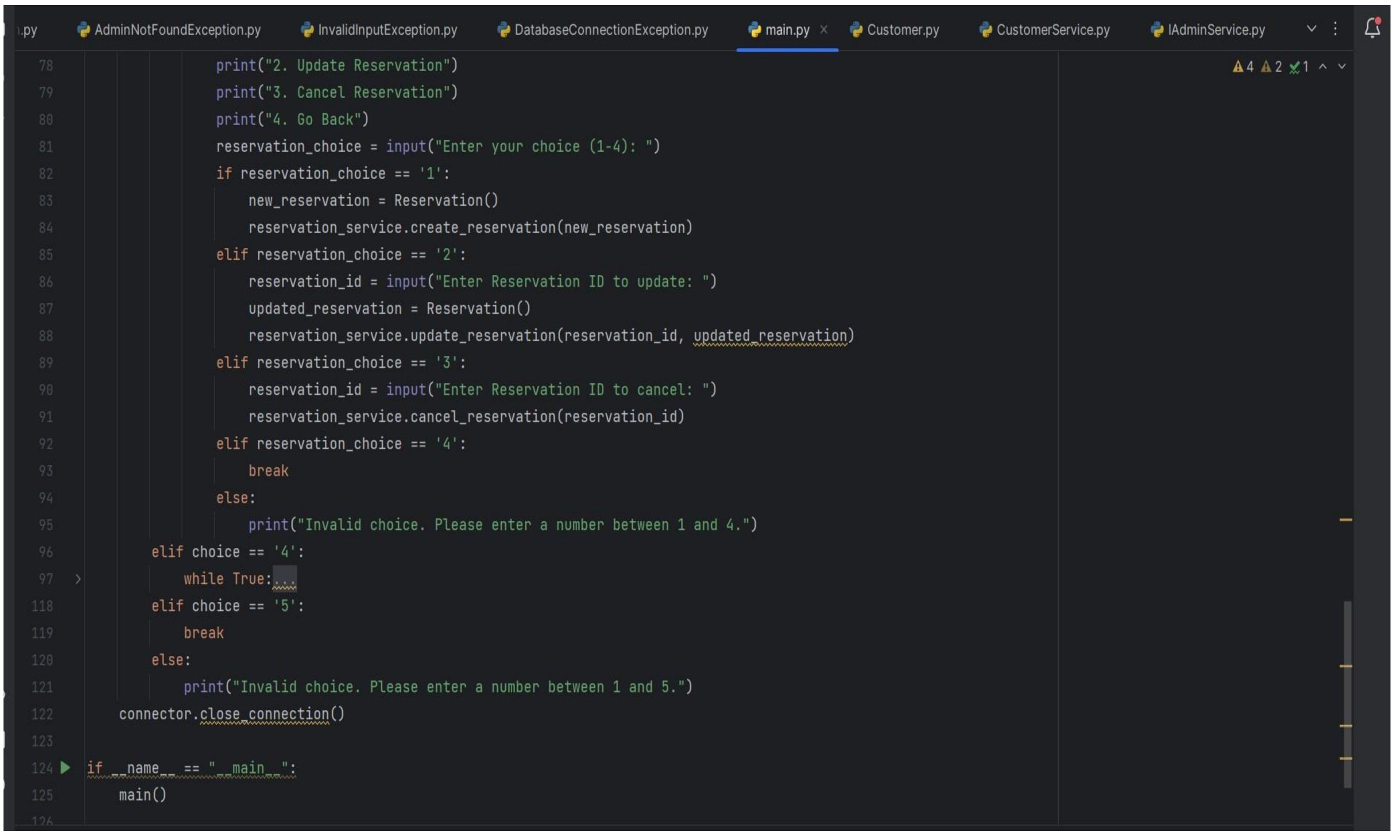
```python
from Customer import Customer
from Vehicle import Vehicle
from Reservation import Reservation
from Admin import Admin
from CustomerService import CustomerService
from VehicleService import VehicleService
from ReservationService import ReservationService
from AdminService import AdminService
from DataConnector import DataConnector
def main():

    connector = DataConnector(host='localhost', user='root', password='Sushant@9546', database='carconnect1')

    customer_service = CustomerService(connector)
    vehicle_service = VehicleService(connector)
    reservation_service = ReservationService(connector)
    admin_service = AdminService(connector)
    connector.create_tables()
    while True:
        print("\nChoose an option:")
        print("1. Register Customer")
        print("2. Add Vehicle")
        print("3. Insert Reservation")
        print("4. Register Admin")
        print("5. Exit")
        choice = input("Enter your choice (1-5): ")
        if choice == '1':
            while True:
```



```python
        if choice == '1':
            while True:
                print("\nCustomer Options:")
                print("1. Register New Customer")
                print("2. Update Customer")
                print("3. Delete Customer")
                print("4. Go Back")
                customer_choice = input("Enter your choice (1-4): ")
                if customer_choice == '1':
                    new_customer = Customer()
                    customer_service.register_customer(new_customer, connector)
                elif customer_choice == '2':
                    customer_id = input("Enter Customer ID to update: ")
                    updated_customer = Customer()
                    customer_service.update_customer(customer_id, updated_customer)

                elif customer_choice == '3':
                    customer_id = input("Enter Customer ID to delete: ")
                    customer_service.delete_customer(customer_id)
                elif customer_choice == '4':
                    break
                else:
                    print("Invalid choice. Please enter a number between 1 and 4.")
        elif choice == '2':
            while True:
                print("\nVehicle Options:")
                print("1. Add New Vehicle")

                print("2. Update Vehicle")
```


AdminNotFoundException.py
InvalidInputException.py
DatabaseConnectionException.py
main.py
Customer.py
CustomerService.py
IAdminService.py
while True › if choice == '1' › while True

```python
                print("2. Update Vehicle")
                print("3. Remove Vehicle")
                print("4. Go Back")
                vehicle_choice = input("Enter your choice (1-4): ")
                if vehicle_choice == '1':
                    new_vehicle = Vehicle()
                    new_vehicle.get_input_from_user()
                    vehicle_service.add_vehicle(new_vehicle.get_data_for_database())
                elif vehicle_choice == '2':
                    vehicle_id = input("Enter Vehicle ID to update: ")
                    updated_vehicle = Vehicle()
                    vehicle_service.update_vehicle(vehicle_id, updated_vehicle)
                elif vehicle_choice == '3':
                    vehicle_id = input("Enter Vehicle ID to remove: ")
                    vehicle_service.remove_vehicle(vehicle_id)
                elif vehicle_choice == '4':
                    break
                else:
                    print("Invalid choice. Please enter a number between 1 and 4.")
        elif choice == '3':
            while True:
                print("\nReservation Options:")
                print("1. Create New Reservation")
                print("2. Update Reservation")
                print("3. Cancel Reservation")
                print("4. Go Back")
                reservation_choice = input("Enter your choice (1-4): ")
                if reservation_choice == '1':
```



```python
                print("2. Update Reservation")
                print("3. Cancel Reservation")
                print("4. Go Back")
                reservation_choice = input("Enter your choice (1-4): ")
                if reservation_choice == '1':
                    new_reservation = Reservation()
                    reservation_service.create_reservation(new_reservation)
                elif reservation_choice == '2':
                    reservation_id = input("Enter Reservation ID to update: ")
                    updated_reservation = Reservation()
                    reservation_service.update_reservation(reservation_id, updated_reservation)
                elif reservation_choice == '3':
                    reservation_id = input("Enter Reservation ID to cancel: ")
                    reservation_service.cancel_reservation(reservation_id)
                elif reservation_choice == '4':
                    break
                else:
                    print("Invalid choice. Please enter a number between 1 and 4.")
        elif choice == '4':
            while True:...
        elif choice == '5':
            break
        else:
            print("Invalid choice. Please enter a number between 1 and 5.")
    connector.close_connection()

if __name__ == "__main__":
    main()
```

Interfaces:

ICustomerService:

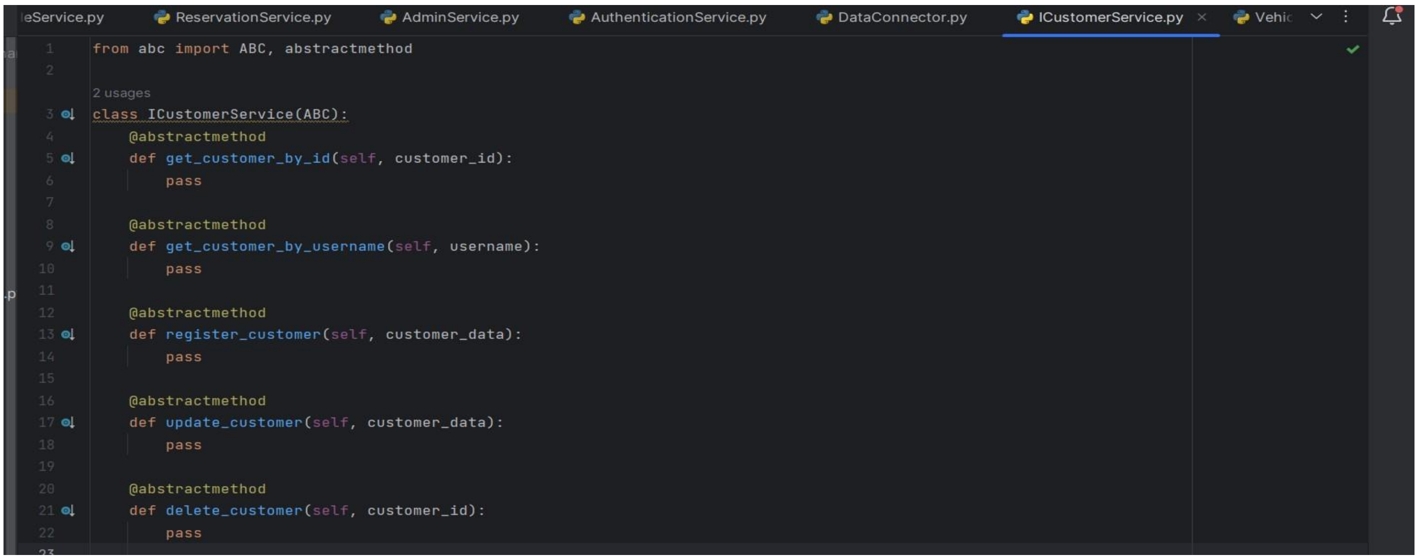
• GetCustomerById(customerId)

