

Software Design Document (SDD)

Vehicle Sales Management System (VSMS)

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1 Overview

1.1 Scope

This document describes the design of the VSMS, which aims to streamline vehicle sales, inventory management, and customer interactions. The design encompasses system architecture, data flow, and integration between various components using diagrams and structured descriptions.

1.2 Purpose

The purpose of this SDD is to translate the functional and non-functional requirements outlined in the SRS into a design framework. It will serve as a guide for developers to implement the VSMS efficiently.

1.3 Intended Audience

The audience includes developers, testers, project managers, and other stakeholders responsible for building, testing, and deploying the VSMS.

2 Definitions

Term	Definition
Administrator	Manages system, inventory, and users.
Customer	Browses, searches, and purchases vehicles.
Inventory Manager	Module that stores and updates vehicle details.
API	Application Programming Interface.
DBMS	Database Management System.
HTML	Hypertext Markup Language; used for creating web page structures.
CSS	Cascading Style Sheets; used for styling web pages.
JavaScript	Programming language for dynamic and interactive web elements.

3 Design Description Information Content

3.1 Introduction

The VSMS design involves modular components with clearly defined interfaces, leveraging object-oriented principles for scalability and maintainability. Key features include vehicle search, sales processing, feedback management, and role-based access.

3.2 SDD Identification

This document identifies modules, their interactions, and data flows necessary for implementing the VSMS.

3.3 Design Stakeholders and Their Concerns

- **Developers:** Require detailed diagrams and modular descriptions.
- **Testers:** Need testable components with clear input-output definitions.
- **Stakeholders:** Expect a secure and user-friendly system.

4 Design Elements

4.1 Design Entities

The main design entities for the Vehicle Sales Management System are as follows:

- **User** - Holds user details, including their role (Admin, Customer, Sales Rep).
- **Vehicle** - Stores information about the vehicles, such as make, model, price, etc.
- **Sales Record** - Tracks the sales transactions made by customers.
- **Inventory** - Keeps a record of vehicles available for sale in the system.
- **Payment** - Manages payment records for each sales transaction.
- **Feedback** - Allows customers to leave feedback about purchased vehicles.

4.2 Design Attributes

The attributes for these design entities are as follows:

- **User Attributes:** username, password, email, role.
- **Vehicle Attributes:** vehicle ID, make, model, price, year, condition.
- **Sales Record Attributes:** sales ID, vehicle ID, customer ID, sale price, date of sale.
- **Payment Attributes:** payment ID, sales ID, amount, payment method, payment status.
- **Feedback Attributes:** feedback ID, customer ID, vehicle ID, rating, comments.

4.3 Design Relationships

The relationships between the entities in the system are:

- **User - Sales Record:** A user can make multiple sales transactions. Each sale is associated with a user.
- **Sales Record - Vehicle:** Each sales record is linked to a specific vehicle.
- **Sales Record - Payment:** Each sale has one or more associated payments.
- **Vehicle - Inventory:** Vehicles are part of the inventory. Each vehicle in the inventory corresponds to a sales record.
- **Customer - Feedback:** Each customer can leave feedback on the vehicle they purchase.

4.4 Design Constraints

The design of the Vehicle Sales Management System must address the following constraints:

- **Data Privacy and Security:** User data must be securely stored and protected from unauthorized access.
- **Scalability:** The system should be designed to handle an increasing number of users, vehicles, and transactions over time.
- **Legal Compliance:** The system must comply with legal regulations regarding data privacy, payment processing, and sales transactions.
- **Performance:** The system should be able to handle a large volume of sales records and vehicle inventory data without performance degradation.

5 Design Viewpoints

5.1 Use Case Diagram for Design Viewpoint

Below is the Use Case Diagram illustrating the interactions between actors and the VSMS system:

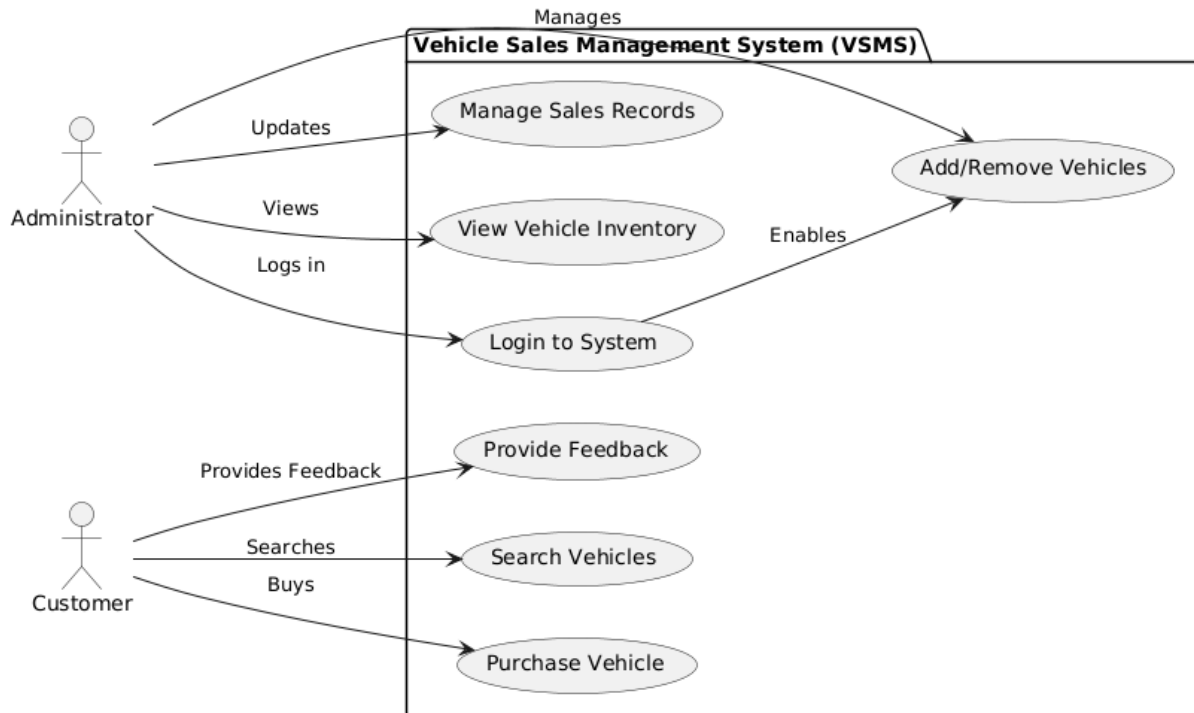


Figure 1: Use Case Diagram for Vehicle Sales Management System (VSMS)

5.2 Context Viewpoint

The system interacts with two primary actors:

- **Administrator:** Adds/removes vehicles, manages sales, and users.
- **Customer:** Searches for and purchases vehicles.

5.2.1 login

admin need to be login in order to add vechile and remove vechiles from the website. They need to specify their unique username and password. They are required to enter their name, password

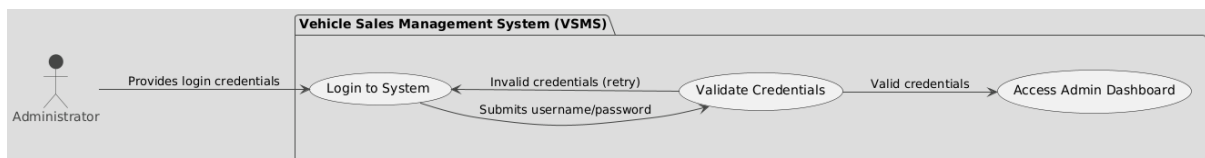


Figure 2: Use Case Diagram for Vehicle Sales Management System (VSMS) admin login

5.2.2 add vechile

This Use Case Diagram depicts the Administrator's interaction with the Vehicle Sales Management System to log in and add a new vehicle to the system's inventory. The process includes logging in, entering vehicle details, and saving the vehicle to the inventory.

