Project Milestone 3

Vehicle Transport Management System (VTMS)

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1 Introduction

The Vehicle Transport Management System (VTMS) Milestone 3 Design Report documents the complete system architecture derived from the IEEE 830-1998 compliant Software Requirements Specification (SRS FR1–FR13). The report translates functional requirements into UML design artifacts including Use Case, multi-level Data Flow Diagrams, Sequence Diagrams, Activity Diagrams, Class Diagram, and Component Diagram. An interactive Figma prototype demonstrates the direct order workflow (Terms → Vehicle Details → 30% Advance Payment → Tracking ID) for four system actors.

2 Design Assumptions and Constraints

2.1 Design Assumptions

- Payment gateways are reliable and PCI-DSS compliant
- Transport managers update shipment status in a timely manner
- Vehicle buyers accept system terms before paying 30% advance
- Notification services are reliable
- A fixed 50% pre-shipment refund policy is acceptable
- All users have valid email addresses
- System is accessed via modern web browsers
- No vehicle inventory management is required

2.2 Design Constraints

2.2.1 Technical Constraints

- Web-based system using RESTful architecture
- Relational database MySQL
- Third-party payment integration required

2.2.2 Performance Constraints

- Page load time within 3 seconds (95th percentile)
- Payment processing within 10 seconds
- System capacity for 100 concurrent users

2.2.3 Security and Regulatory Constraints

- HTTPS and Role-Based Access Control required
- PCI-DSS compliance for all payment operations
- GDPR compliance for user data
- Compliance with international vehicle export regulations

3 Key Design Decisions

3.1 Direct Order Workflow

Decision: Linear workflow without inventory browsing
Justification: Reduces system complexity and aligns with export-based business model

3.2 Centralized Order Entity

Decision: Single Order entity managing all related operations
Justification: Ensures data consistency, traceability, and simplified state management

3.3 Event-Driven Notifications

Decision: Automatic notifications triggered on order status changes
Justification: Enables real-time communication and reduces manual coordination

3.4 Fixed Refund Policy

Decision: Automatic 50% refund before shipment
Justification: Simplifies financial workflows and enforces business rules

3.5 Role-Based Dashboards

Decision: Four actor-specific dashboards post-login
Justification: Information hiding, task-focused interface, enhanced usability

3.6 3-Level DFD Decomposition

Decision: Context → Level 1 (6 processes) → Level 2 (Order Processing detail)
Justification: Systematic decomposition ensures traceability to all SRS functional requirements