• GetCustomerByUsername(username)

• RegisterCustomer(customerData)

• UpdateCustomer(customerData)

• DeleteCustomer(customerId)



```python
from abc import ABC, abstractmethod

2 usages
class ICustomerService(ABC):
    @abstractmethod
    def get_customer_by_id(self, customer_id):
        pass

    @abstractmethod
    def get_customer_by_username(self, username):
        pass

    @abstractmethod
    def register_customer(self, customer_data):
        pass

    @abstractmethod
    def update_customer(self, customer_data):
        pass

    @abstractmethod
    def delete_customer(self, customer_id):
        pass
```

IVehicleService:

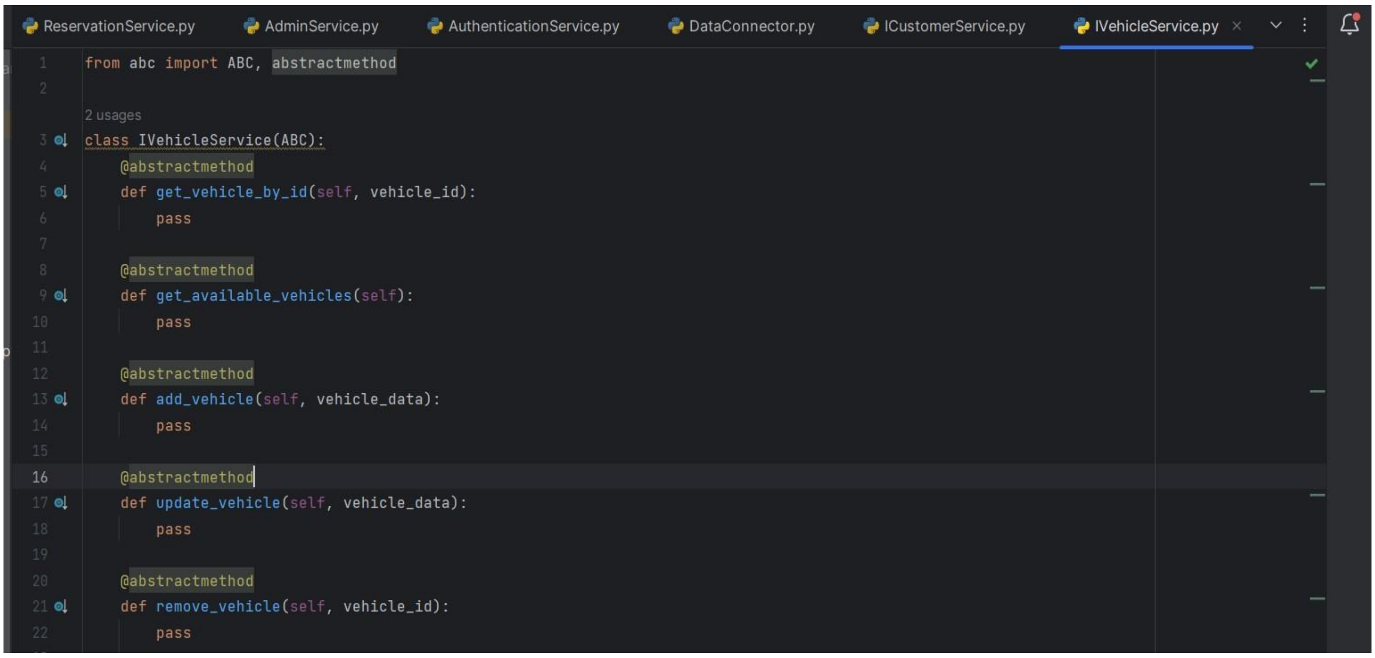
• GetVehicleById(vehicleId)

• GetAvailableVehicles()

• AddVehicle(vehicleData)

• UpdateVehicle(vehicleData)

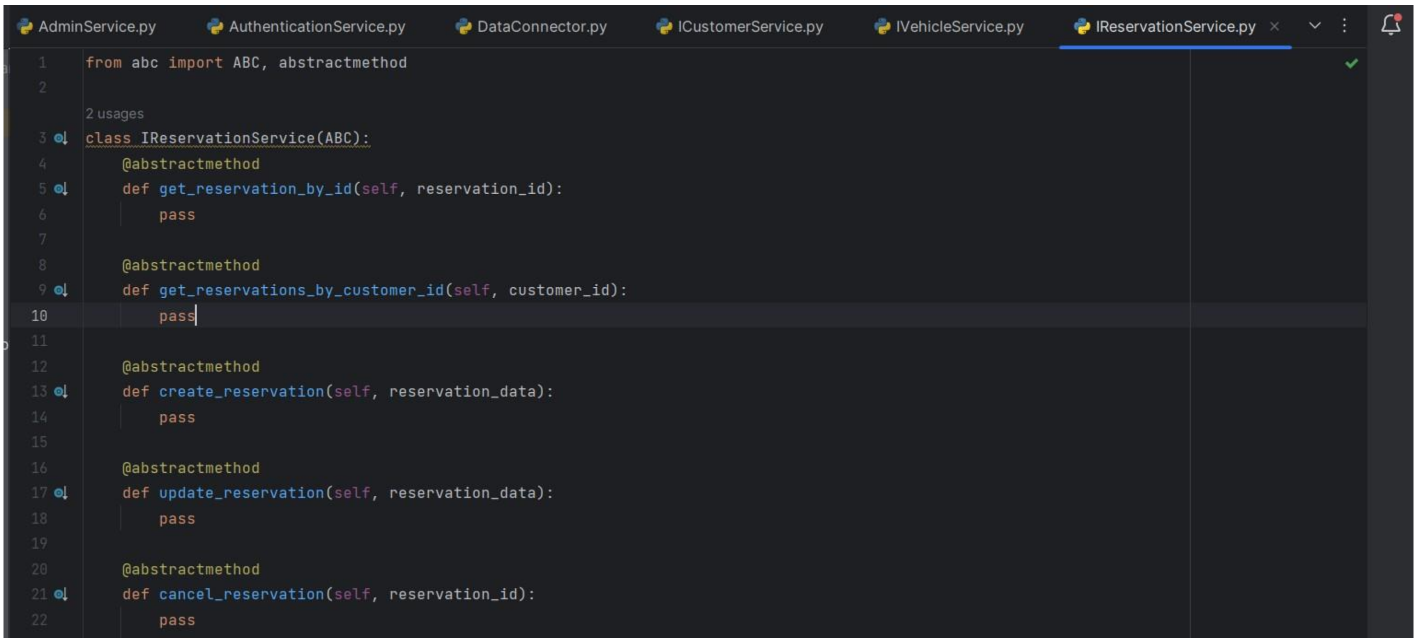
• RemoveVehicle(vehicleId)



```python
from abc import ABC, abstractmethod

2 usages
class IVehicleService(ABC):
    @abstractmethod
    def get_vehicle_by_id(self, vehicle_id):
        pass

    @abstractmethod
    def get_available_vehicles(self):
        pass

    @abstractmethod
    def add_vehicle(self, vehicle_data):
        pass

    @abstractmethod
    def update_vehicle(self, vehicle_data):
        pass

    @abstractmethod
    def remove_vehicle(self, vehicle_id):
        pass
```

IReservationService:

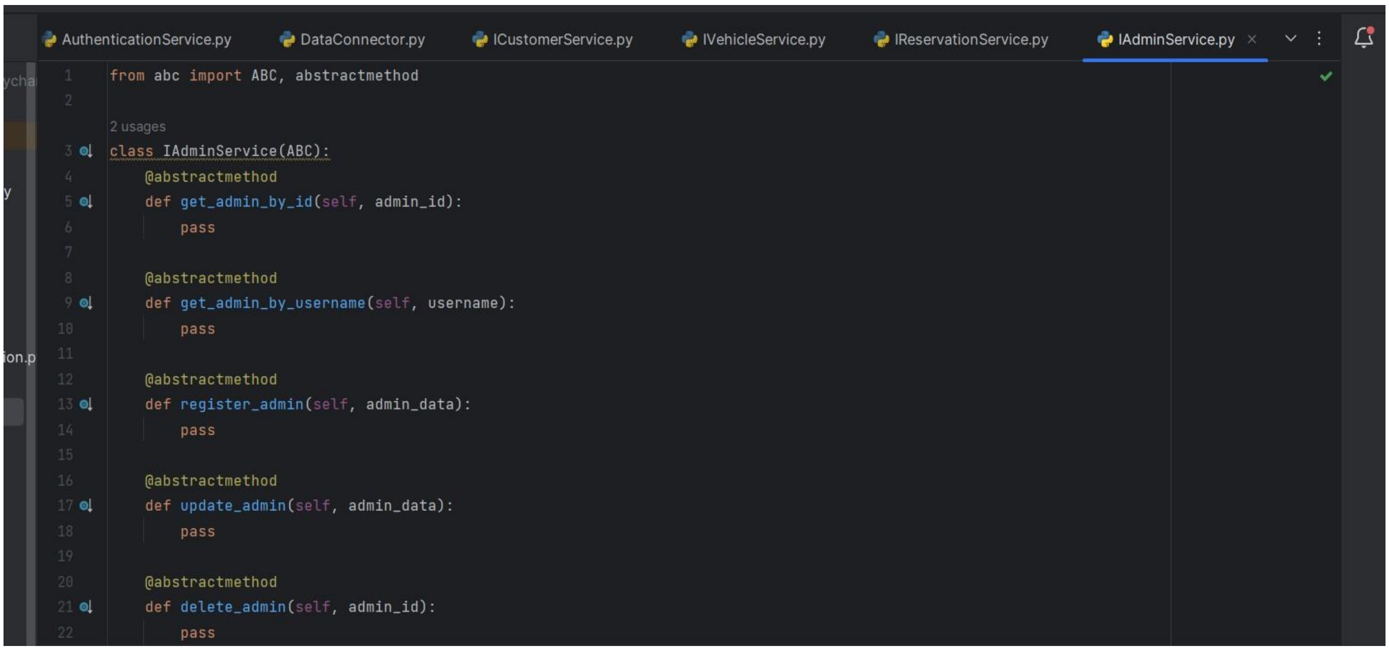
- GetReservationById(reservationId)
- GetReservationsByCustomerId(customerId)
- CreateReservation(reservationData)
- UpdateReservation(reservationData)
- CancelReservation(reservationId)