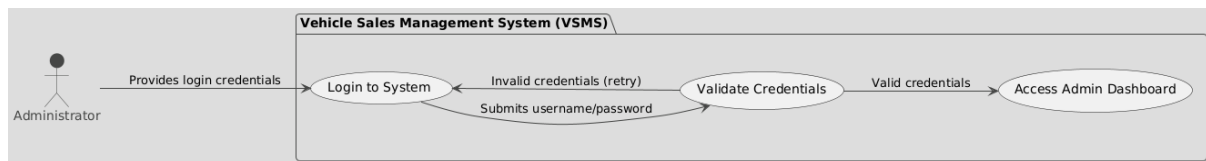


Figure 3: Use Case Diagram for Vehicle Sales Management System (VSMS) add vechile

5.2.3 delete vechile

This Use Case Diagram illustrates the Administrator's role in deleting a vehicle from the system's inventory. The diagram focuses on the single action of the administrator performing the deletion task.

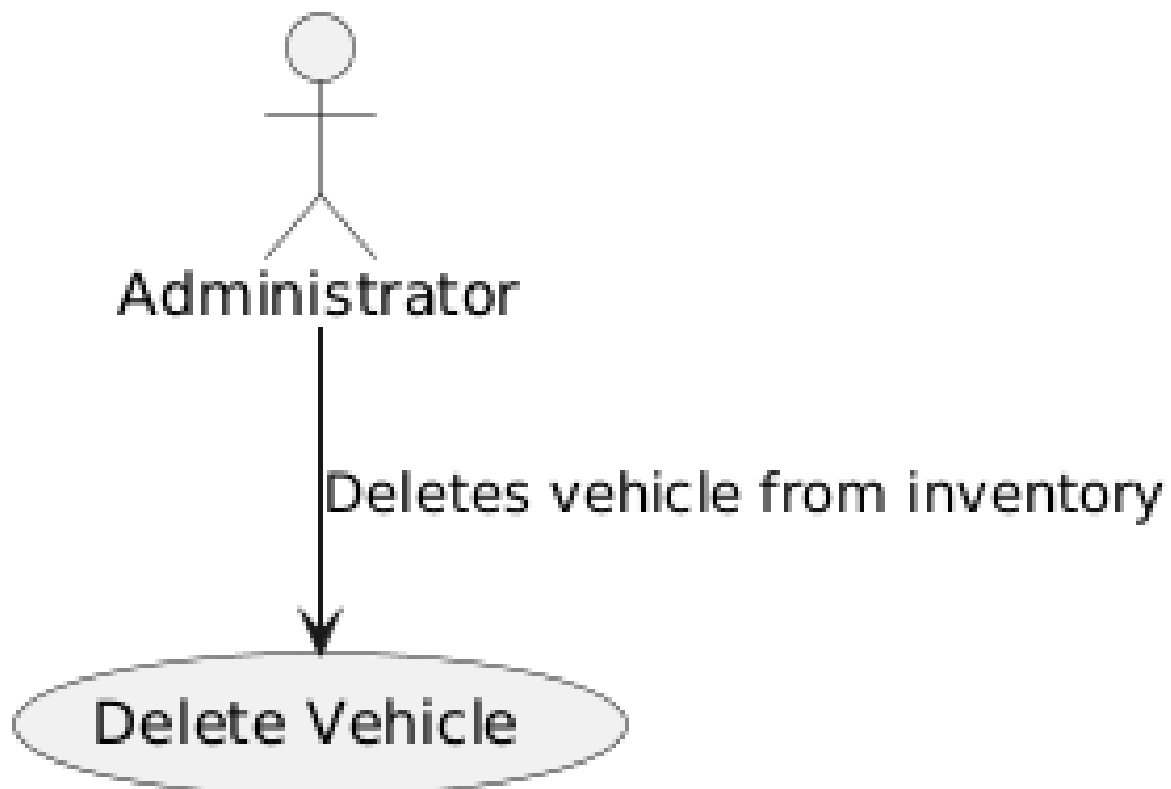


Figure 4: Use Case Diagram for Vehicle Sales Management System (VSMS) delete vechile

5.2.4 payment

This diagram shows the User's interaction with the Payment Tracking System. The user can perform two actions: make a payment and track the payment status afterward.

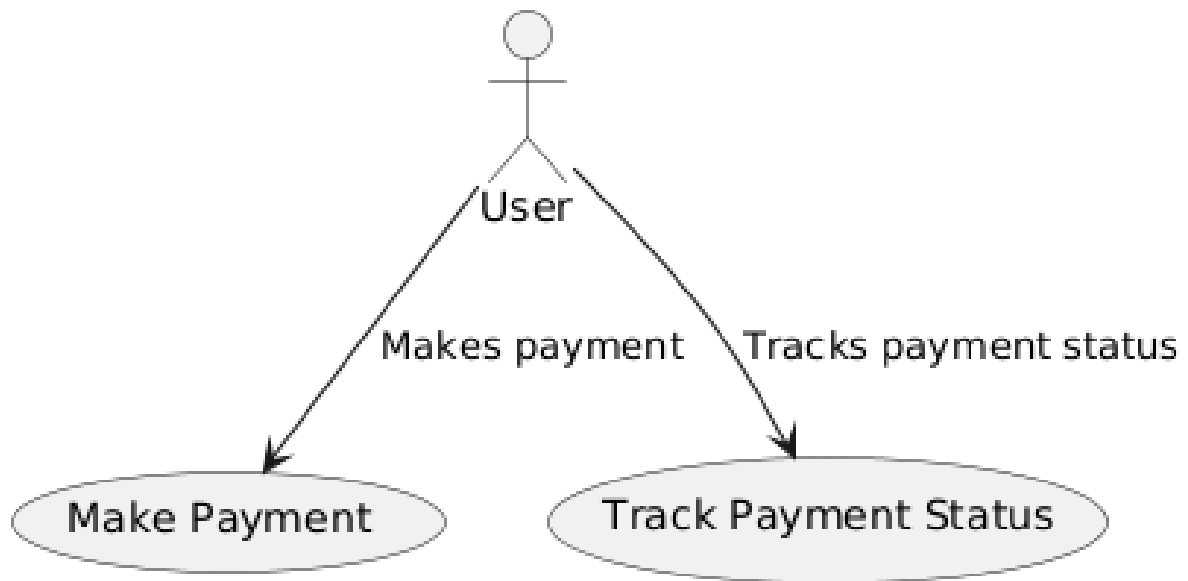


Figure 5: Use Case Diagram for Vehicle Sales Management System (VSMS) basic payment trackin

5.2.5 customer search vechile

This diagram shows the Customer interacting with the system to search for a vehicle. The customer initiates the search based on criteria like make, model, price, etc

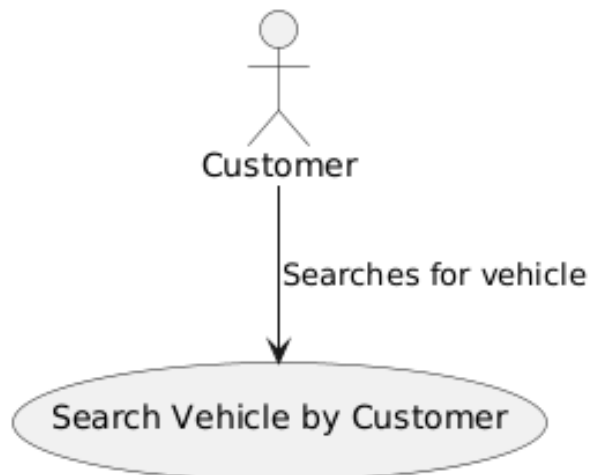


Figure 6: Use Case Diagram for Vehicle Sales Management System (VSMS)search vechile by customer

5.2.6 add cart

Customer: The actor who adds a vehicle to their cart. Use Case: Add Vehicle to Cart is the action taken by the customer.

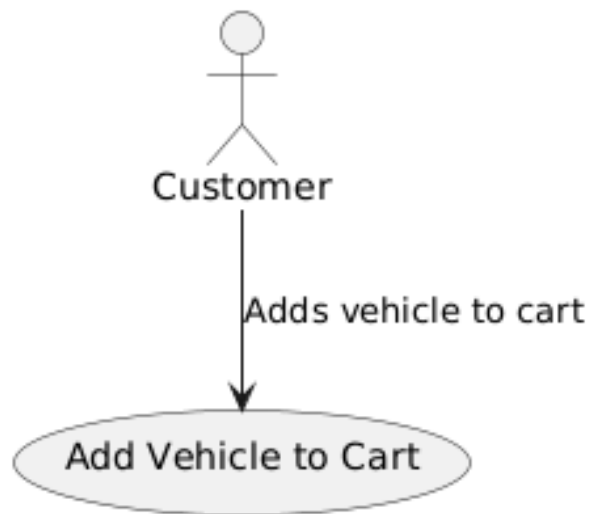


Figure 7: Use Case Diagram for Vehicle Sales Management System (VSMS) add vehicle to cart by customer

5.2.7 buy vehicle

This shows the Customer completing the purchase of a vehicle. The Purchase Vehicle use case represents the successful transaction by the customer.

