

PROJECT DESIGN & PLANNING REPORT

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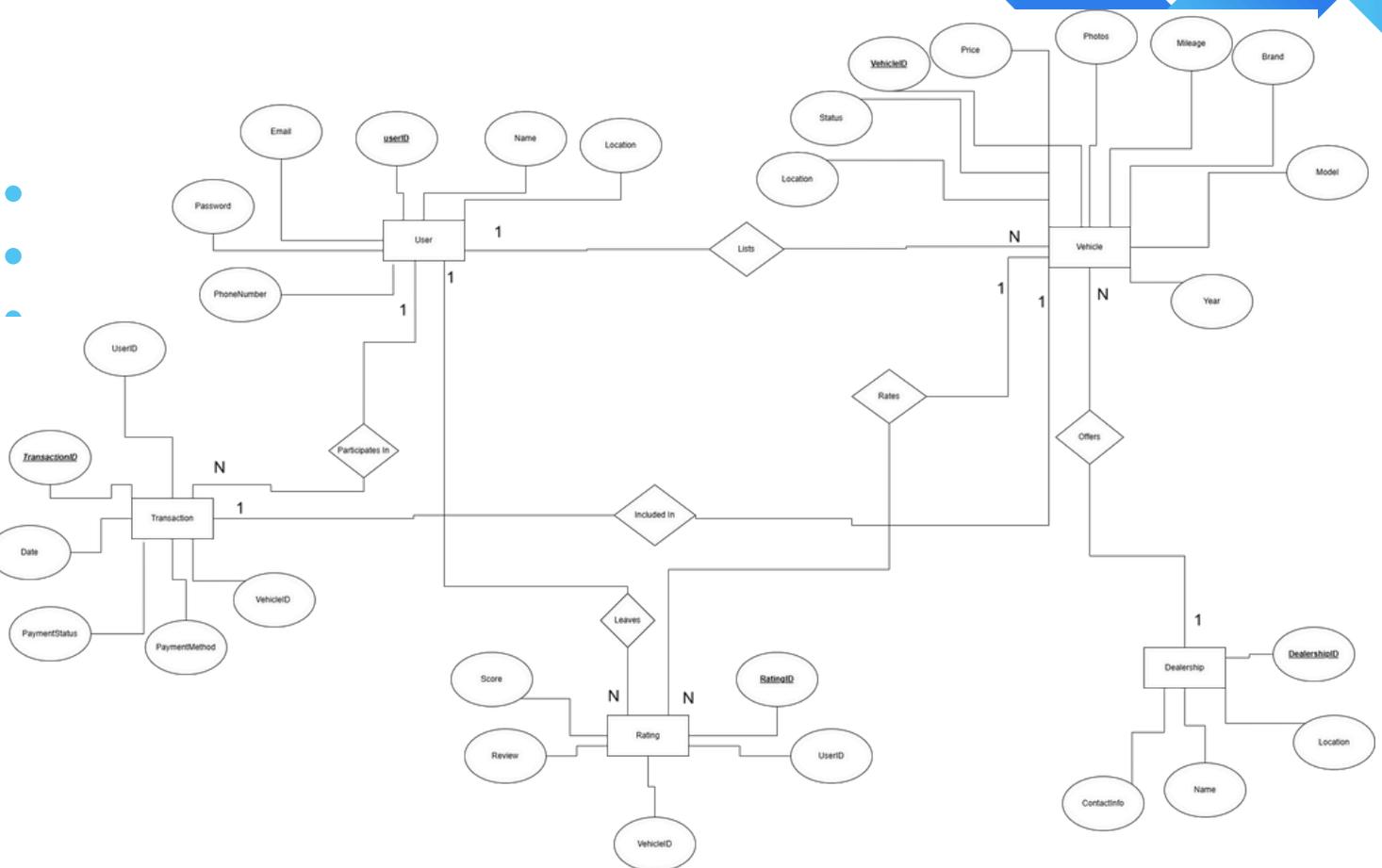
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Database Design



Relational Schema

```

users(userID, name, email, password, phone_number, location, role)
vehicles(TransactionID, photos, price, mileage, brand, model, year, location,
status, user_id, dealership_id)
dealerships(DealershipID, name, location, contact_info)
transactions(TransactionID, buyer_id, seller_id, vehicle_id, payment_method,
payment_status, date)
ratings(VehicleID, user_id, vehicle_id, score, review)

```

User Table

- userId (Primary Key)
- name
- email
- password
- phone_number
- location

Vehicle Table

- vehicleId (Primary Key)
- photos
- price
- mileage
- brand
- model
- year
- location
- status
- user_id (Foreign Key referencing User.id)
- dealership_id (Foreign Key referencing Dealership.id)

Dealership Table

- dealershipId (Primary Key)
- name
- location
- contact_info

Transaction Table

- transactionId (Primary Key)
- buyer_id (Foreign Key referencing User.id)
- seller_id (Foreign Key referencing User.id)
- vehicle_id (Foreign Key referencing Vehicle.id)
- payment_method
- payment_status
- date