AdminService.py AuthenticationService.py DataConnector.py ICustomerService.py IVehicleService.py IReservationService.py

```python
from abc import ABC, abstractmethod

2 usages
class IReservationService(ABC):
    @abstractmethod
    def get_reservation_by_id(self, reservation_id):
        pass

    @abstractmethod
    def get_reservations_by_customer_id(self, customer_id):
        pass

    @abstractmethod
    def create_reservation(self, reservation_data):
        pass

    @abstractmethod
    def update_reservation(self, reservation_data):
        pass

    @abstractmethod
    def cancel_reservation(self, reservation_id):
        pass
```

IAdminService:

- GetAdminById(adminId)
- GetAdminByUsername(username)
- RegisterAdmin(adminData)
- UpdateAdmin(adminData)
- DeleteAdmin(adminId)


AuthenticationService.py DataConnector.py ICustomerService.py IVehicleService.py IReservationService.py IAdminService.py

```python
from abc import ABC, abstractmethod

2 usages
class IAdminService(ABC):
    @abstractmethod
    def get_admin_by_id(self, admin_id):
        pass

    @abstractmethod
    def get_admin_by_username(self, username):
        pass

    @abstractmethod
    def register_admin(self, admin_data):
        pass

    @abstractmethod
    def update_admin(self, admin_data):
        pass

    @abstractmethod
    def delete_admin(self, admin_id):
        pass
```

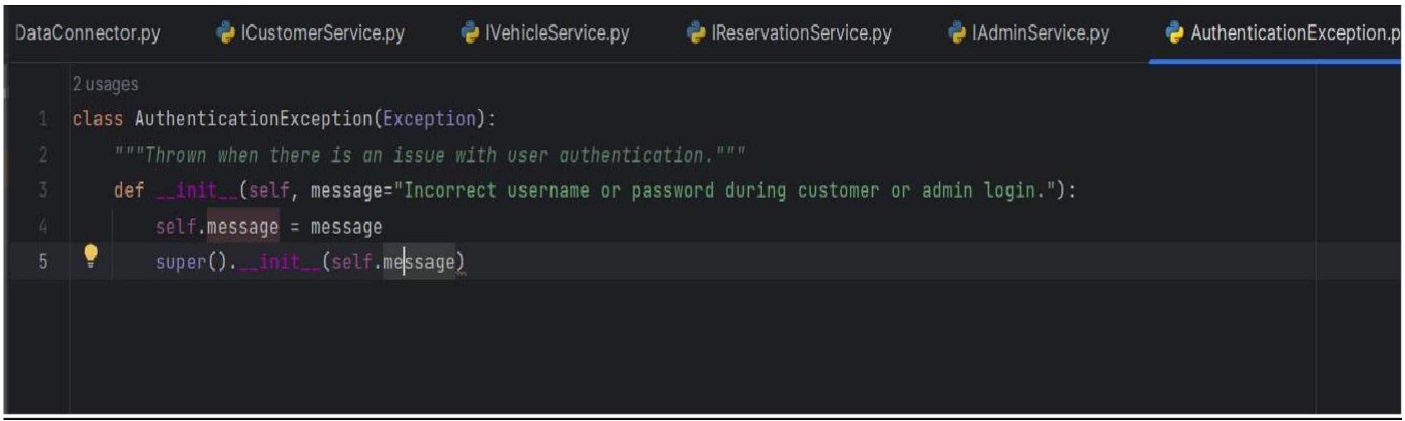
Custom Exceptions:

Note: Each and every exceptions is connected to there respective modules in different classes.

AuthenticationException:

• Thrown when there is an issue with user authentication.

• Example Usage: Incorrect username or password during customer or admin login.

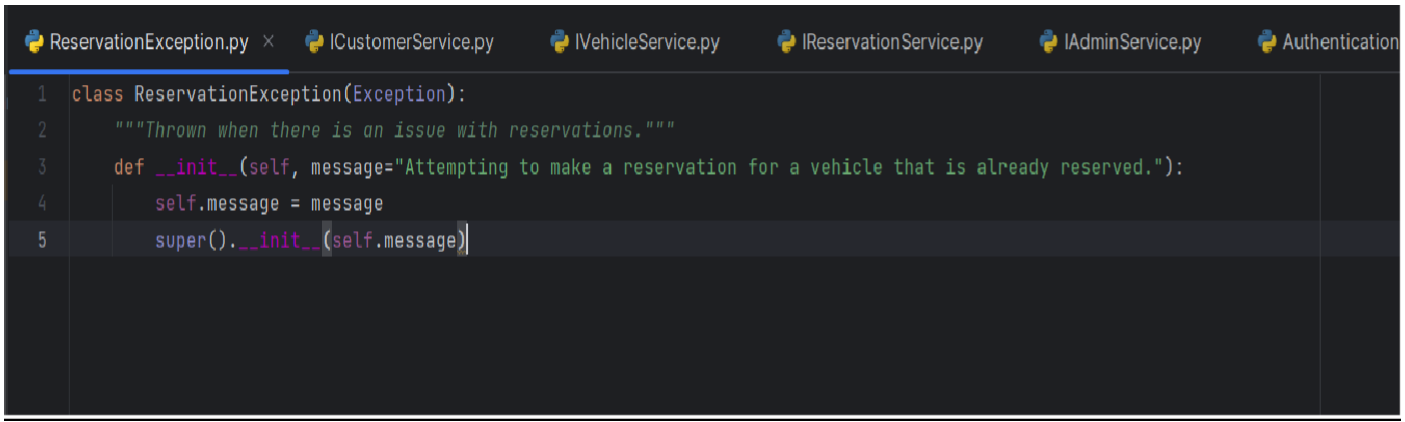


```python
class AuthenticationException(Exception):
    """Thrown when there is an issue with user authentication."""
    def __init__(self, message="Incorrect username or password during customer or admin login."):
        self.message = message
        super().__init__(self.message)
```

ReservationException:

• Thrown when there is an issue with reservations.

• Example Usage: Attempting to make a reservation for a vehicle that is already reserved.

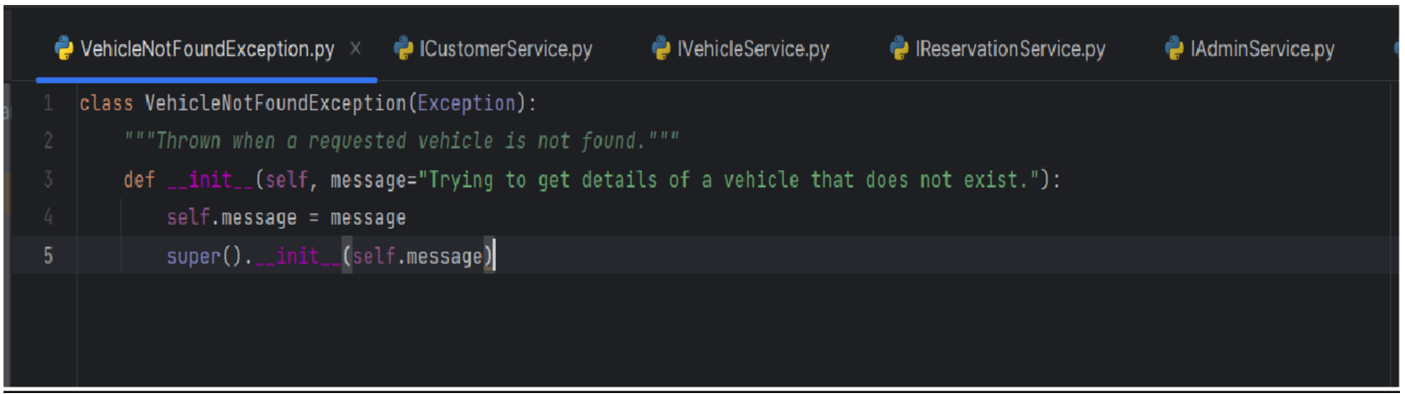


```python
class ReservationException(Exception):
    """Thrown when there is an issue with reservations."""
    def __init__(self, message="Attempting to make a reservation for a vehicle that is already reserved."):
        self.message = message
        super().__init__(self.message)
```

VehicleNotFoundException:

• Thrown when a requested vehicle is not found.

• Example Usage: Trying to get details of a vehicle that does not exist.