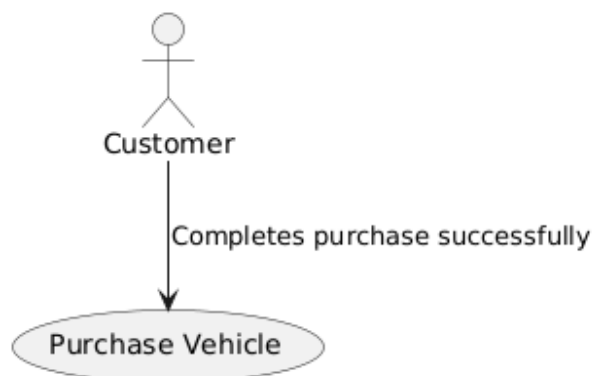
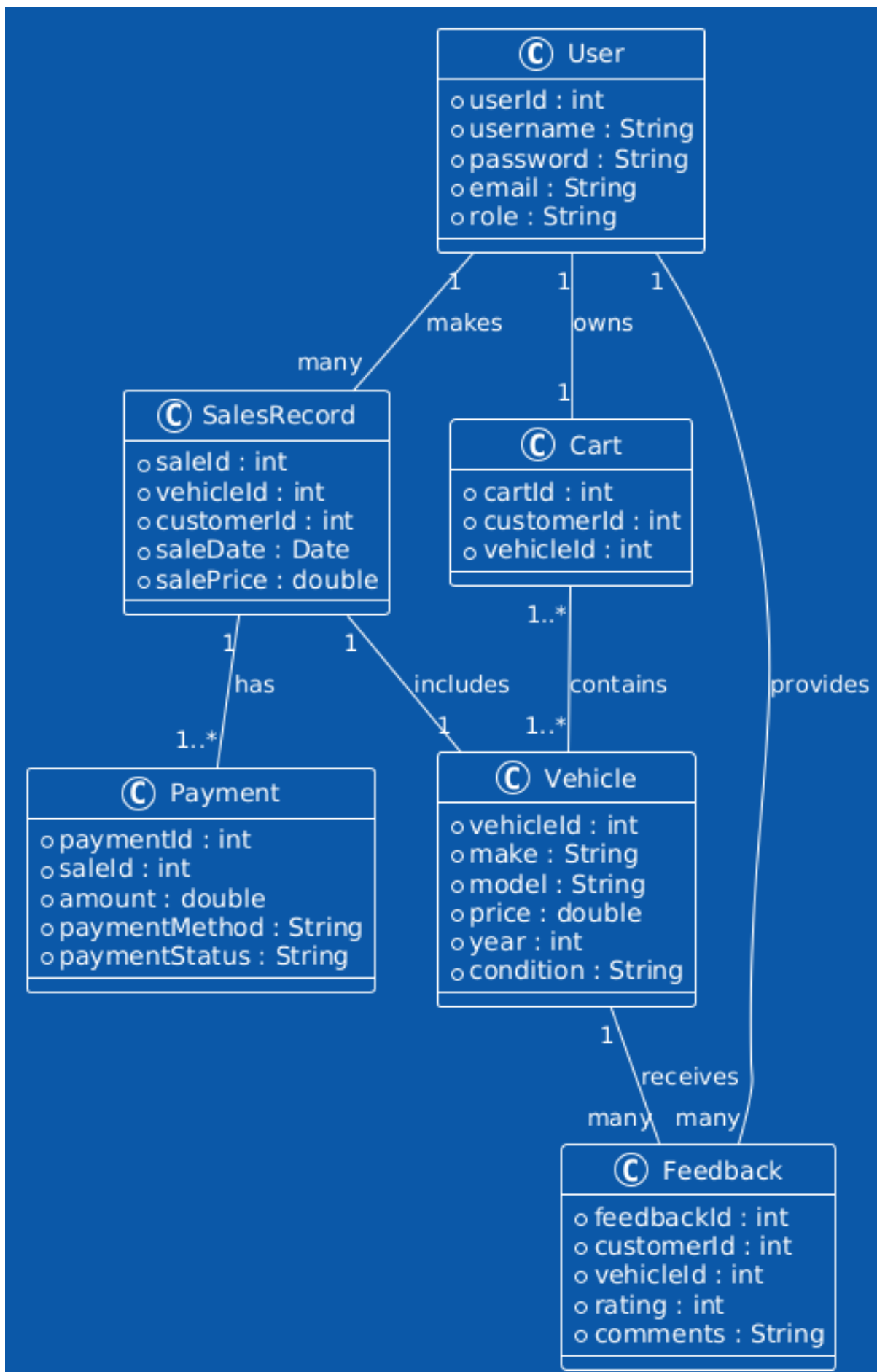


Figure 8: Use Case Diagram for Vehicle Sales Management System (VSMS) purchase successfully by customer

5.3 Logical Viewpoint

The system is designed using object-oriented principles. Key entities include:

- **User:** Attributes include `username`, `password`, `role`.
- **Vehicle:** Attributes include `brand`, `model`, `price`.
- **Sales Record:** Links vehicles to customers.



5.3.1 User Class

The User class represents any individual interacting with the system, which could include administrators or customers. This class stores essential information about the user and their role within the system.

Attribute	Description
<code>userId</code>	A unique identifier assigned to each user for tracking purposes.
<code>username</code>	The login name used by the user to access the system.
<code>password</code>	The encrypted password used for authenticating the user.
<code>role</code>	Defines the role of the user (e.g., Admin, Customer), which dictates their access level and permissions within the system.

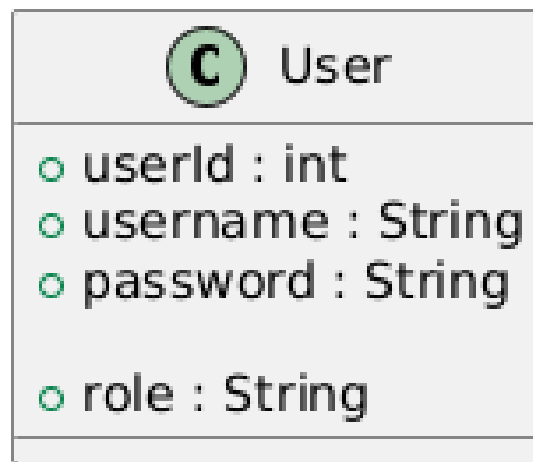


Figure 10: Visualization of ReceivedMessage Class Diagram

5.3.2 Vehicle Class

The **Vehicle** class stores information about vehicles available for sale in the system. It includes essential attributes like vehicle identification, model, price, and manufacturing year.

Attribute	Description
vehicleId	A unique identifier assigned to each vehicle in the system for tracking and management purposes.
model	The specific model name or identifier of the vehicle (e.g., Corolla, Civic).
price	The price of the vehicle in the system, stored as a decimal value to accommodate precision.
year	The manufacturing year of the vehicle, which is essential for determining its age and market value.

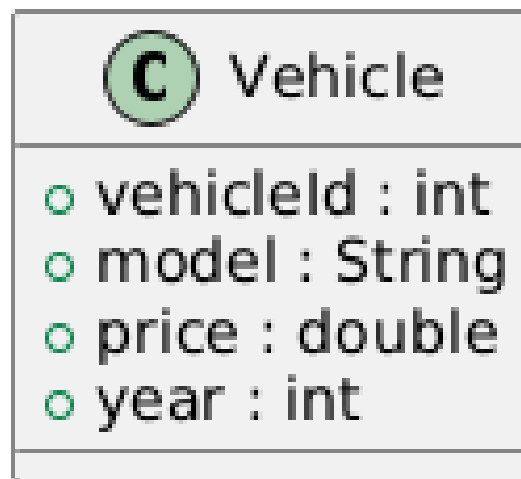


Figure 11: Visualization of vehicle Class Diagram

5.3.3 SalesRecord Class

The **SalesRecord** class captures details of each sales transaction within the system. It links vehicles, customers, and the price at which a vehicle was sold.