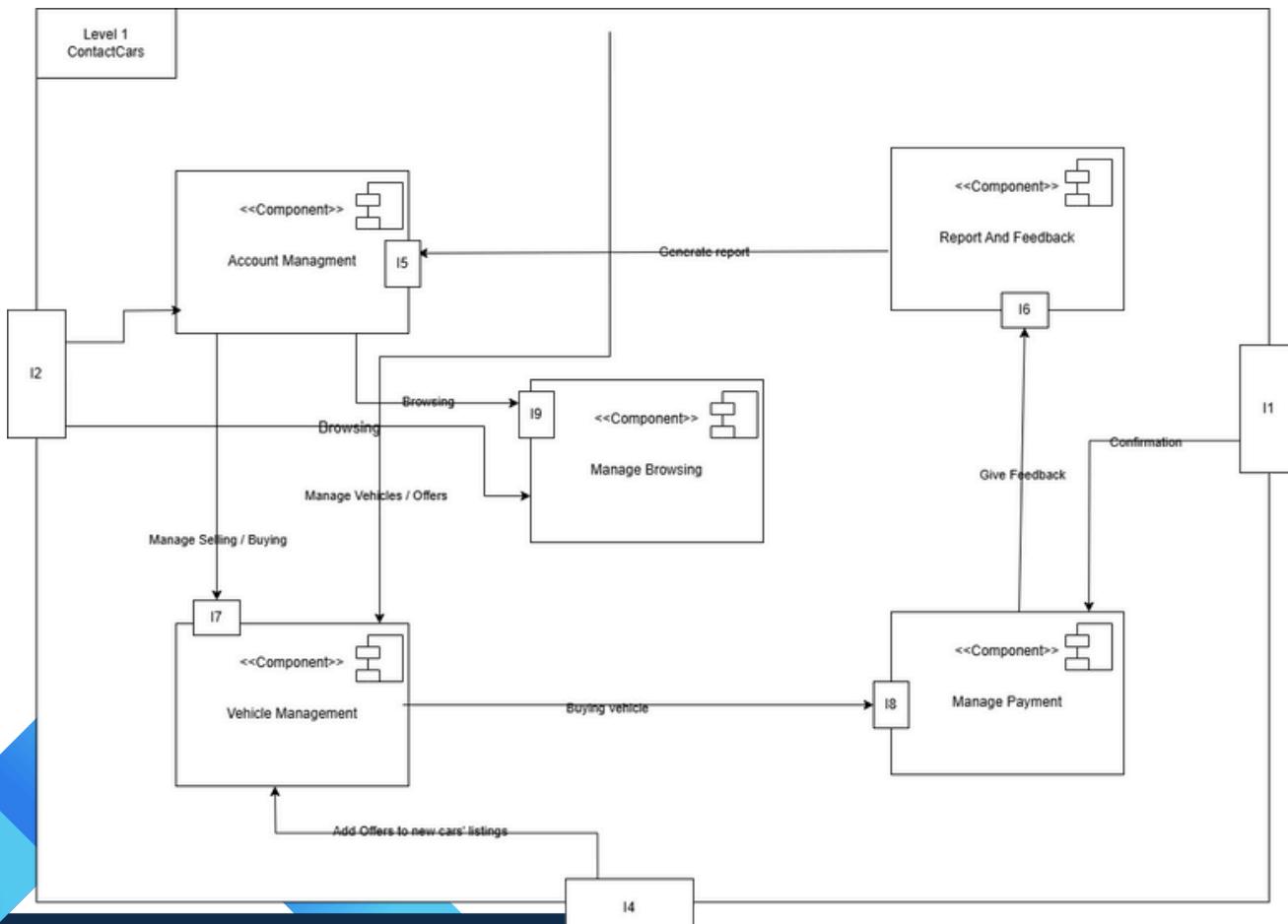
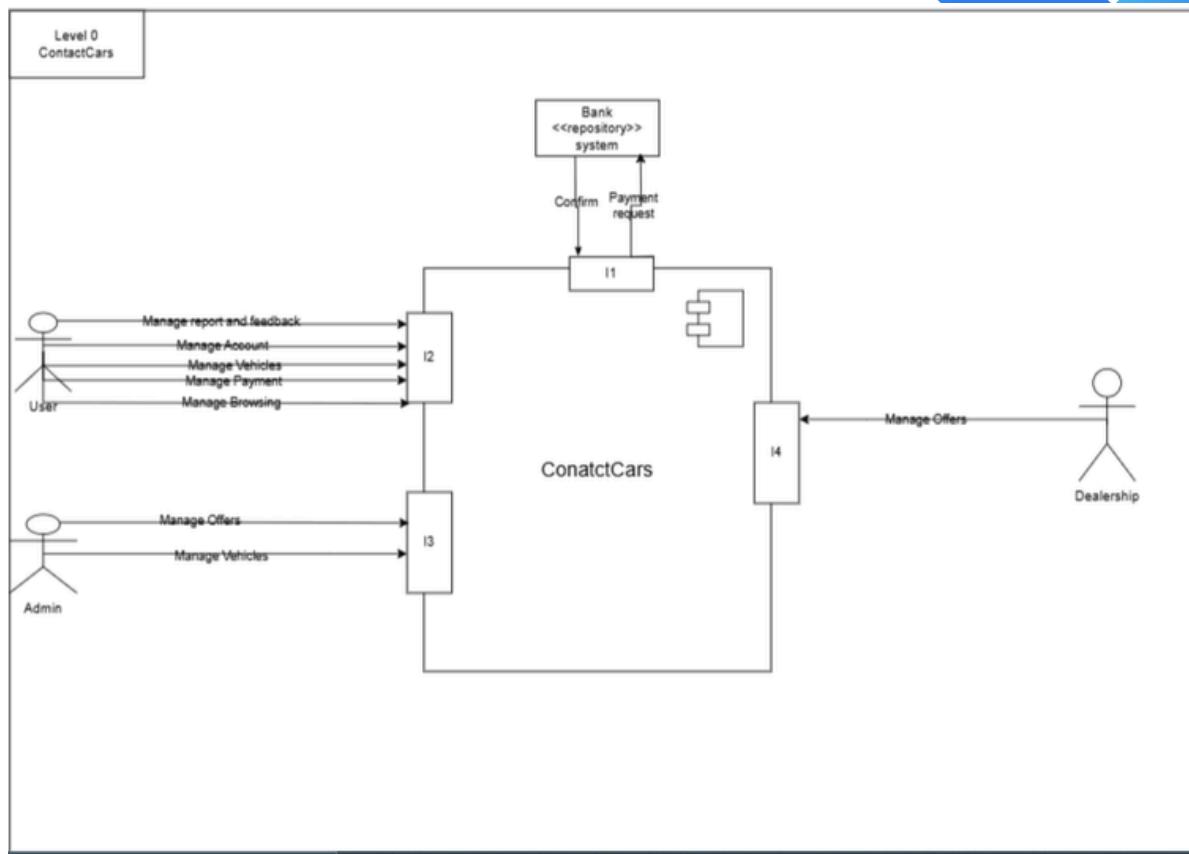
Rating Table