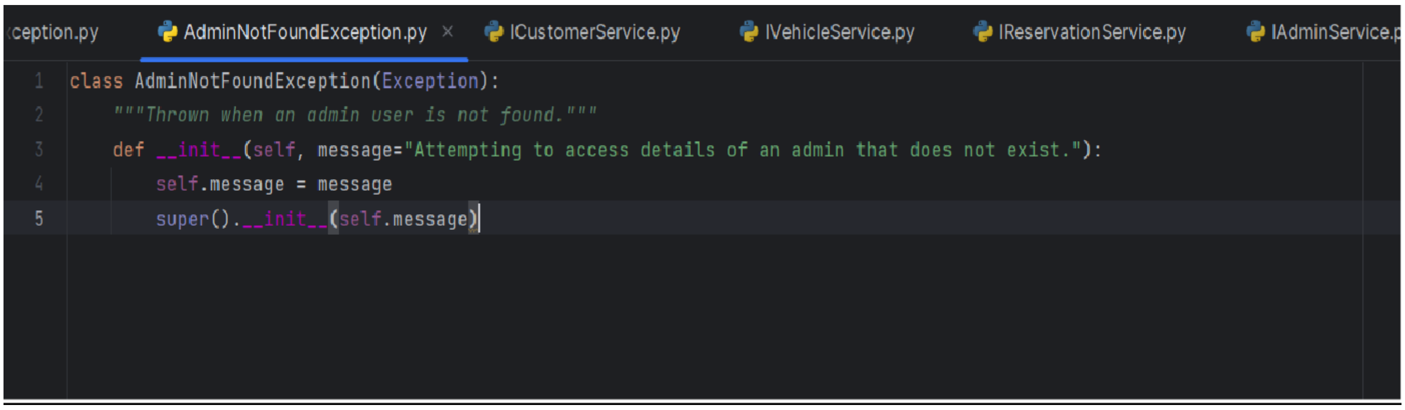


```python
class VehicleNotFoundException(Exception):
    """Thrown when a requested vehicle is not found."""
    def __init__(self, message="Trying to get details of a vehicle that does not exist."):
        self.message = message
        super().__init__(self.message)
```

AdminNotFoundException:

• Thrown when an admin user is not found.

• Example Usage: Attempting to access details of an admin that does not exist.

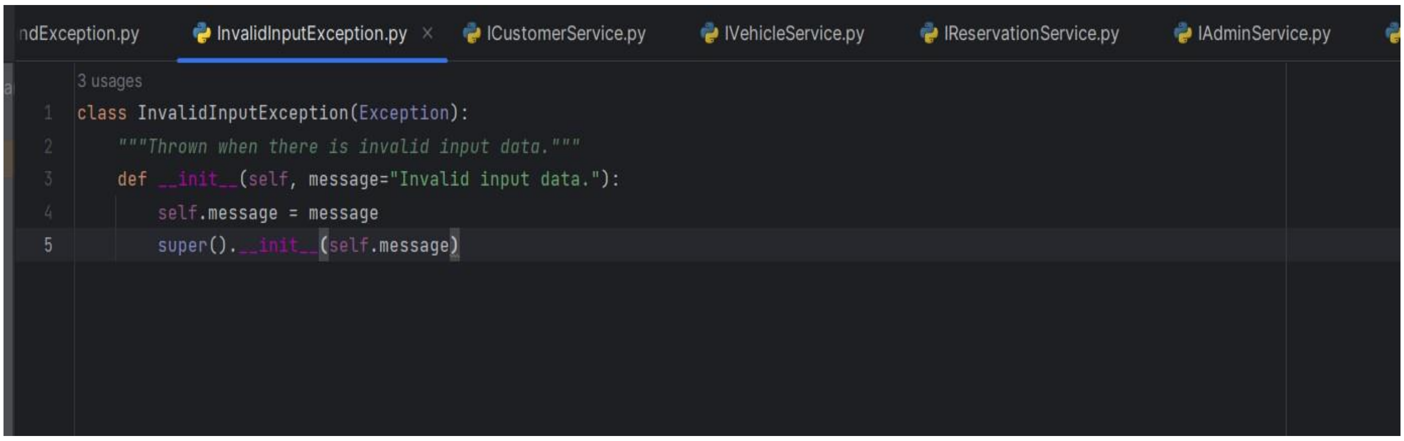


```python
class AdminNotFoundException(Exception):
    """Thrown when an admin user is not found."""
    def __init__(self, message="Attempting to access details of an admin that does not exist."):
        self.message = message
        super().__init__(self.message)
```

InvalidInputException:

• Thrown when there is invalid input data.

• Example Usage: When a required field is missing or has an incorrect format.

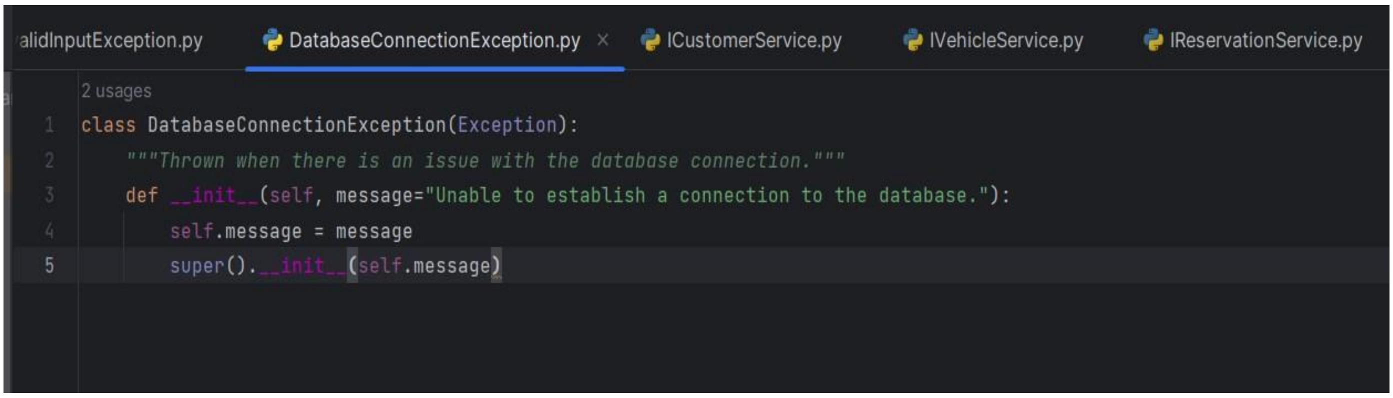


```python
class InvalidInputException(Exception):
    """Thrown when there is invalid input data."""
    def __init__(self, message="Invalid input data."):
        self.message = message
        super().__init__(self.message)
```

DatabaseConnectionException:

• Thrown when there is an issue with the database connection.

• Example Usage: Unable to establish a connection to the database.

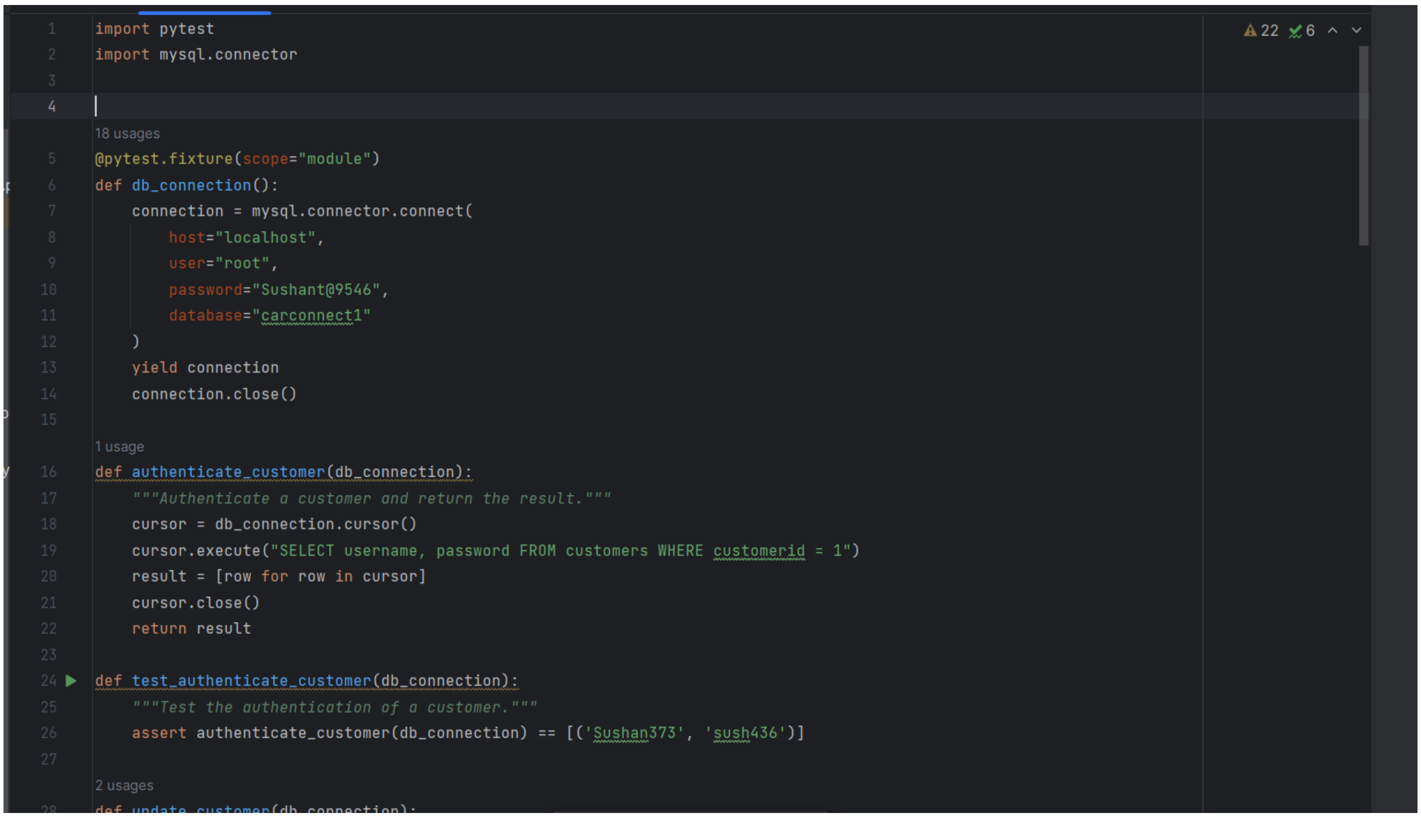


```python
class DatabaseConnectionException(Exception):
    """Thrown when there is an issue with the database connection."""
    def __init__(self, message="Unable to establish a connection to the database."):
        self.message = message
        super().__init__(self.message)
```