Attribute	Description
saleId	A unique identifier for each sales transaction, used for tracking and auditing purposes.
vehicleId	A reference to the unique identifier of the vehicle that was sold, linking this record to the Vehicle class.
customerId	A reference to the unique identifier of the customer who purchased the vehicle, linking this record to the User class.
salePrice	The price at which the vehicle was sold, stored as a decimal value to capture precision.

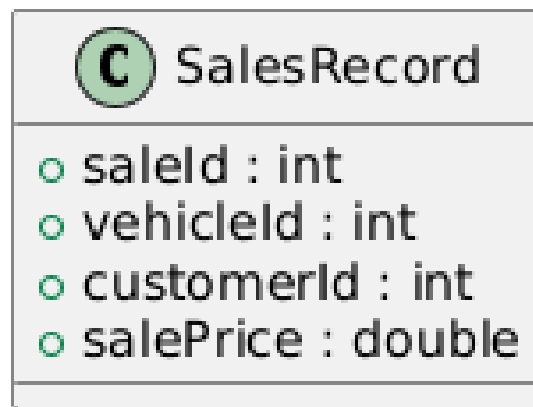


Figure 12: Visualization of sales Class Diagram

5.3.4 Payment Class

The **Payment** class captures details of payment transactions for sales within the system. It ensures that payments are linked to sales records and tracks the amount paid.

Attribute	Description
paymentId	A unique identifier for each payment transaction, used for tracking and auditing purposes.
saleId	A reference to the unique identifier of the associated sales record, linking this payment to a specific sale.
amount	The total amount paid by the customer for the transaction, stored as a decimal value to capture precision.

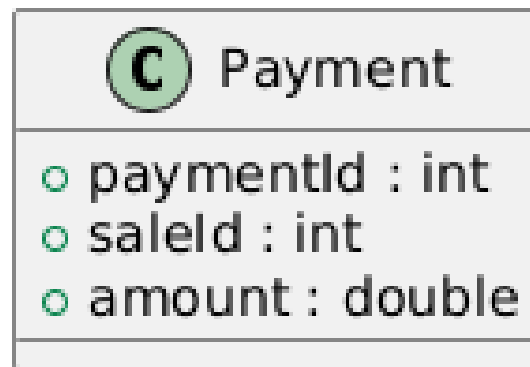


Figure 13: Visualization of payment Class Diagram

5.3.5 Feedback Class

The **Feedback** class captures customer feedback for vehicles they have purchased. It includes ratings and optional comments to provide insights into customer satisfaction.

Attribute	Description
rating	An integer representing the customer's rating of the vehicle, typically on a predefined scale (e.g., 1 to 5).
comments	A string containing optional comments or detailed feedback provided by the customer about their experience or the vehicle.



Figure 14: Visualization of feedback Class Diagram

5.3.6 Cart Class

The **Cart** class represents the shopping cart functionality in the system. It stores information about the vehicles a customer has added to their cart before completing the purchase.

Attribute	Description
customerId	An integer representing the unique identifier of the customer who owns the cart, linking it to the User class.
vehicleId	An integer representing the unique identifier of the vehicle added to the cart, linking it to the Vehicle class.

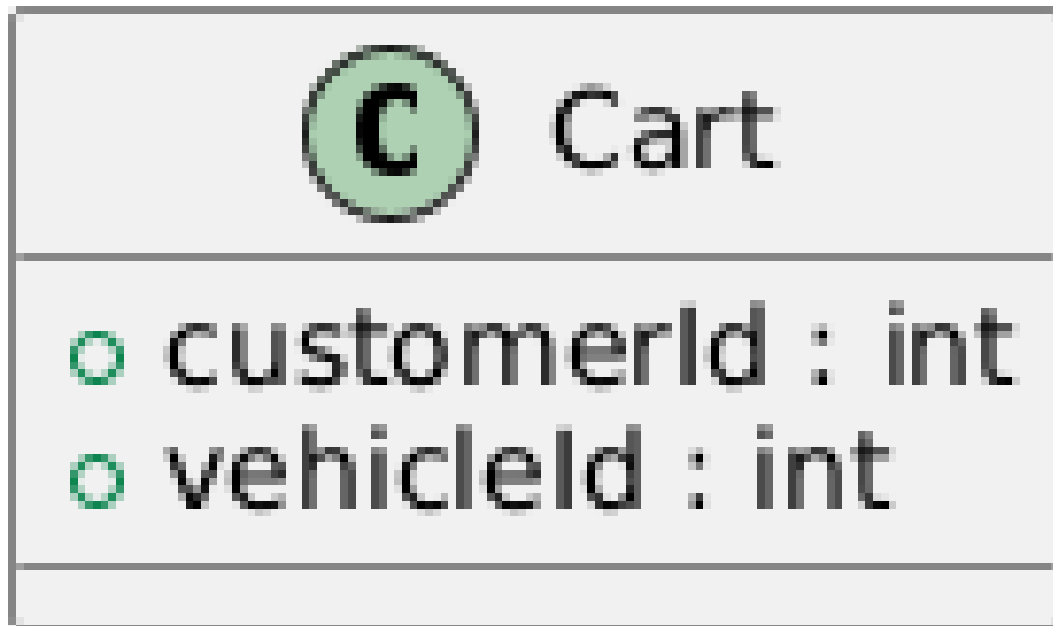


Figure 15: Visualization of cart Class Diagram

5.4 Information Viewpoint

Entity-Relationship Diagram (ERD): Illustrates relationships between tables, such as Users, Vehicles, Sales, and Feedback.