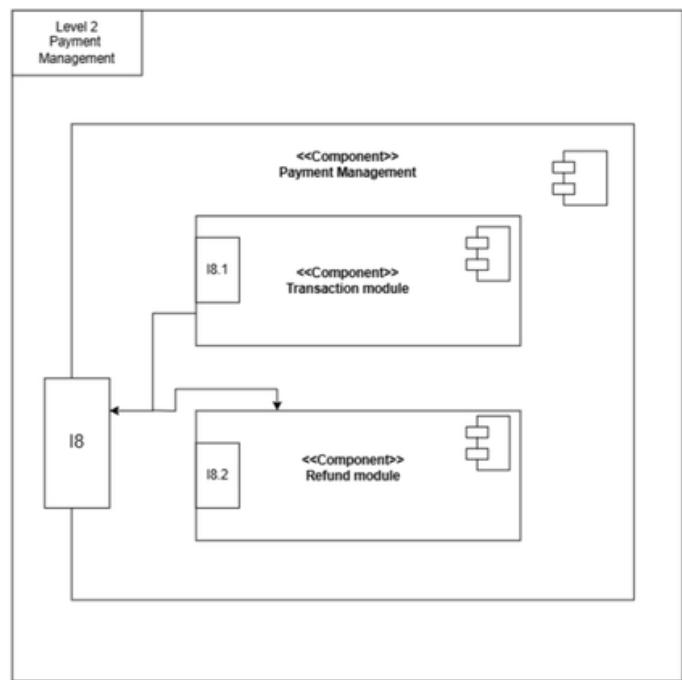
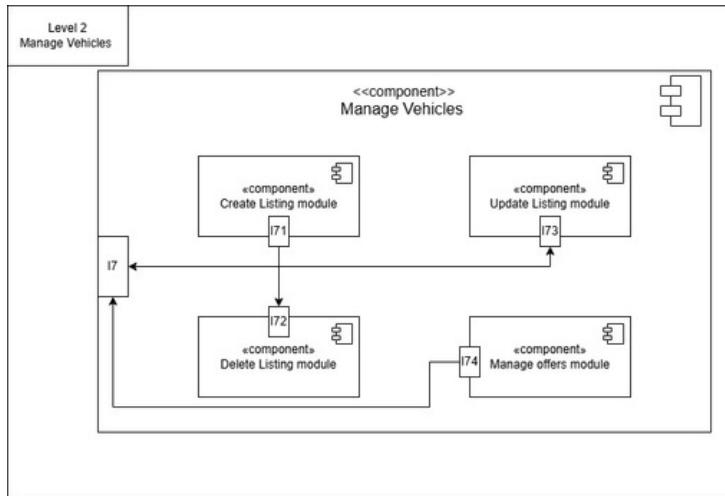
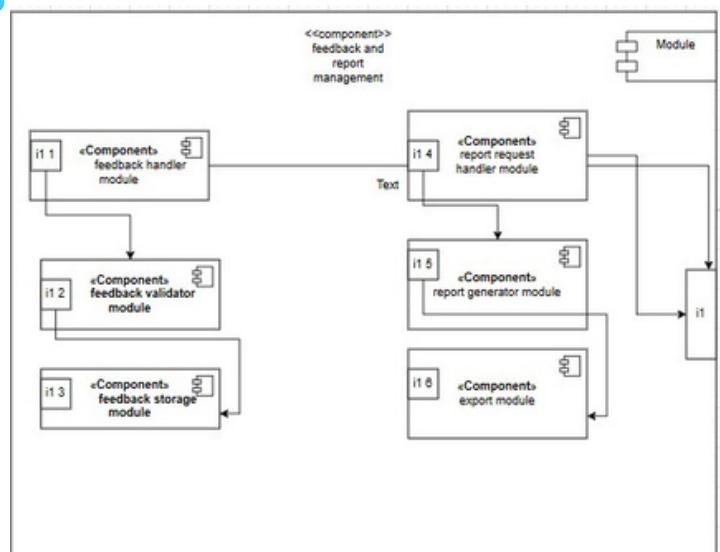
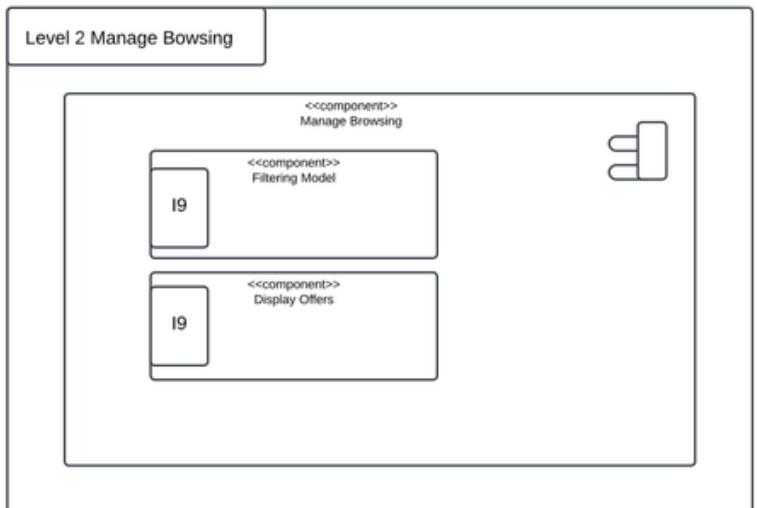
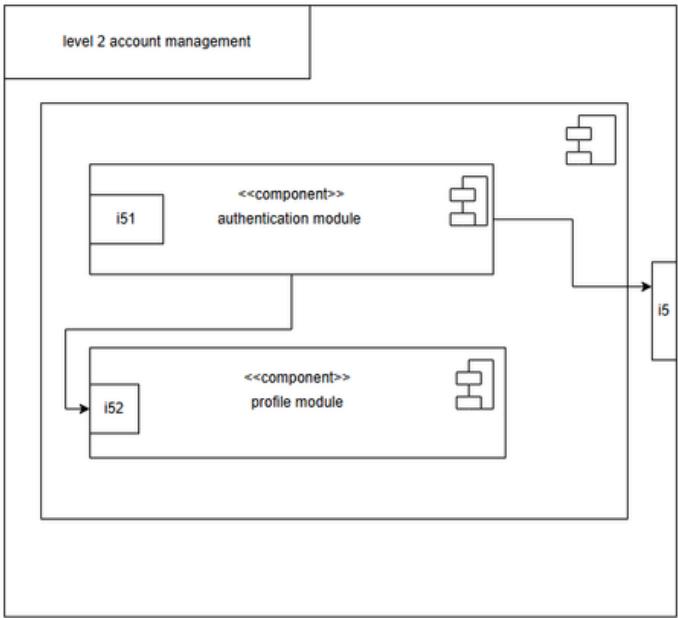
- ratingId (Primary Key)
- user_id (Foreign Key referencing User.id)
- vehicle_id (Foreign Key referencing Vehicle.id)
- score
- review

Relationships

- User (One) "Lists" → (Many) Vehicle
- User (One) "Participates In" → (Many) Transaction
- Dealership (One) "Offers" → (Many) Vehicle
- Vehicle (One) "Included In" → (One) Transaction
- User (One) "Leaves" → (Many) Rating
- Rating (Many) "Rates" → (One) Vehicle

The Architecture Models





Internal and External Interfaces Definitions.

Level 0 Interfaces Description

- **I1 (User Interface):**

Enables users to register, log in, browse cars, manage listings, and communicate with buyers/sellers.

- **I2 (Payment Interface):**

Facilitates payment transactions for new cars, including integration with external payment systems.

- **I3 (Admin Interface):**

Allows administrators to manage user accounts, dealership contracts, vehicle listings, and system notifications.