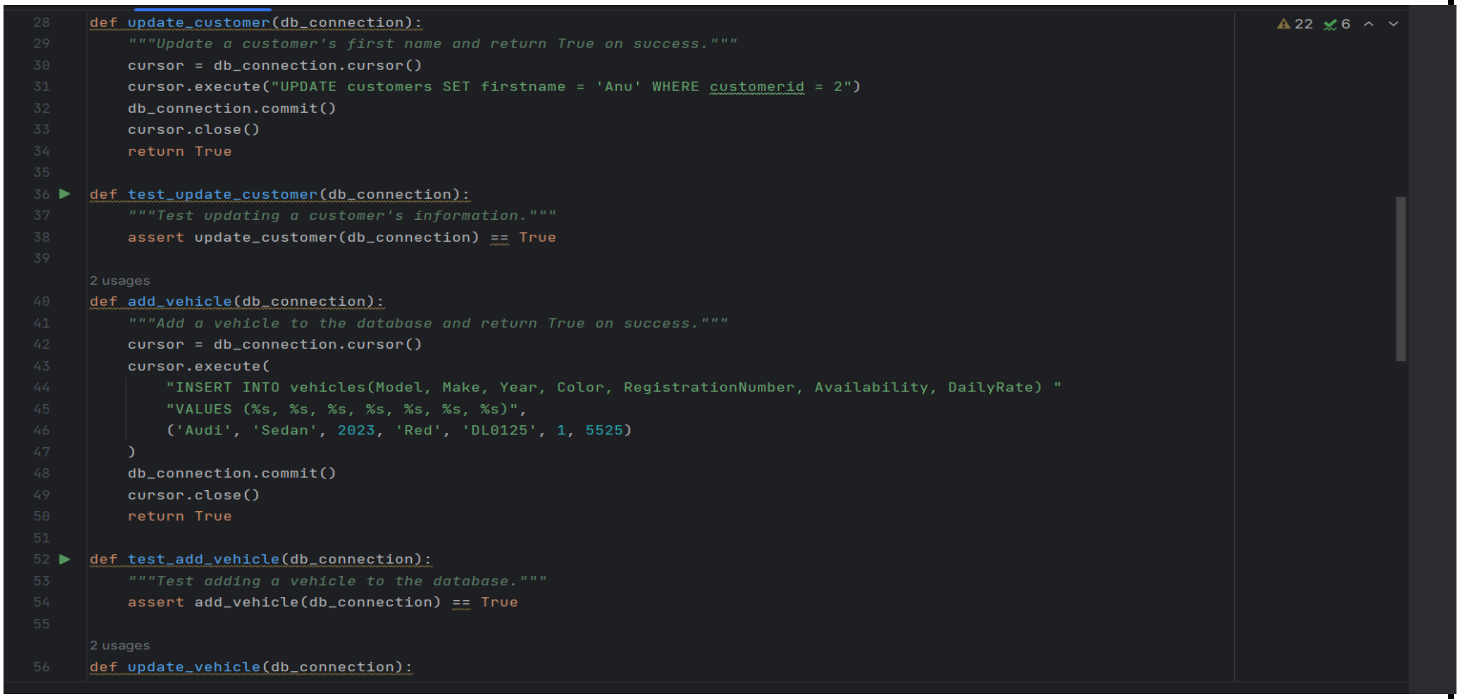
Unit Testing:

Create NUnit test cases for car rental System are essential to ensure the correctness and reliability of your system. Below are some example questions to guide the creation of NUnit test cases for various components of the system:

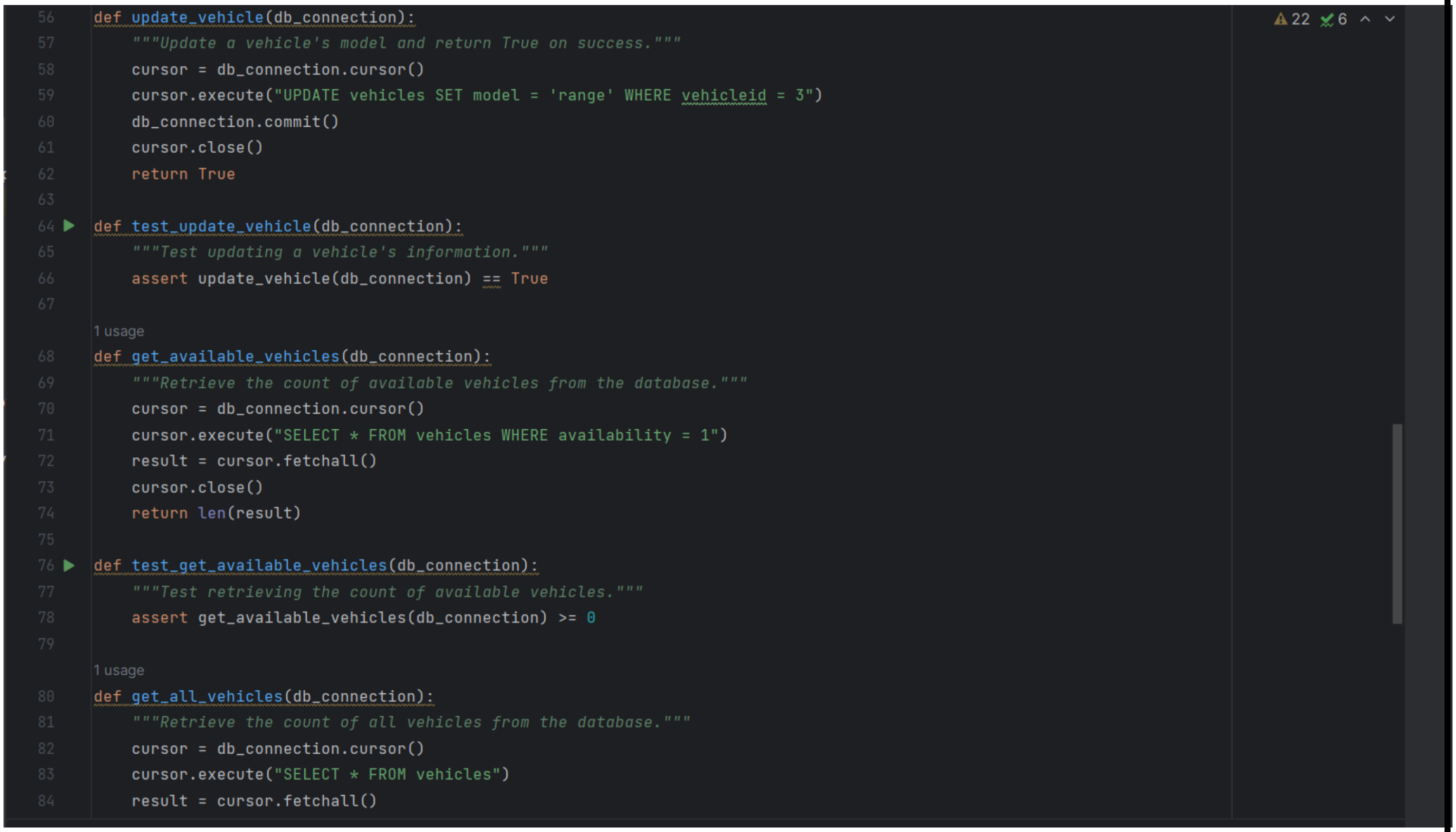
1. Test customer authentication with invalid credentials.
2. Test updating customer information.
3. Test adding a new vehicle.
4. Test updating vehicle details.
5. Test getting a list of available vehicles.
6. Test getting a list of all vehicles.