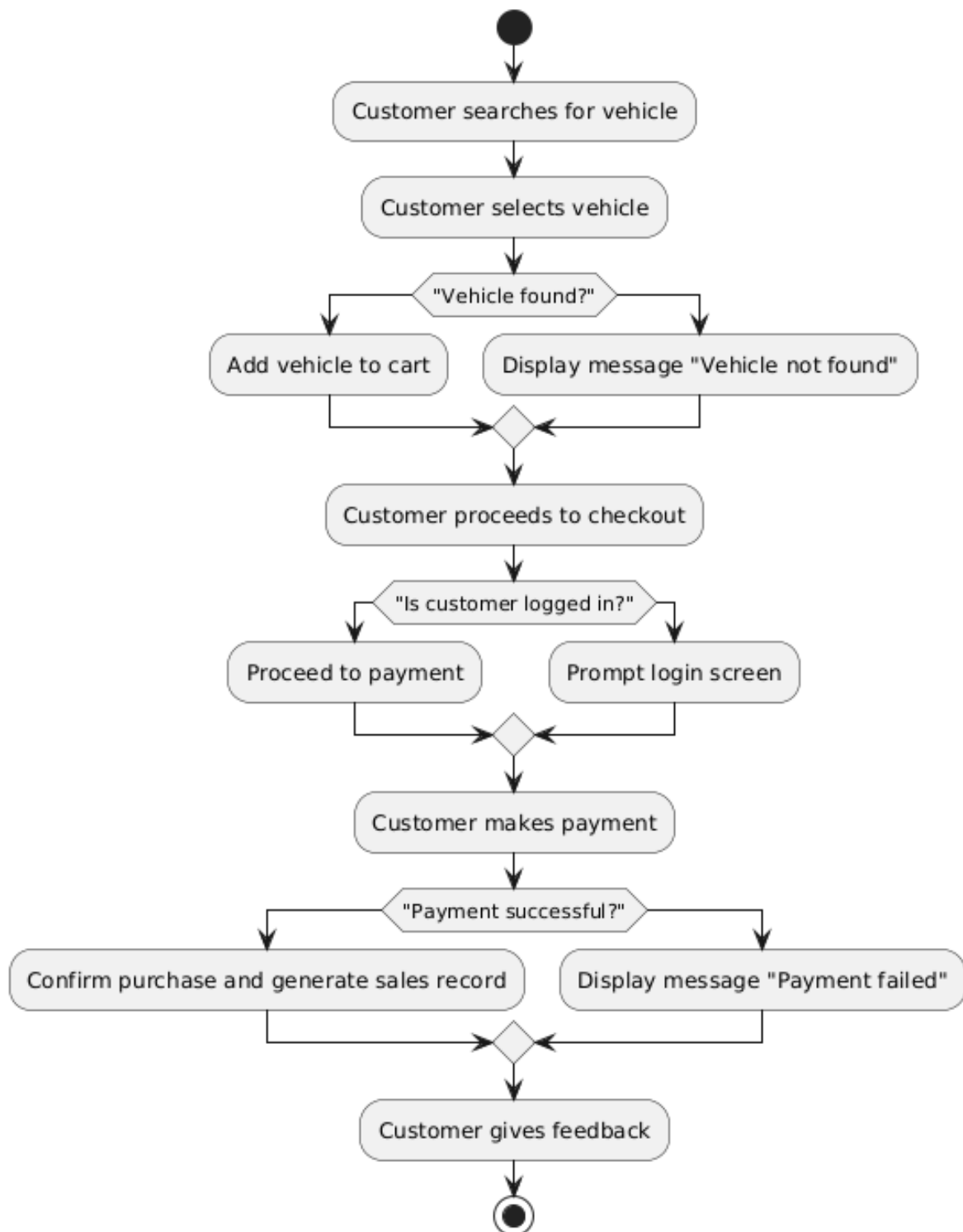


Figure 16: Visualization of cart Class Diagram

5.5 intraction viewpoint

5.5.1 login

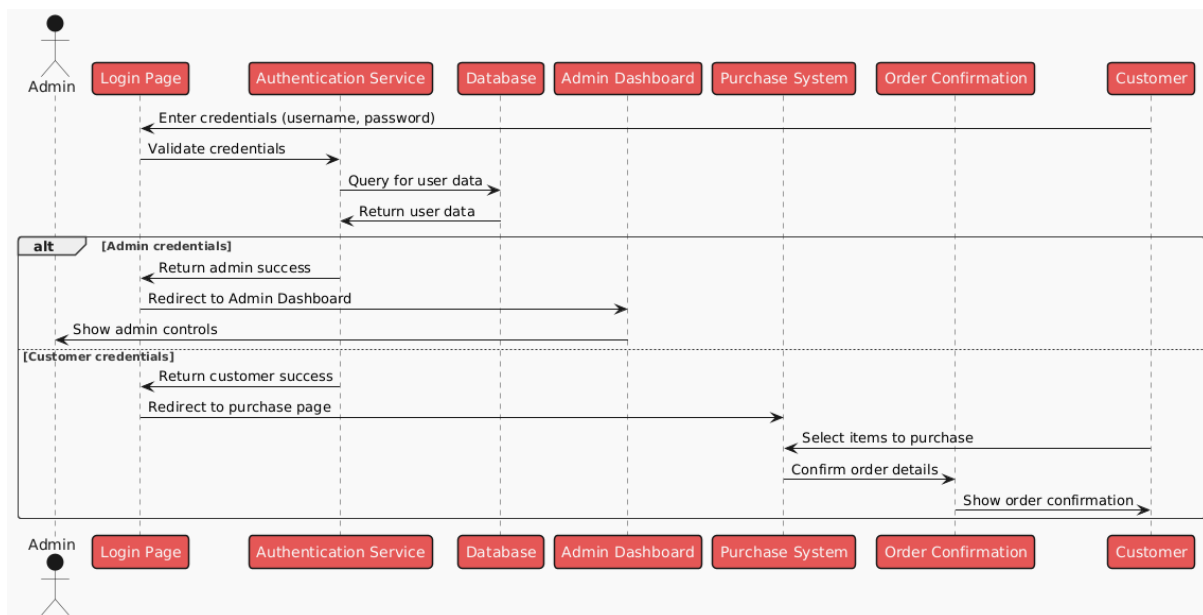


Figure 17: Visualization of login sequence Diagram

This sequence diagram shows the login process for admin roles. The admin is redirected to the Admin Dashboard, while the customer is directed to the Purchase System to make a purchase. After confirming the purchase details, the order confirmation is shown to the customer.

5.5.2 addvechile

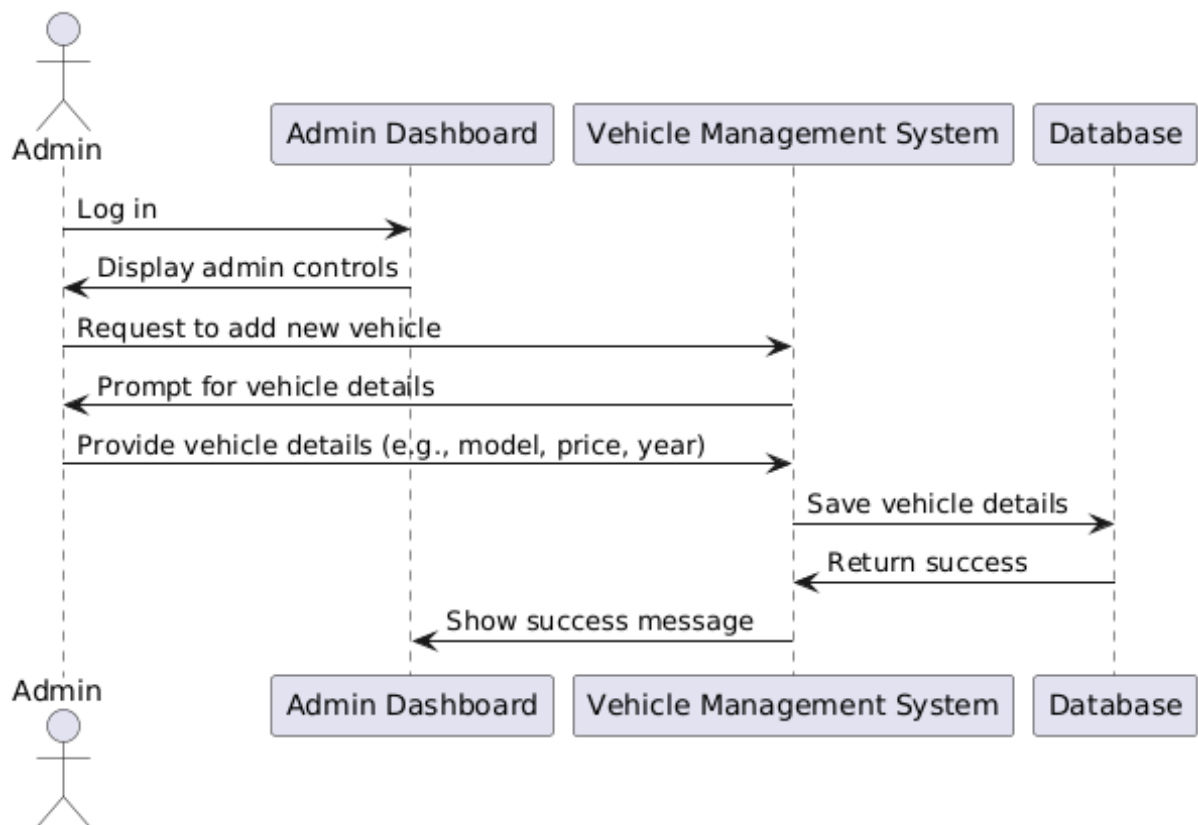


Figure 18: Visualization of add vechile sequence Diagram

In this sequence diagram, the admin logs into the Admin Dashboard and requests to add a new vehicle. The Vehicle Management System prompts the admin to provide vehicle details, which are then saved to the database. After the details are successfully stored, the system notifies the admin with a success message. The entire process highlights the admin's interaction with the system to manage vehicle information.