- **I4 (Dealership Interface):**

Enables dealerships to add new car listings, set offers, and view buyer details after transactions.

Level 1 Interfaces Description

- **I5 (Vehicle Management Interface):**

Handles user interactions with vehicle listings, allowing users to add, edit, delete, and search for vehicles.

- **I6 (Transaction Management Interface):**

Manages communication between the system and external payment gateways, ensuring secure and verified transactions.

- **I7 (Notification Service Interface):**

Sends updates to users regarding new offers, messages, or changes to vehicle listings via email, SMS, or push notifications.

- **I8 (Rating and Review Interface):**

Manages user-submitted ratings and reviews for vehicles and transactions, ensuring visibility on relevant listings.

Level 2 Interfaces Description

- **Authentication Module ↔ Account Management Module:**

Ensures secure user login and allows updates to user profile details such as phone number and location.

- **Vehicle Listing Module ↔ Search and Filter Module:**

Retrieves and displays vehicles matching the search criteria provided by users, such as brand, model, or price range.

- **Dealership Management Module ↔ Offer Management Module:**

Facilitates dealerships in creating and updating special offers on new cars listed on the platform.

- **Transaction Module ↔ Payment Processing Module:**

Handles the processing of payments, updating the vehicle status (e.g., Reserved or Sold) once a transaction is completed.

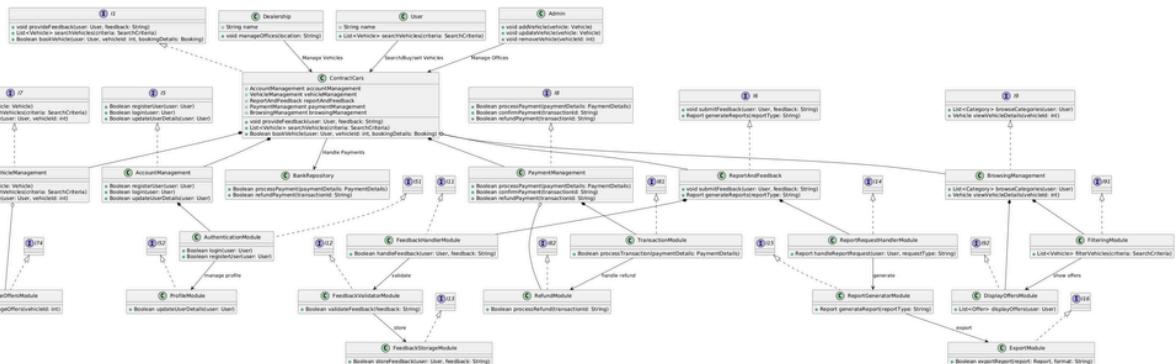
- **Notification Module ↔ User Interaction Module:**

Sends notifications to users about listing updates, offers, and messages based on their preferences.

- **Review and Rating Module ↔ Vehicle Listing Module:**

Collects and displays user reviews and ratings associated with specific vehicles and dealerships.

Class Diagram

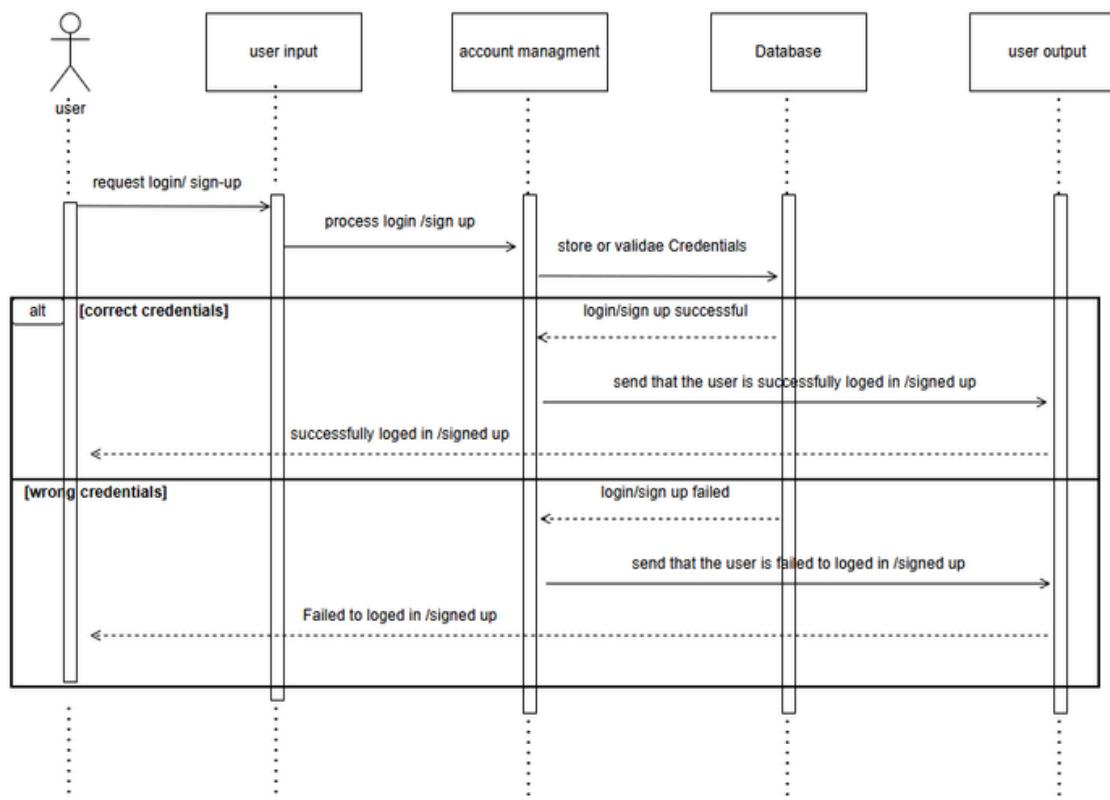


The Mapping Modeling Matrix

Use Cases / Classes	User	Admin	Profile	AuthenticationService	Vehicle	Seller	Buyer	ListingService	SearchService	Filter	Wishlist	Dealer	Contract	Offer	Message	CommunicationService	Payment	Transaction	BankSystem	Review	Rating	DatabaseManagement
Account Management	✓	✓	✓	✓																		✓
Vehicle Listing Management					✓	✓	✓	✓														✓
Search and Filter					✓				✓	✓												✓
Wishlist Management	✓				✓		✓				✓											✓
Dealer Management		✓			✓	✓						✓	✓									✓
Offers Management						✓	✓					✓		✓								✓
Communication Management	✓	✓													✓	✓						✓
Payment Management																	✓	✓	✓			✓
Rating and Review System	✓						✓											✓	✓	✓	✓	✓