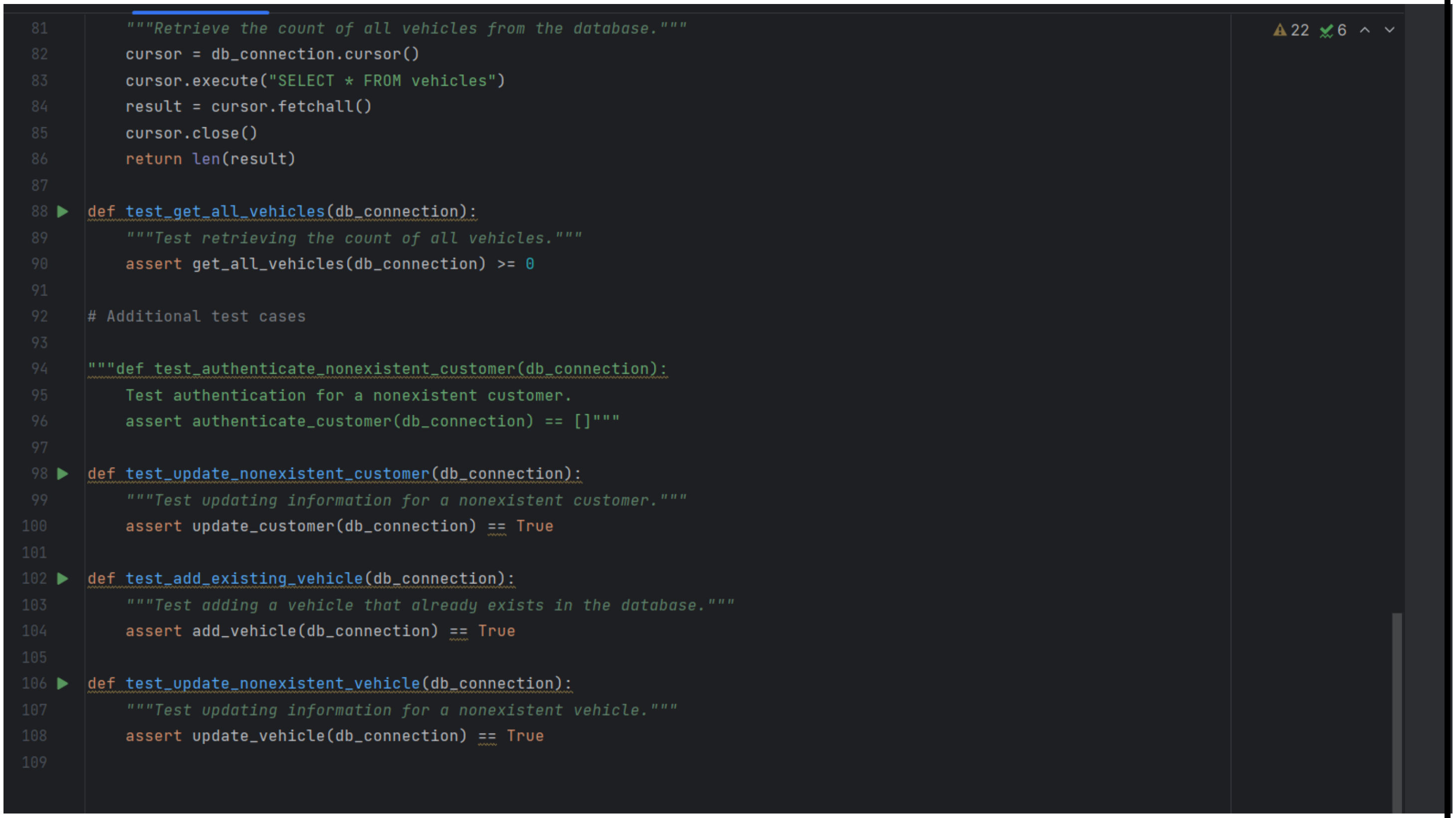
```python
import pytest
import mysql.connector


18 usages
@pytest.fixture(scope="module")
def db_connection():
    connection = mysql.connector.connect(
        host="localhost",
        user="root",
        password="Sushant@9546",
        database="carconnect1"
    )
    yield connection
    connection.close()

1 usage
def authenticate_customer(db_connection):
    """Authenticate a customer and return the result."""
    cursor = db_connection.cursor()
    cursor.execute("SELECT username, password FROM customers WHERE customerid = 1")
    result = [row for row in cursor]
    cursor.close()
    return result

def test_authenticate_customer(db_connection):
    """Test the authentication of a customer."""
    assert authenticate_customer(db_connection) == [('Sushan373', 'sush436')]

2 usages
```



```python
def update_customer(db_connection):
    """Update a customer's first name and return True on success."""
    cursor = db_connection.cursor()
    cursor.execute("UPDATE customers SET firstname = 'Anu' WHERE customerid = 2")
    db_connection.commit()
    cursor.close()
    return True

def test_update_customer(db_connection):
    """Test updating a customer's information."""
    assert update_customer(db_connection) == True

2 usages
def add_vehicle(db_connection):
    """Add a vehicle to the database and return True on success."""
    cursor = db_connection.cursor()
    cursor.execute(
        "INSERT INTO vehicles(Model, Make, Year, Color, RegistrationNumber, Availability, DailyRate) "
        "VALUES (%s, %s, %s, %s, %s, %s, %s)",
        ('Audi', 'Sedan', 2023, 'Red', 'DL0125', 1, 5525)
    )
    db_connection.commit()
    cursor.close()
    return True

def test_add_vehicle(db_connection):
    """Test adding a vehicle to the database."""
    assert add_vehicle(db_connection) == True

2 usages
def update_vehicle(db_connection):
```

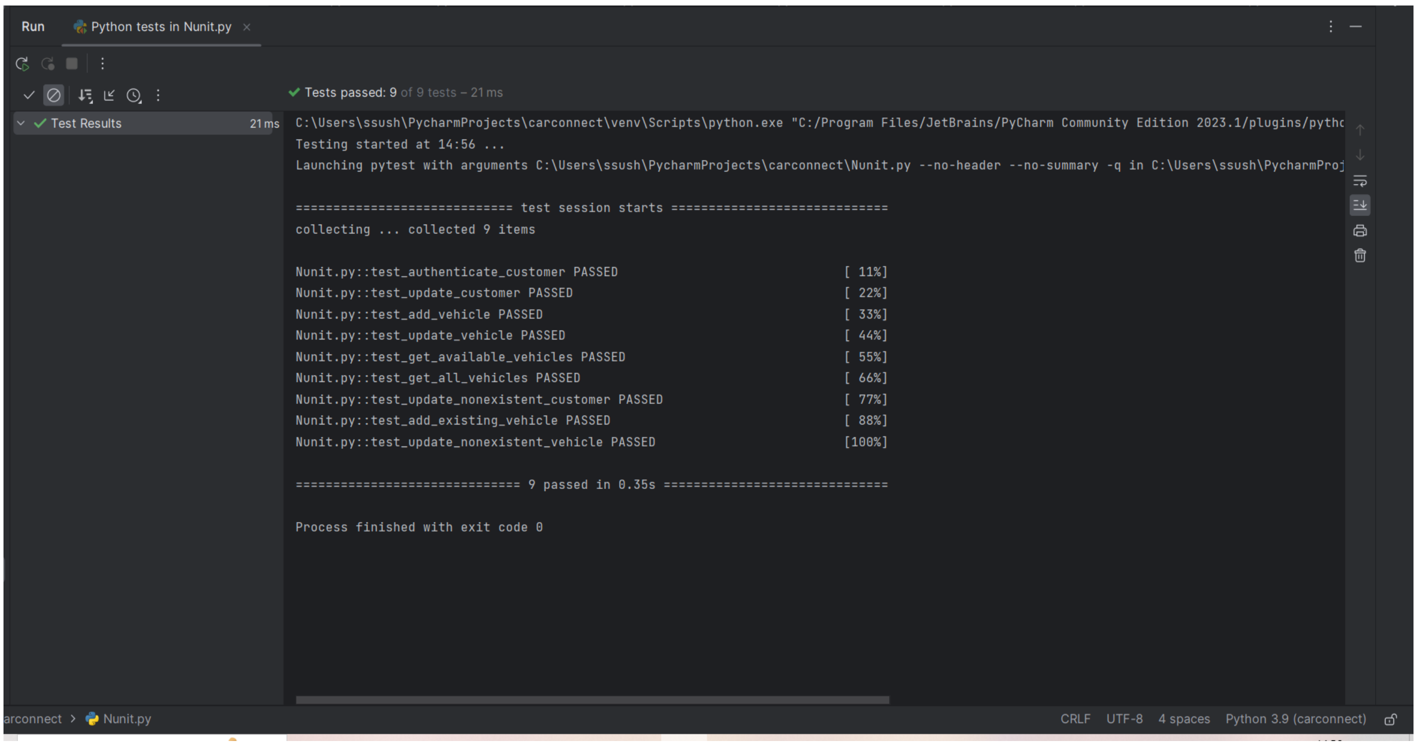


```
def update_vehicle(db_connection):
    """Update a vehicle's model and return True on success."""
    cursor = db_connection.cursor()
    cursor.execute("UPDATE vehicles SET model = 'range' WHERE vehicleid = 3")
    db_connection.commit()
    cursor.close()
    return True

def test_update_vehicle(db_connection):
    """Test updating a vehicle's information."""
    assert update_vehicle(db_connection) == True

1 usage
def get_available_vehicles(db_connection):
    """Retrieve the count of available vehicles from the database."""
    cursor = db_connection.cursor()
    cursor.execute("SELECT * FROM vehicles WHERE availability = 1")
    result = cursor.fetchall()
    cursor.close()
    return len(result)

def test_get_available_vehicles(db_connection):
    """Test retrieving the count of available vehicles."""
    assert get_available_vehicles(db_connection) >= 0

1 usage
def get_all_vehicles(db_connection):
    """Retrieve the count of all vehicles from the database."""
    cursor = db_connection.cursor()
    cursor.execute("SELECT * FROM vehicles")
    result = cursor.fetchall()
```