5.5.3 deletevechile

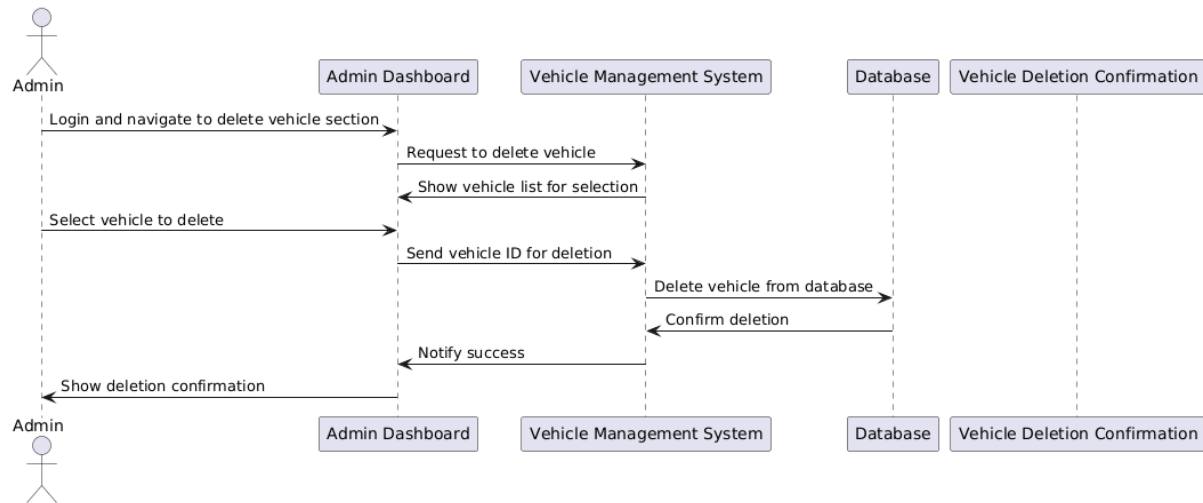


Figure 19: Visualization of delete vechile sequence Diagram

In this sequence diagram, the admin logs into the Admin Dashboard and requests to delete a vehicle. The system displays a list of vehicles for the admin to select and send the selected vehicle's ID to the Database for deletion. Once the database confirms the deletion, the Vehicle Management System notifies the admin of the success. Finally, the Admin Dashboard displays a confirmation message to the admin..

5.5.4 payment

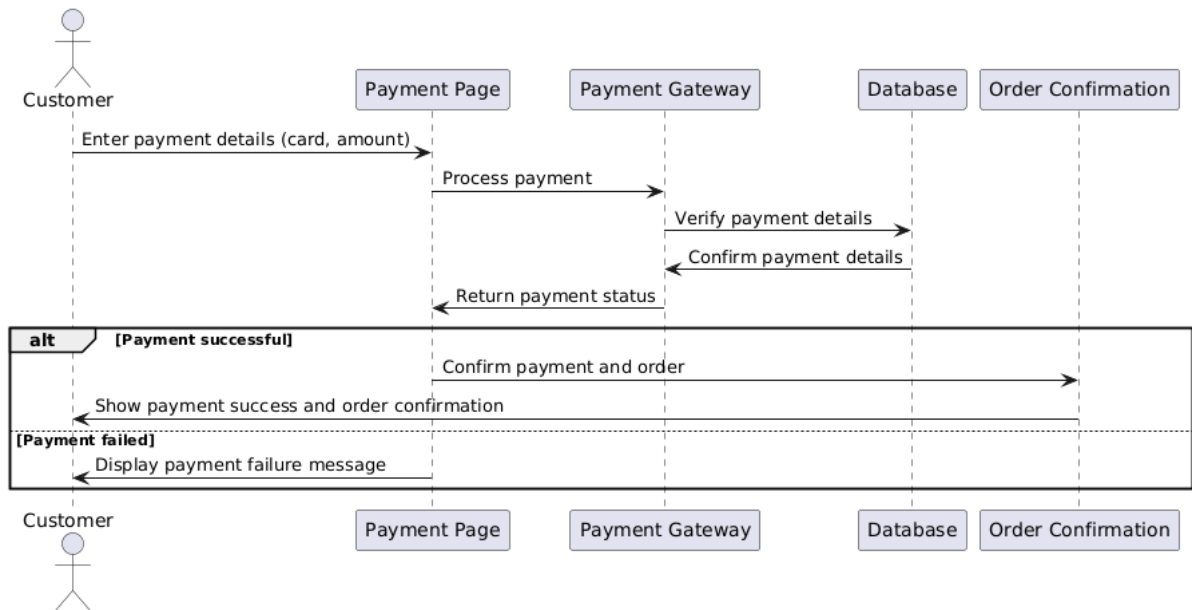


Figure 20: Visualization of payment vehicle sequence Diagram

In this sequence diagram, the Customer enters payment details on the Payment Page, which sends them to the Payment Gateway for processing. The Payment Gateway verifies the details with the Database and returns the payment status. If the payment is successful, the Order Confirmation page confirms the order to the customer. If the payment fails, the customer is shown a failure message.

5.5.5 add to cart

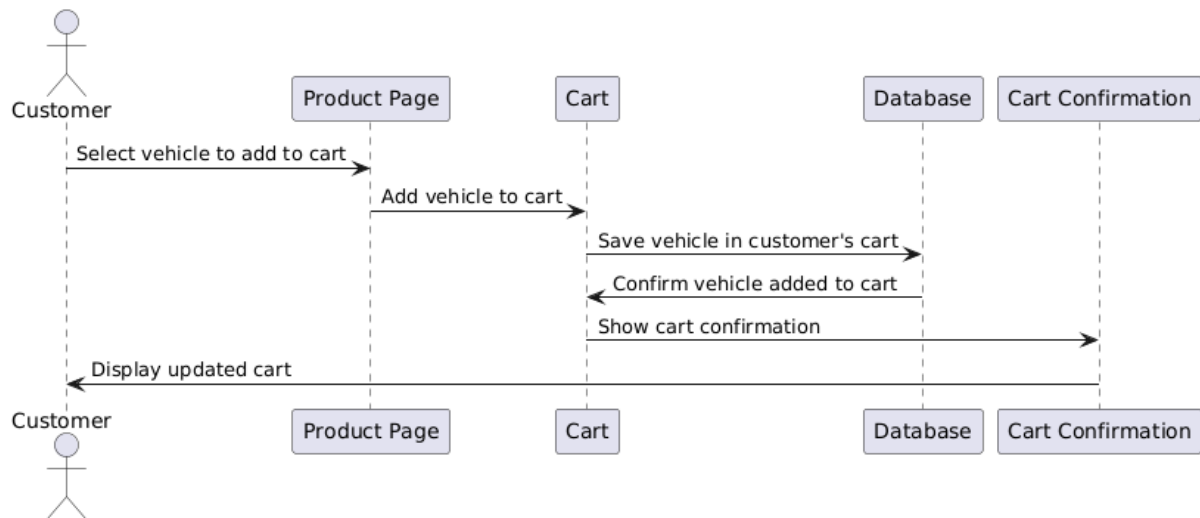


Figure 21: Visualization of add to cart sequence Diagram

In this sequence diagram, the Customer selects a vehicle from the Product Page to add to their cart. The Product Page sends a request to the Cart system to add the selected vehicle. The Cart system saves the vehicle to the customer's cart in the Database and confirms the addition. Finally, the Cart Confirmation page displays the updated cart to the Customer.

5.5.6 buy vechile

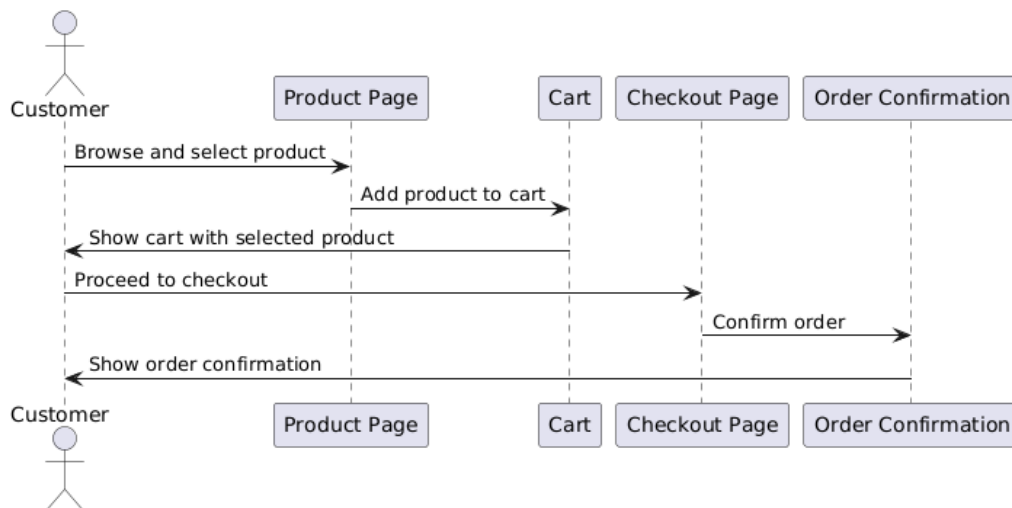


Figure 22: Visualization of buy vechile sequence Diagram

In this sequence diagram, the Customer browses the Product Page and adds a product to the Cart. The Cart shows the selected product, and the Customer proceeds to the Checkout Page. The Checkout Page confirms the order and sends the information to the Order Confirmation page. Finally, the Order Confirmation page displays the order confirmation to the Customer.