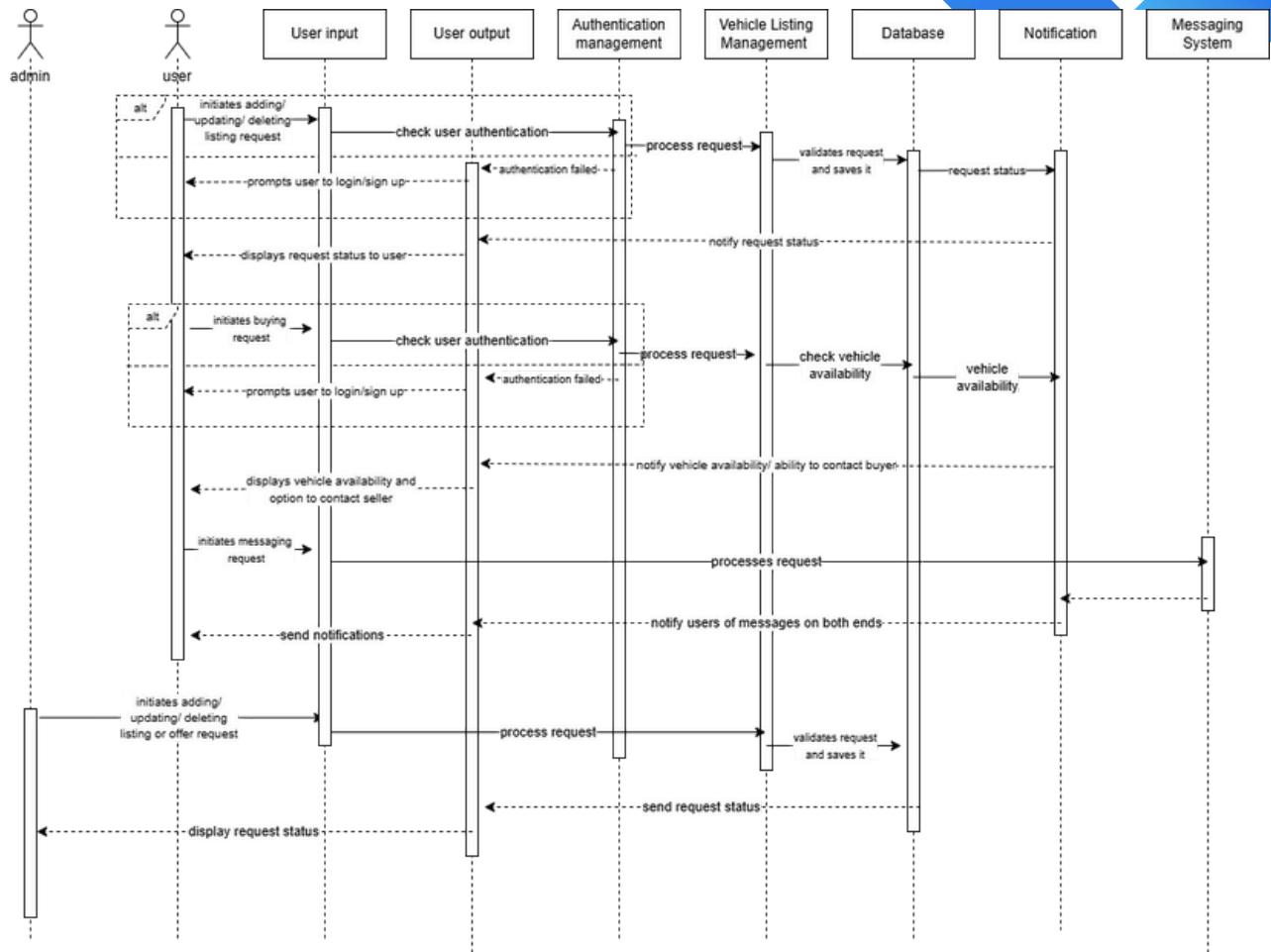
The Sequence Diagrams

Manage account:

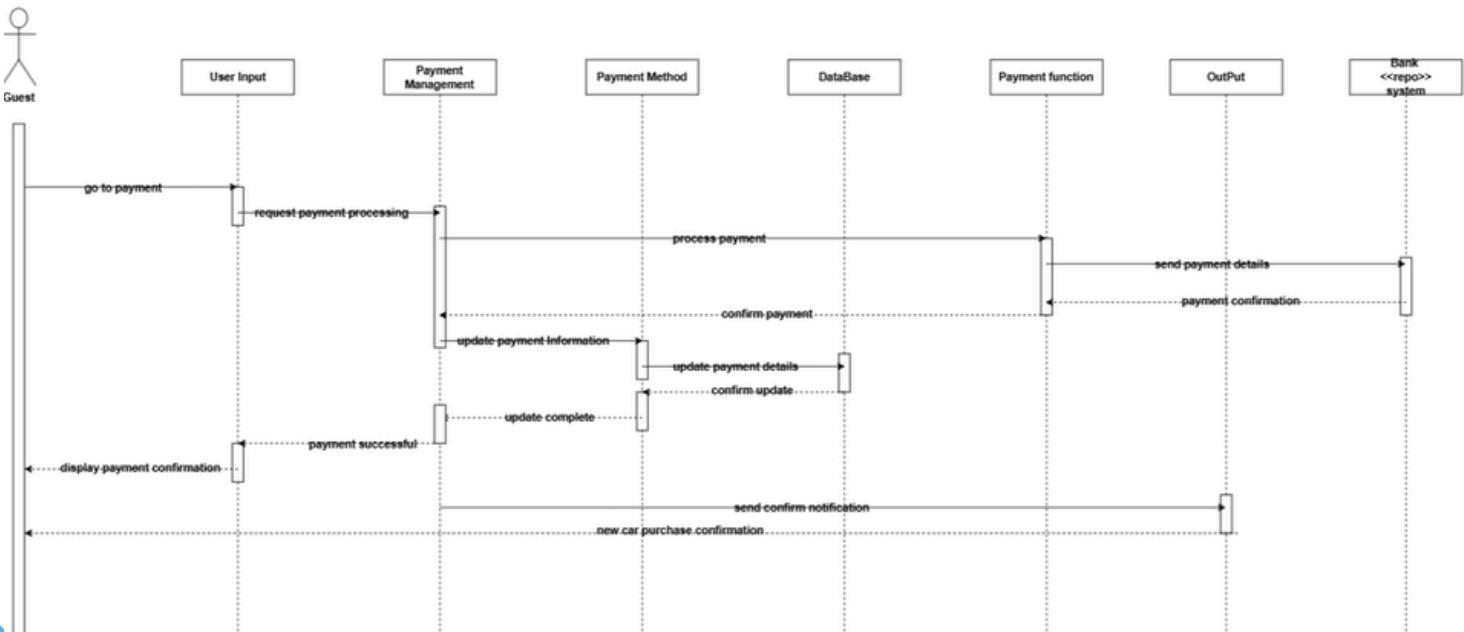


Manage browsing:

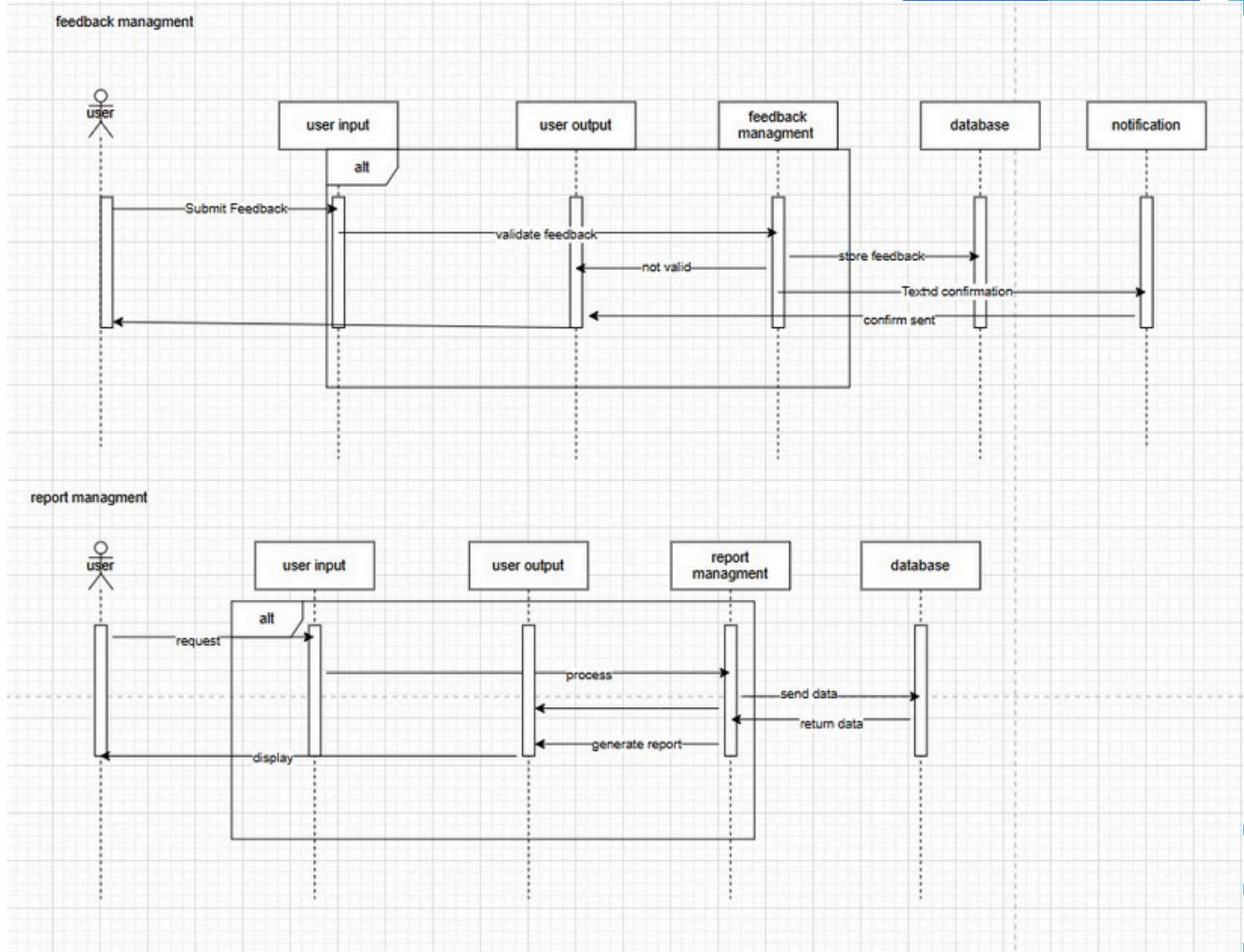
Manage vehicles:



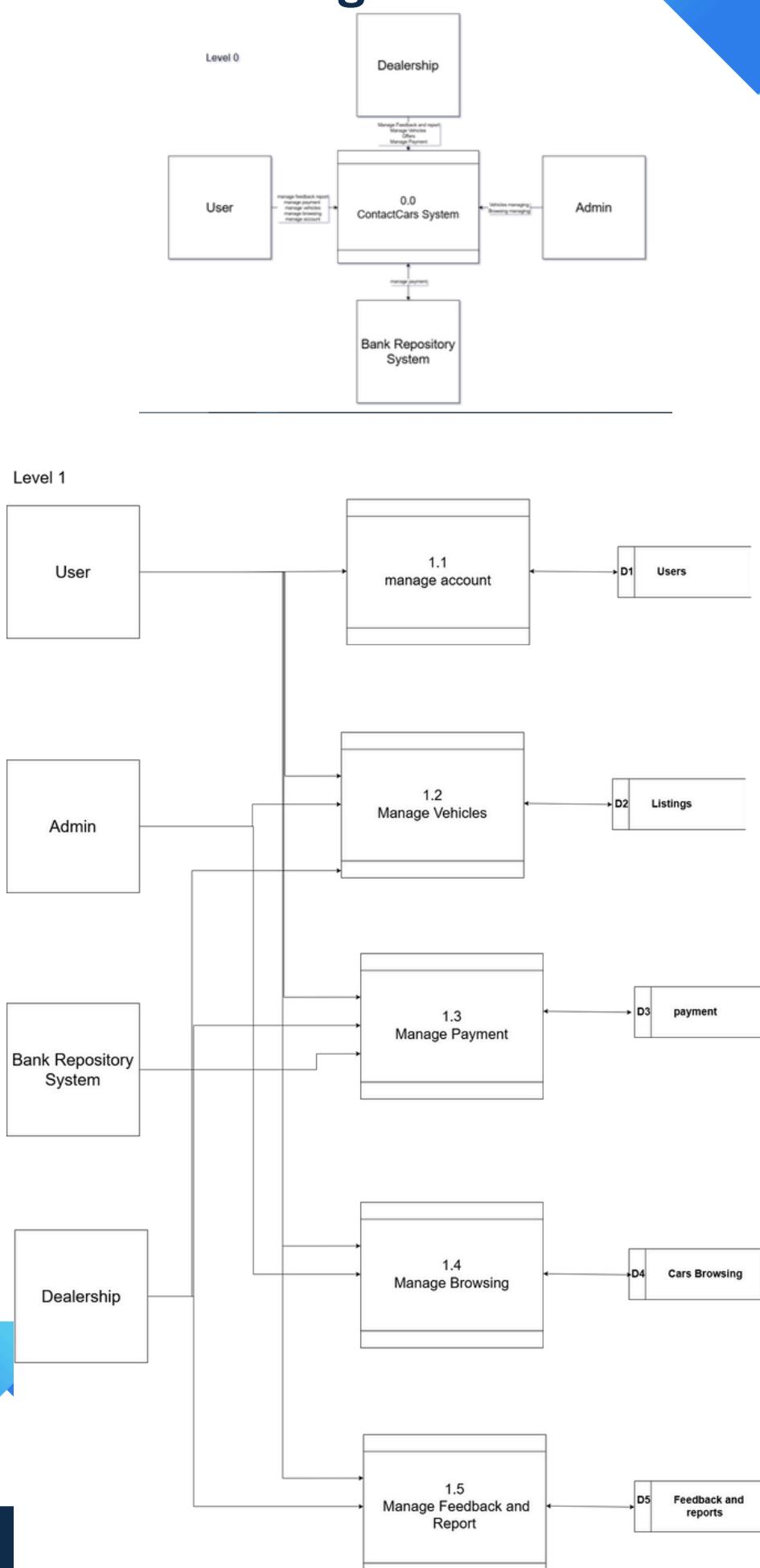
Manage payment:

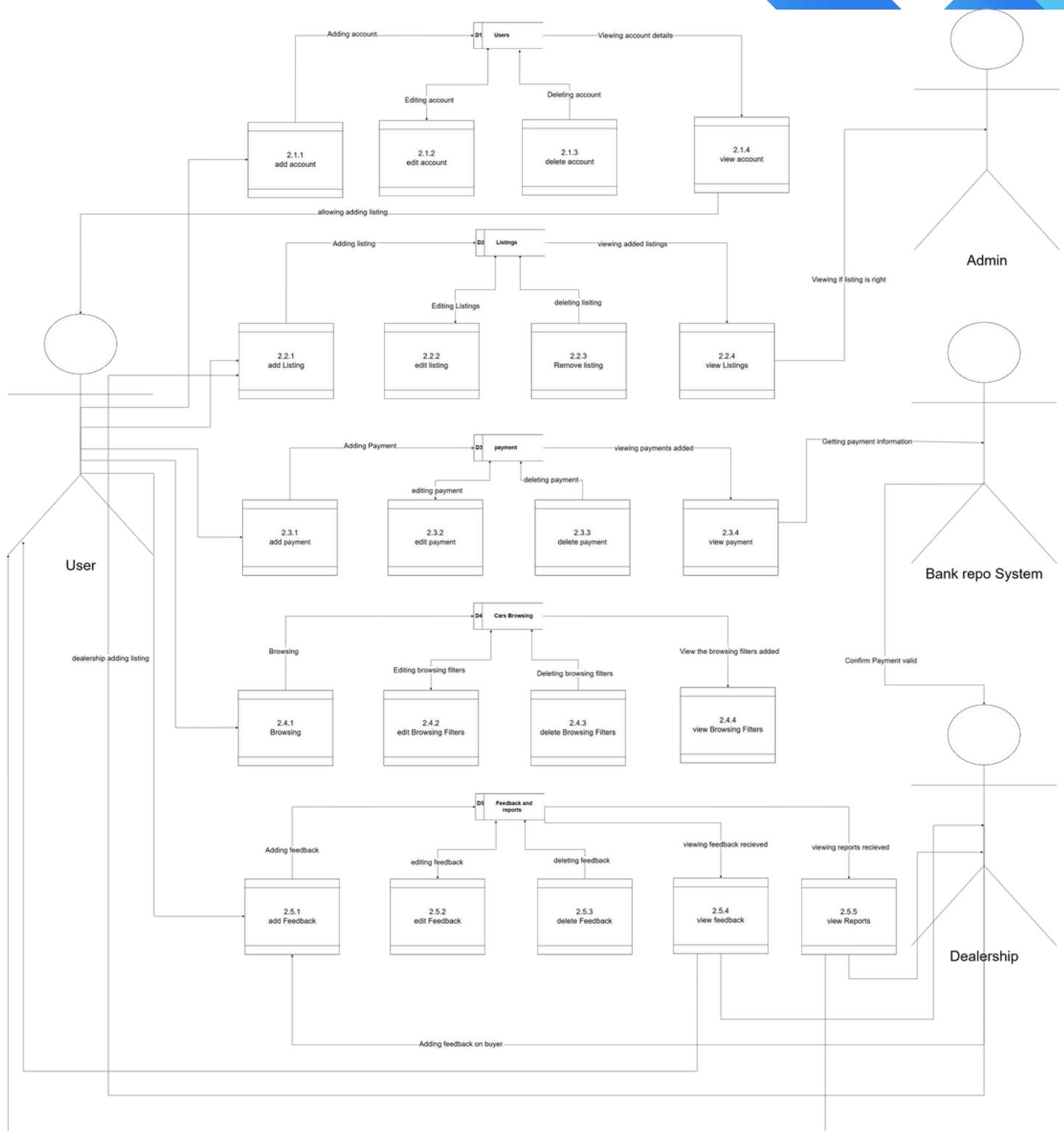


Manage report and feedback:



The Data Flow Diagrams





Usecase Estimations Using Fibonacci

Use Case	Description	Effort (Fibonacci Points)
Sign Up and Login	User account creation, login, and profile updates.	5
Guest Access	Allow guests to browse vehicles but restrict certain actions.	3
Vehicle Listing Management	Sellers add, edit, and delete used car listings; admin manages new car listings.	8
Search and Filter	Buyers search for vehicles using filters like brand, model, year, and location.	8
Messaging System	Buyers and sellers exchange messages; admins monitor communications.	8
Payment Processing	Handle transactions for new cars and cash-only payments for used cars.	13
Notification System	Send updates about messages, offers, or vehicle statuses.	5
Wishlist Management	Allow users to add, view, and manage favorite vehicles.	3
Dealership Management	Admin manages dealership contracts, adds offers, and tracks sales.	8
Rating and Review	Users leave ratings and reviews for sellers, buyers, and dealerships.	5
Reporting and Feedback	Generate reports and collect user feedback; display dealership responses.	8

Total Effort Calculation

- Add all Fibonacci points: $5+3+8+8+8+13+5+3+8+5+8=76$
- **Velocity:** Assume a team velocity of 10 points per sprint (adjustable based on team size and skill level).
- Estimated Sprints: $\lceil 76/10 \rceil = 8$ sprints.