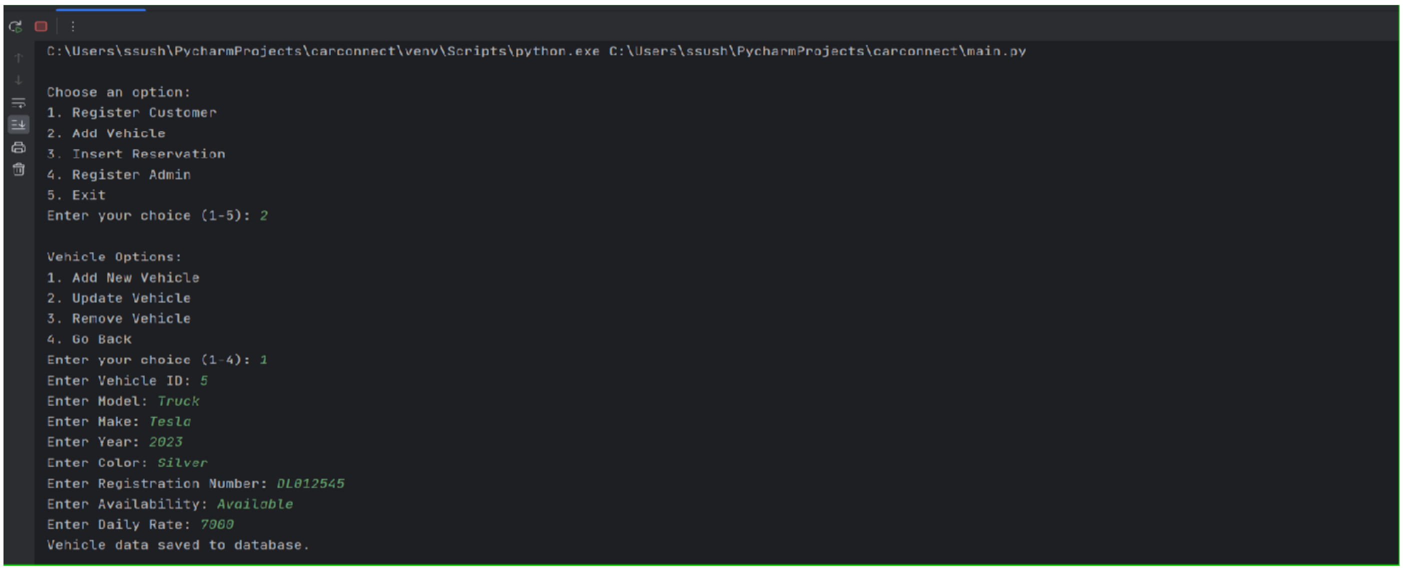
```
    """Retrieve the count of all vehicles from the database."""
    cursor = db_connection.cursor()
    cursor.execute("SELECT * FROM vehicles")
    result = cursor.fetchall()
    cursor.close()
    return len(result)

def test_get_all_vehicles(db_connection):
    """Test retrieving the count of all vehicles."""
    assert get_all_vehicles(db_connection) >= 0

# Additional test cases

"""def test_authenticate_nonexistent_customer(db_connection):
    Test authentication for a nonexistent customer.
    assert authenticate_customer(db_connection) == []"""

def test_update_nonexistent_customer(db_connection):
    """Test updating information for a nonexistent customer."""
    assert update_customer(db_connection) == True

def test_add_existing_vehicle(db_connection):
    """Test adding a vehicle that already exists in the database."""
    assert add_vehicle(db_connection) == True

def test_update_nonexistent_vehicle(db_connection):
    """Test updating information for a nonexistent vehicle."""
    assert update_vehicle(db_connection) == True
```

TEST RESULTS


Run
Python tests in Nunit.py
Tests passed: 9 of 9 tests – 21 ms
Test Results 21 ms
arconnect > Nunit.py
CRLF UTF-8 4 spaces Python 3.9 (carconnect)

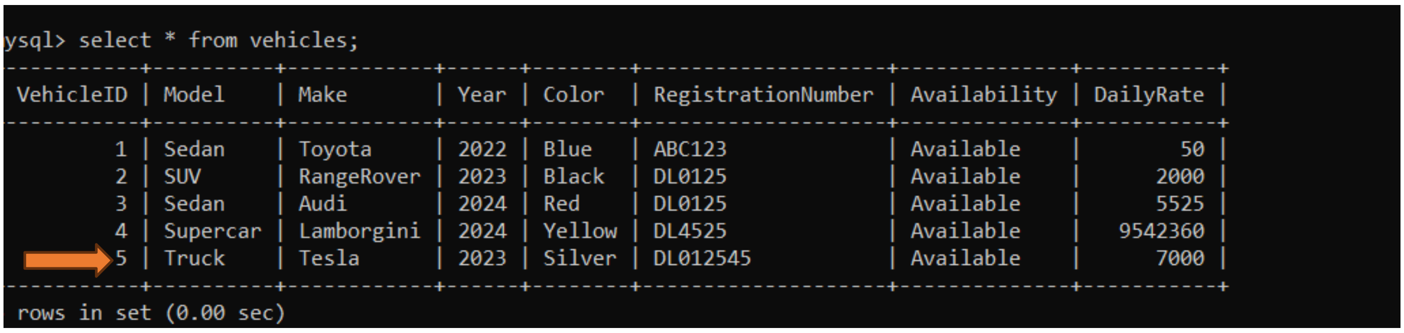
```
C:\Users\ssush\PycharmProjects\carconnect\venv\Scripts\python.exe "C:/Program Files/JetBrains/PyCharm Community Edition 2023.1/plugins/pytho
Testing started at 14:56 ...
Launching pytest with arguments C:\Users\ssush\PycharmProjects\carconnect\Nunit.py --no-header --no-summary -q in C:\Users\ssush\PycharmProj

============================ test session starts ============================
collecting ... collected 9 items

Nunit.py::test_authenticate_customer PASSED                             [ 11%]
Nunit.py::test_update_customer PASSED                                   [ 22%]
Nunit.py::test_add_vehicle PASSED                                       [ 33%]
Nunit.py::test_update_vehicle PASSED                                    [ 44%]
Nunit.py::test_get_available_vehicles PASSED                            [ 55%]
Nunit.py::test_get_all_vehicles PASSED                                  [ 66%]
Nunit.py::test_update_nonexistent_customer PASSED                       [ 77%]
Nunit.py::test_add_existing_vehicle PASSED                              [ 88%]
Nunit.py::test_update_nonexistent_vehicle PASSED                        [100%]

============================= 9 passed in 0.35s =============================

Process finished with exit code 0
```

OUTPUTS



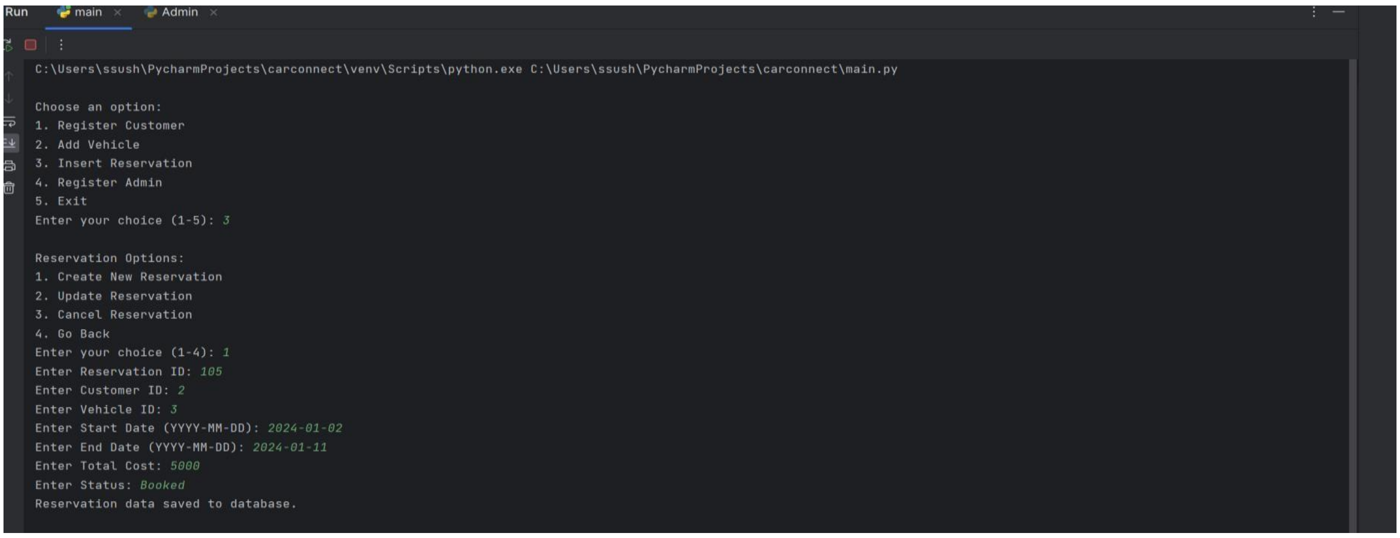
```
C:\Users\ssush\PycharmProjects\carconnect\venv\Scripts\python.exe C:\Users\ssush\PycharmProjects\carconnect\main.py

Choose an option:
1. Register Customer
2. Add Vehicle
3. Insert Reservation
4. Register Admin
5. Exit
Enter your choice (1-5): 2

Vehicle Options:
1. Add New Vehicle
2. Update Vehicle
3. Remove Vehicle
4. Go Back
Enter your choice (1-4): 1
Enter Vehicle ID: 5
Enter Model: Truck
Enter Make: Tesla
Enter Year: 2023
Enter Color: Silver
Enter Registration Number: DL012545
Enter Availability: Available
Enter Daily Rate: 7000
Vehicle data saved to database.
```