5.5.7 rating and review

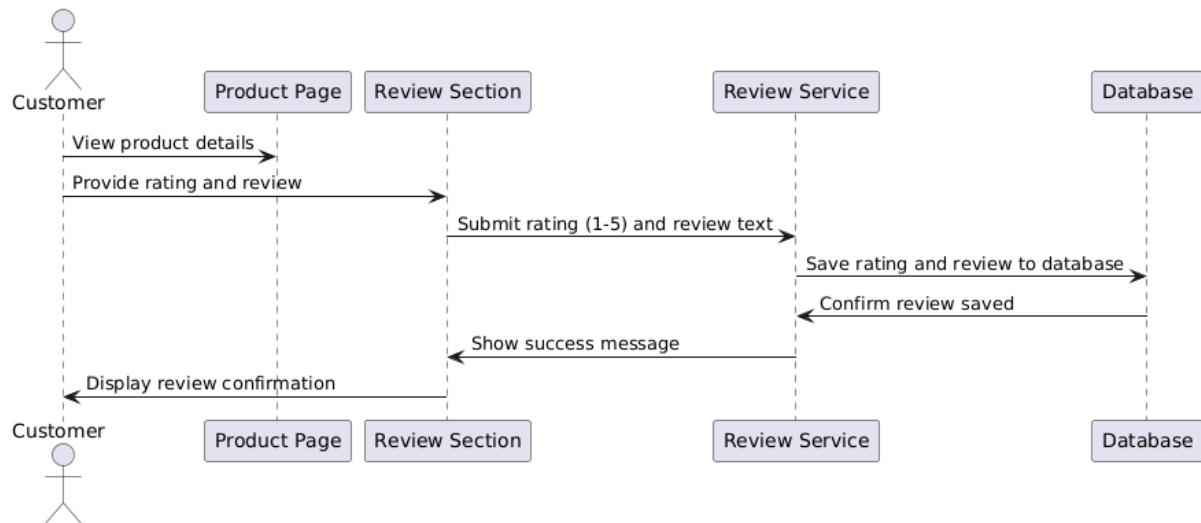


Figure 23: Visualization of rating and review sequence Diagram

In this sequence diagram, the Customer views the product details on the Product Page. The Customer provides both a rating (1-5 stars) and a review (text) in the Review Section. The Review Section submits the rating and review to the Review Service, which saves the information to the Database. Once saved, the system confirms the review and displays a success message to the Customer

5.6 Dynamic Viewpoints for Vehicle Sales Management System

There are eight main states in the Vehicle Sales Management System. Each of these states represents a webpage that the user interacts with. The states are as follows:

- **Main Page:** The landing page where customers can view and navigate to other pages, such as searching for vehicles or signing up/logging in.
- **Login Page:** A page where registered users log in by entering their username and password to access their account.
- **Vehicle Search Page:** A page where customers can search for vehicles based on filters like make, model, price, and other parameters.
- **Vehicle Details Page:** A page that shows detailed information about a specific vehicle selected from the search results.
- **Cart Page:** A page where customers can view and manage the vehicles added to their shopping cart before proceeding to checkout.
- **Checkout Page:** A page where customers review their order and enter payment details to complete the purchase.
- **Order Confirmation Page:** A page that confirms the purchase and displays the order summary after a successful payment.

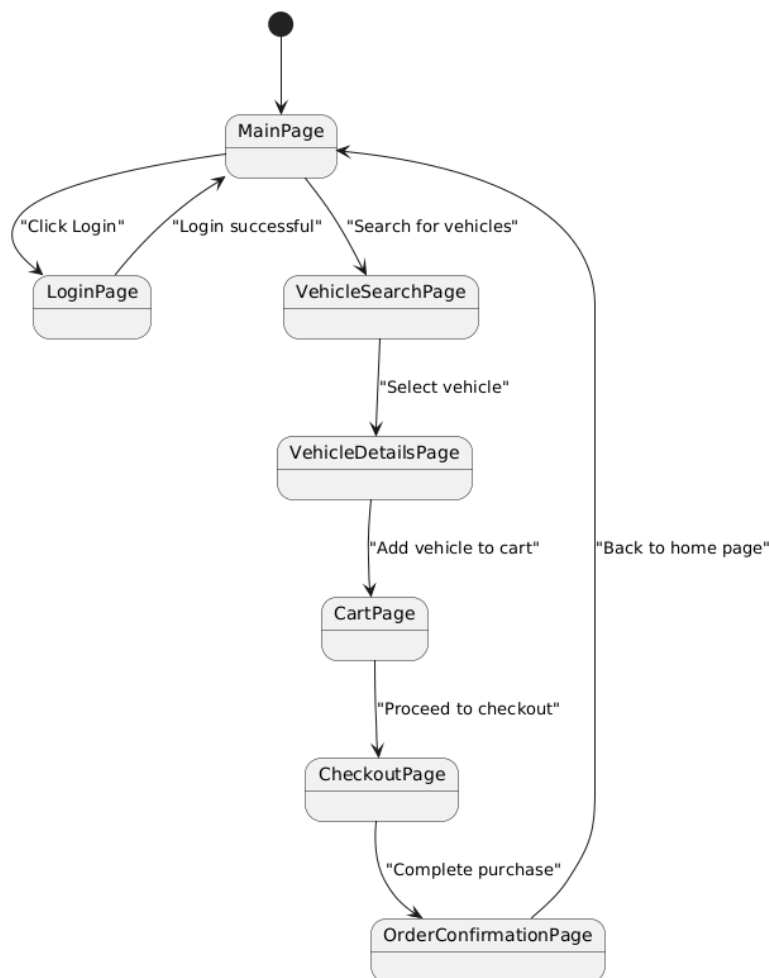


Figure 24: Visualization of State Chart Diagram

5.6.1 Main Page

The Main Page is the landing page of the system that customers first see when they visit the website. It typically includes options to **sign up**, **log in**, and **search for vehicles**. The Main Page serves as a navigation hub for customers to access various functionalities, such as vehicle browsing or account management.

5.6.2 Login Page

Registered users can access their accounts by entering their **username** (or **email**) and **password**. This page is primarily for users who already have an account and want to authenticate themselves. After successful login, users are typically redirected to their **profile** or the **Main Page** where they can continue browsing vehicles or managing their account settings.

5.6.3 Vehicle Search Page

This page allows customers to search for vehicles based on various criteria. Common filters include **make**, **model**, **price range**, **year of manufacture**, and **vehicle condition** (new or used). The search results are usually displayed in a list or grid format, showing basic details about each vehicle (such as price, model, and a small image). This page helps users quickly find vehicles that match their preferences.

5.6.4 Vehicle Details Page

After selecting a vehicle from the search results, the customer is directed to this page, which provides detailed information about the chosen vehicle. Information typically includes the vehicle's **specifications**, **features**, **condition**, **price**, **photos**, and **availability**. This page might also offer a way to **contact the seller** or provide a call to action (like **adding the vehicle to the cart** or **scheduling a test drive**).

5.6.5 Cart Page

This page displays all the vehicles that the customer has added to their shopping cart. Customers can view details of the selected vehicles, remove items, or update quantities (if applicable). It serves as a **pre-checkout review**, allowing customers to double-check the items they wish to purchase before proceeding to the next stage.

5.6.6 Order Confirmation Page

After the payment is successful, customers are redirected to this page to confirm that their purchase has been completed. This page marks the end of the transaction process, confirming that the vehicle purchase was successful.

5.7 Interface Viewpoint

- **Frontend:** Provides user interfaces for vehicle search, inventory management, and reporting.
- **APIs:** Facilitates communication between frontend and backend.
- **Database Interface:** Ensures secure storage and retrieval of data.

5.7.1 Admin Dashboard

The following figure represents the interface of the Admin Dashboard, which allows administrators to manage products, view orders, and handle user accounts.