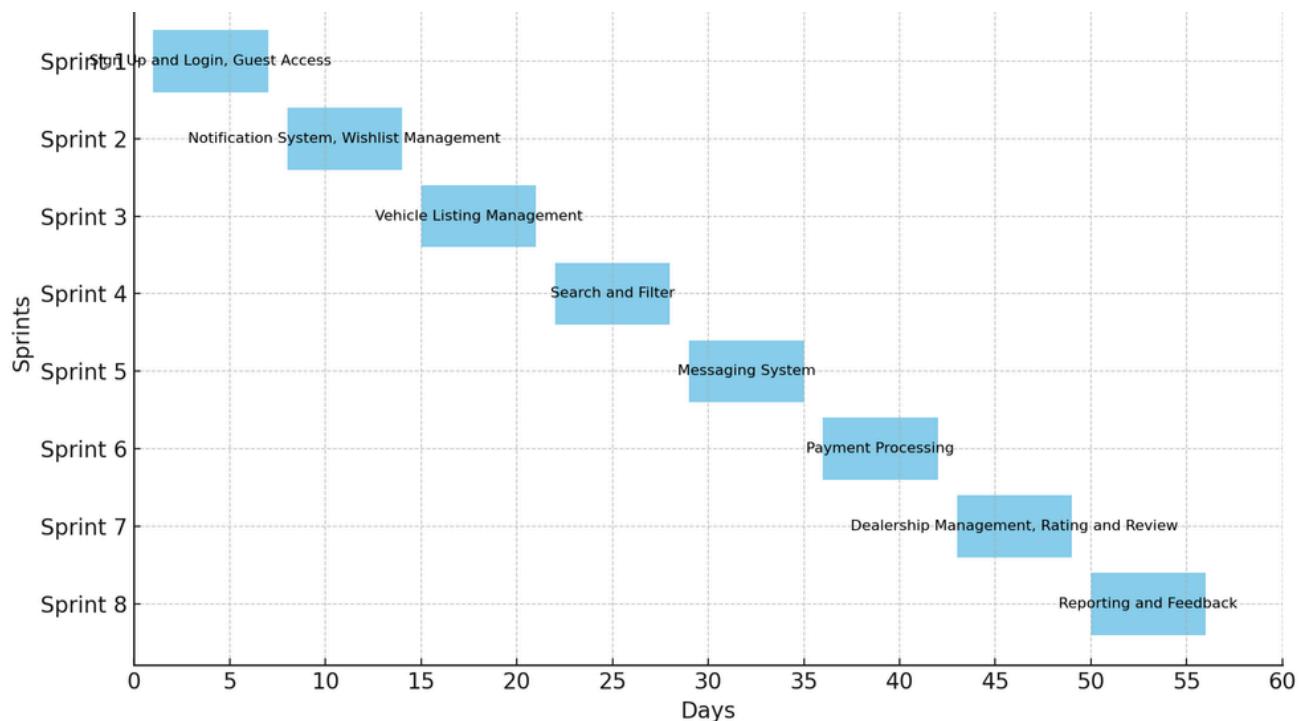
Rough Timeline (8 Sprints)

Sprint	Tasks (Use Cases)	Estimated Effort
Sprint 1	Sign Up and Login, Guest Access	$5 + 3 = 8$
Sprint 2	Notification System, Wishlist Management	$5 + 3 = 8$
Sprint 3	Vehicle Listing Management	8
Sprint 4	Search and Filter	8
Sprint 5	Messaging System	8
Sprint 6	Payment Processing	13
Sprint 7	Dealership Management, Rating and Review	$8 + 5 = 13$
Sprint 8	Reporting and Feedback	8

Textual Gantt Chart Representation

Sprint	Start	End	Tasks
Sprint 1	Day 1	Day 7	Sign Up and Login, Guest Access
Sprint 2	Day 8	Day 14	Notification System, Wishlist Management
Sprint 3	Day 15	Day 21	Vehicle Listing Management
Sprint 4	Day 22	Day 28	Search and Filter
Sprint 5	Day 29	Day 35	Messaging System
Sprint 6	Day 36	Day 42	Payment Processing
Sprint 7	Day 43	Day 49	Dealership Management, Rating and Review
Sprint 8	Day 50	Day 56	Reporting and Feedback

The Gantt Chart



Testing Plan

1. Unit Tests:

- Unit Test 1:** Add user account (Account Management)
- Unit Test 2:** Authenticate user login (Account Management)
- Unit Test 3:** Update user profile (Account Management)
- Unit Test 4:** Create a vehicle listing (Vehicle Listing Management)
- Unit Test 5:** Edit a vehicle listing (Vehicle Listing Management)
- Unit Test 6:** Delete a vehicle listing (Vehicle Listing Management)
- Unit Test 7:** Search for vehicles using filters (Search and Filter Management)
- Unit Test 8:** Add a vehicle to the wishlist (Wishlist Management)
- Unit Test 9:** Remove a vehicle from the wishlist (Wishlist Management)
- Unit Test 10:** Add a dealer contract (Dealer Management)
- Unit Test 11:** Add an offer to a new vehicle (Offers Management)
- Unit Test 12:** Send and receive messages (Communication Management)
- Unit Test 13:** Process payment (Payment Management)
- Unit Test 14:** Submit a review (Rating and Review System)

2. Regression Tests:

Regression Test 1: Validate the vehicle listing flow (create → edit → delete).

Regression Test 2: Confirm the user account creation and authentication processes remain functional after system updates.

Regression Test 3: Verify that search filters return accurate results.

Regression Test 4: Ensure wishlist functionality (add/remove) remains functional after updates.

Regression Test 5: Validate secure payment processing for both cash and credit card methods.

3. Integration Test Plan

Integration Test 1: Account Management → Vehicle Listing Management

Integration Test 2: Vehicle Listing Management → Search and Filter Management

Integration Test 3: Wishlist Management → Vehicle Listing Management

Integration Test 4: Offers Management → Dealer Management → Vehicle Listing Management

Integration Test 5: Payment Management → Bank System Integration

Integration Test 6: Communication Management → Messaging Service

4. System Testing Plan

System Test 1: Verify the entire user journey from guest access → account creation → vehicle search → vehicle purchase → review submission.

System Test 2: Test concurrent usage by multiple users (e.g., searching, messaging, and making payments simultaneously).

System Test 3: Validate admin functionalities like user management, dealer management, and system monitoring.

System Test 4: Verify secure payment processing for both new and used cars with appropriate restrictions.