DATA SUCCESSFULLY SAVED INTO OUR DATABASE



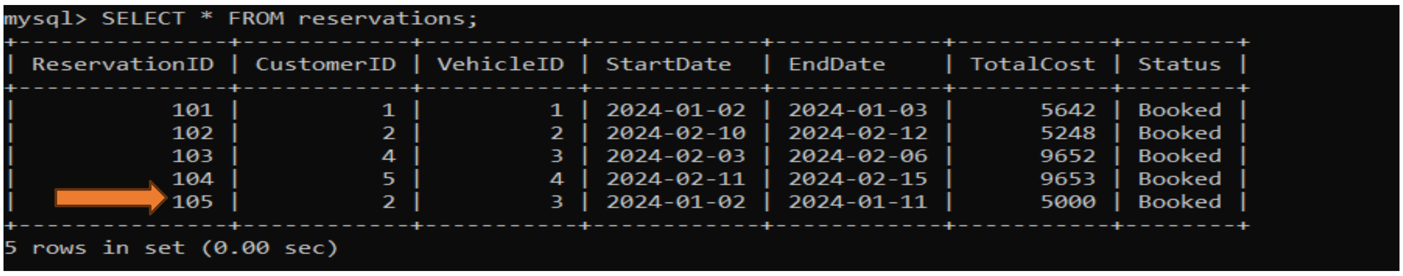
```
ysql> select * from vehicles;
-----------+-----------+-------------+------+--------+--------------------+--------------+-----------+
 VehicleID | Model     | Make        | Year | Color  | RegistrationNumber | Availability | DailyRate |
-----------+-----------+-------------+------+--------+--------------------+--------------+-----------+
         1 | Sedan     | Toyota      | 2022 | Blue   | ABC123             | Available    |        50 |
         2 | SUV       | RangeRover  | 2023 | Black  | DL0125             | Available    |      2000 |
         3 | Sedan     | Audi        | 2024 | Red    | DL0125             | Available    |      5525 |
         4 | Supercar  | Lamborgini  | 2024 | Yellow | DL4525             | Available    |   9542360 |
         5 | Truck     | Tesla       | 2023 | Silver | DL012545           | Available    |      7000 |
-----------+-----------+-------------+------+--------+--------------------+--------------+-----------+
 rows in set (0.00 sec)
```

2) RESERVATION MENU



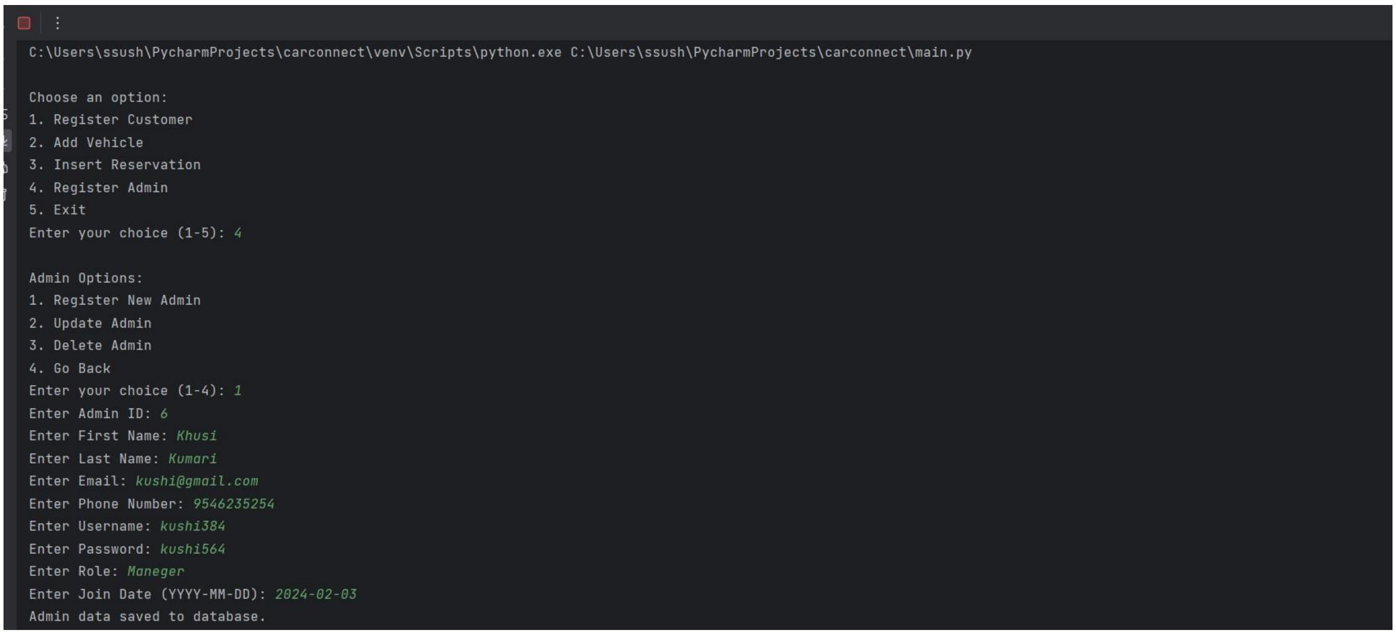
```
C:\Users\ssush\PycharmProjects\carconnect\venv\Scripts\python.exe C:\Users\ssush\PycharmProjects\carconnect\main.py

Choose an option:
1. Register Customer
2. Add Vehicle
3. Insert Reservation
4. Register Admin
5. Exit
Enter your choice (1-5): 3

Reservation Options:
1. Create New Reservation
2. Update Reservation
3. Cancel Reservation
4. Go Back
Enter your choice (1-4): 1
Enter Reservation ID: 105
Enter Customer ID: 2
Enter Vehicle ID: 3
Enter Start Date (YYYY-MM-DD): 2024-01-02
Enter End Date (YYYY-MM-DD): 2024-01-11
Enter Total Cost: 5000
Enter Status: Booked
Reservation data saved to database.
```

DATA SUCCESSFULLY SAVED INTO OUR RESERVATION TABLE AND DATABASE



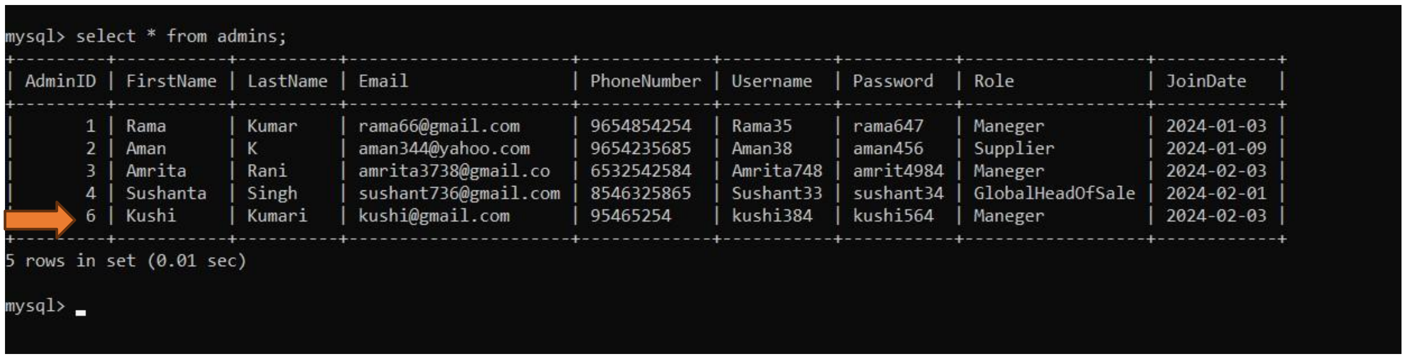
```
mysql> SELECT * FROM reservations;
+---------------+------------+-----------+------------+------------+-----------+--------+
| ReservationID | CustomerID | VehicleID | StartDate  | EndDate    | TotalCost | Status |
+---------------+------------+-----------+------------+------------+-----------+--------+
|           101 |          1 |         1 | 2024-01-02 | 2024-01-03 |      5642 | Booked |
|           102 |          2 |         2 | 2024-02-10 | 2024-02-12 |      5248 | Booked |
|           103 |          4 |         3 | 2024-02-03 | 2024-02-06 |      9652 | Booked |
|           104 |          5 |         4 | 2024-02-11 | 2024-02-15 |      9653 | Booked |
|           105 |          2 |         3 | 2024-01-02 | 2024-01-11 |      5000 | Booked |
+---------------+------------+-----------+------------+------------+-----------+--------+
5 rows in set (0.00 sec)
```

3) ADDING AND UPDATING NEW VALUE INTO ADMIN TABLE



```
C:\Users\ssush\PycharmProjects\carconnect\venv\Scripts\python.exe C:\Users\ssush\PycharmProjects\carconnect\main.py

Choose an option:
1. Register Customer
2. Add Vehicle
3. Insert Reservation
4. Register Admin
5. Exit
Enter your choice (1-5): 4

Admin Options:
1. Register New Admin
2. Update Admin
3. Delete Admin
4. Go Back
Enter your choice (1-4): 1
Enter Admin ID: 6
Enter First Name: Khusi
Enter Last Name: Kumari
Enter Email: kushi@gmail.com
Enter Phone Number: 9546235254
Enter Username: kushi384
Enter Password: kushi564
Enter Role: Maneger
Enter Join Date (YYYY-MM-DD): 2024-02-03
Admin data saved to database.
```

DATA SUCCESSFULLY SAVED INTO OUR ADMIN TABLE AND DATABASE



```
mysql> select * from admins;
+---------+-----------+----------+-----------------------+-------------+------------+------------+-------------------+------------+
| AdminID | FirstName | LastName | Email                 | PhoneNumber | Username   | Password   | Role              | JoinDate   |
+---------+-----------+----------+-----------------------+-------------+------------+------------+-------------------+------------+
|       1 | Rama      | Kumar    | rama66@gmail.com      | 9654854254  | Rama35     | rama647    | Maneger           | 2024-01-03 |
|       2 | Aman      | K        | aman344@yahoo.com     | 9654235685  | Aman38     | aman456    | Supplier          | 2024-01-09 |
|       3 | Amrita    | Rani     | amrita3738@gmail.co   | 6532542584  | Amrita748  | amrit4984  | Maneger           | 2024-02-03 |
|       4 | Sushanta  | Singh    | sushant736@gmail.com  | 8546325865  | Sushant33  | sushant34  | GlobalHeadOfSale  | 2024-02-01 |
|       6 | Kushi     | Kumari   | kushi@gmail.com       | 95465254    | kushi384   | kushi564   | Maneger           | 2024-02-03 |
+---------+-----------+----------+-----------------------+-------------+------------+------------+-------------------+------------+
5 rows in set (0.01 sec)

mysql> _
```

**********Thank You**********