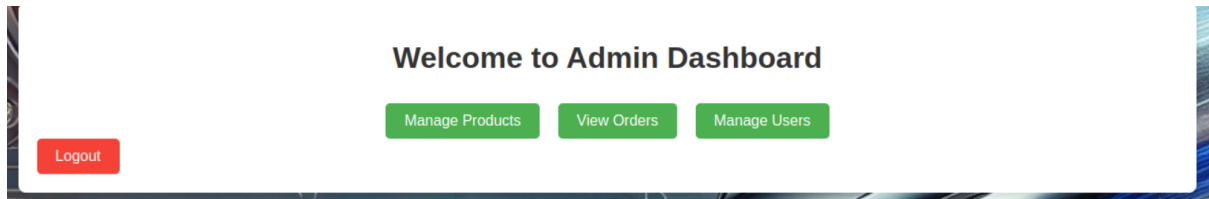


Figure 25: Admin Dashboard Interface showing options for managing products, orders, and users.

5.7.2 customer Dashboard

The following figure represents the interface of the customer Dashboard, which allows administrators to manage products, view orders, and handle user accounts.

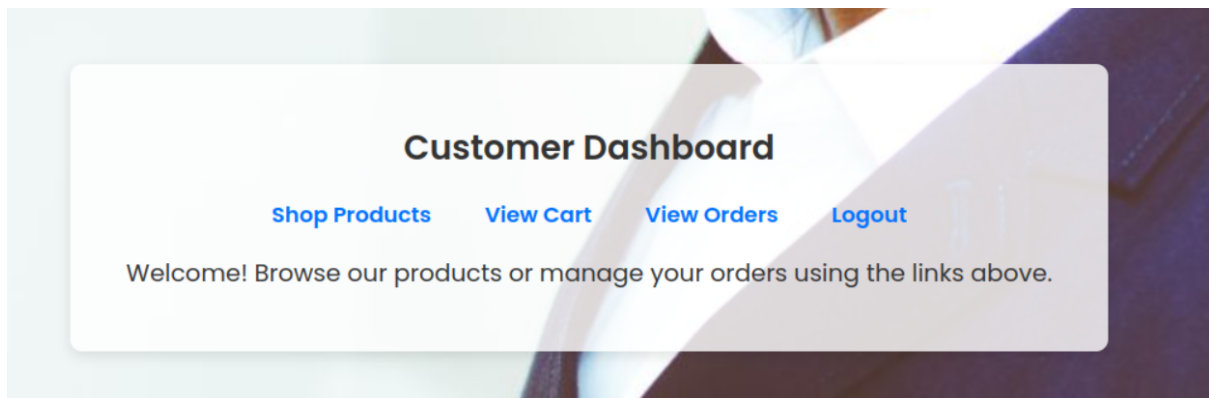


Figure 26: customer Dashboard Interface showing options for managing products, orders, and users.

5.7.3 Login Page

The figure below showcases the login page of the system. It includes fields for the user to enter their email and password, as well as links for account registration.

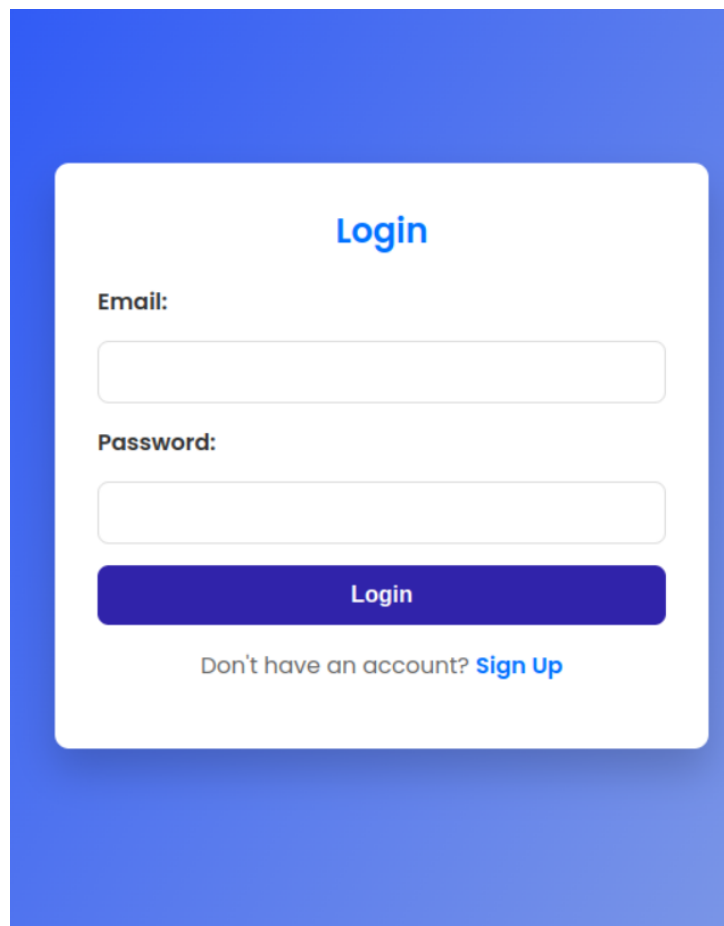
The image shows a login page with a blue gradient background. In the center is a white rounded rectangle containing the login form. At the top of this rectangle is the word "Login" in blue. Below it are two labels, "Email:" and "Password:", each followed by a white input field with a thin grey border. Under the password field is a solid blue button with the word "Login" in white. At the bottom of the white rectangle is the text "Don't have an account?" followed by a blue "Sign Up" link.

Figure 27: Login page interface, featuring email and password fields with a "Sign Up" link for admin and customer

5.7.4 Sign Up Page

The figure below showcases the **Sign Up** page of the system. Users can enter their username, email, password, and select a role before submitting their information to create an account.

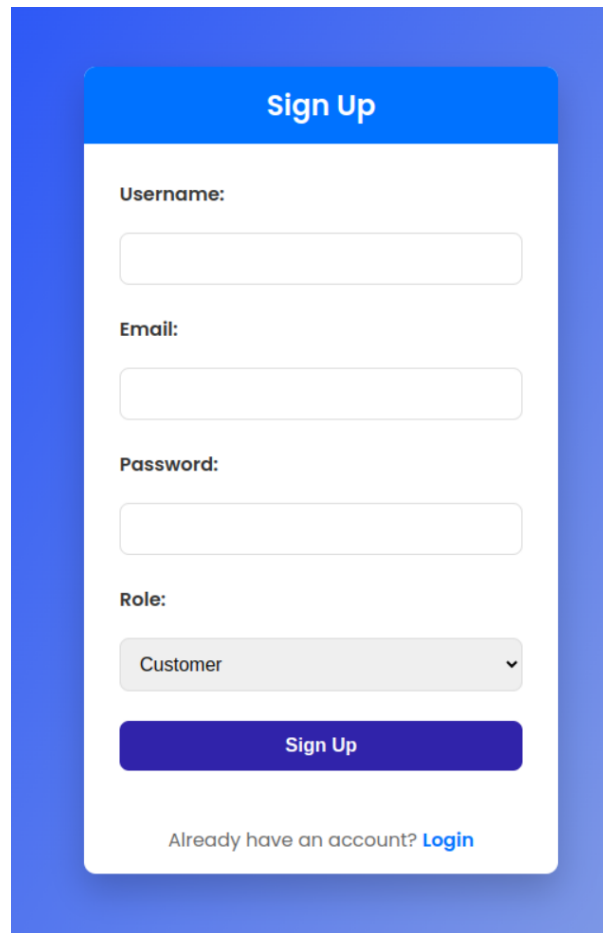
The image shows a 'Sign Up' form interface. It has a blue header with the text 'Sign Up'. Below the header, there are four input fields: 'Username:', 'Email:', 'Password:', and 'Role:'. The 'Role:' field is a dropdown menu with 'Customer' selected. At the bottom of the form is a blue button labeled 'Sign Up'. Below the button, there is a link that says 'Already have an account? Login'.

Figure 28: Sign Up page interface with fields for account creation and a login redirection link.

6 Planning of the Project

Date	Task
oct 2024	Complete user management module.
nov 2024	Develop vehicle inventory module.
nov 2025	Implement feedback and reporting modules.
dec 2025	Conduct unit and system testing.