4 System Design Diagrams

4.1 Use Case Diagram

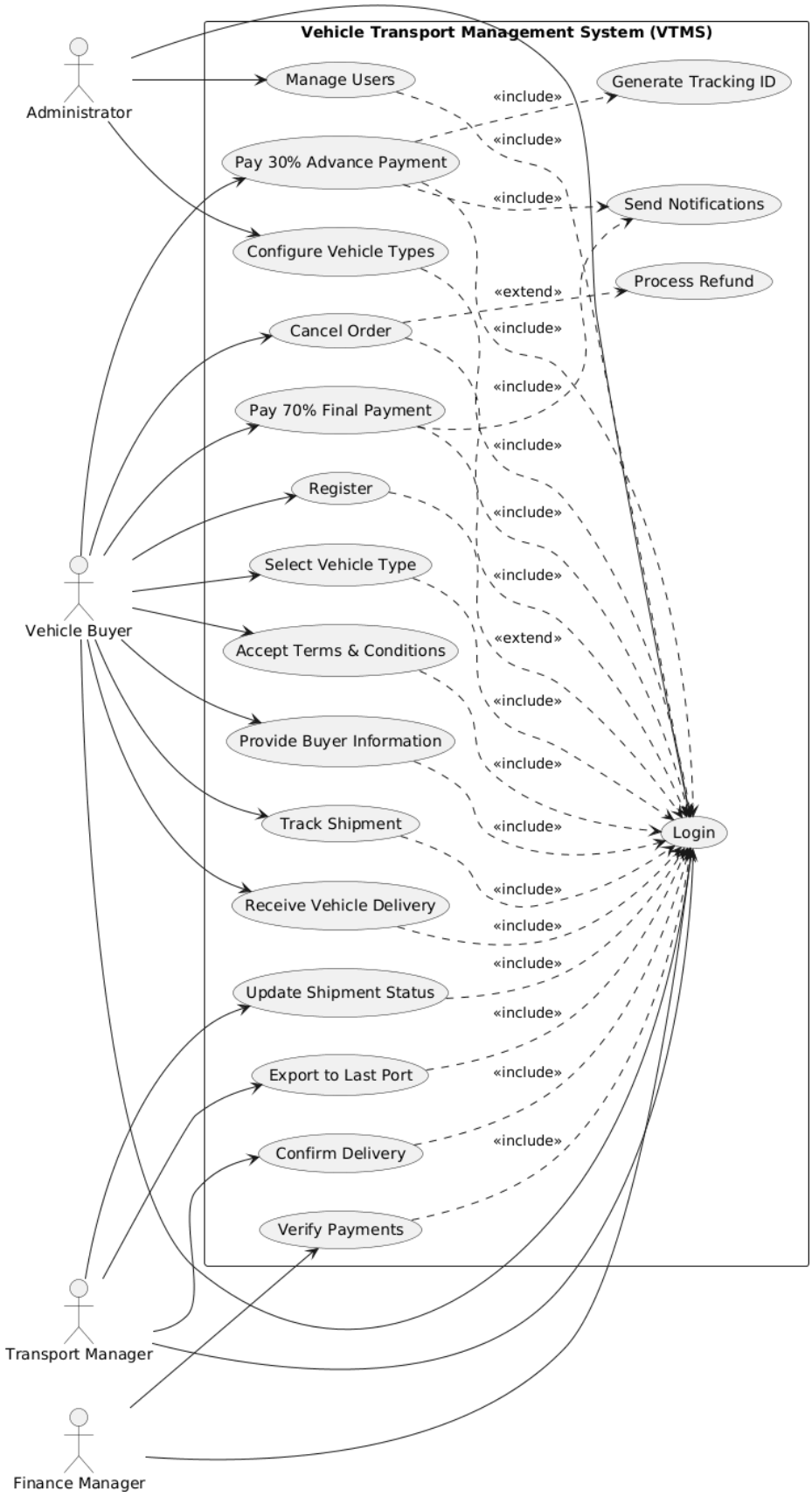


Figure 1: Use Case Diagram

4.2 Data Flow Diagrams

4.2.1 Context Diagram

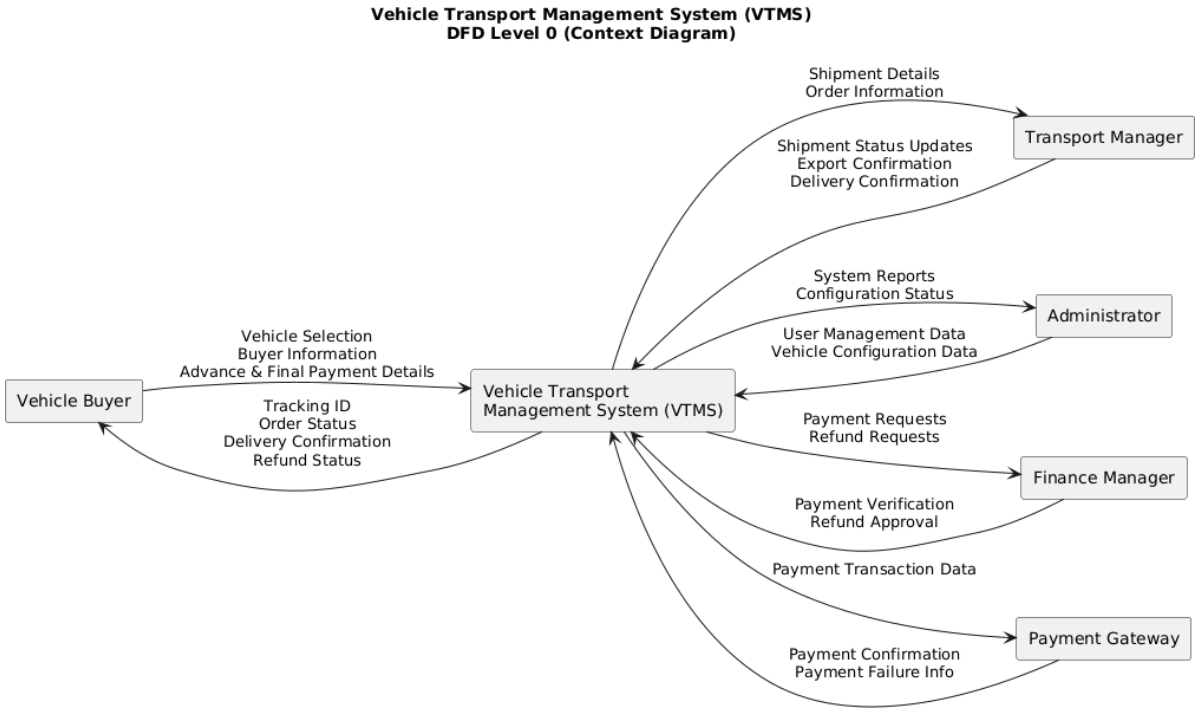
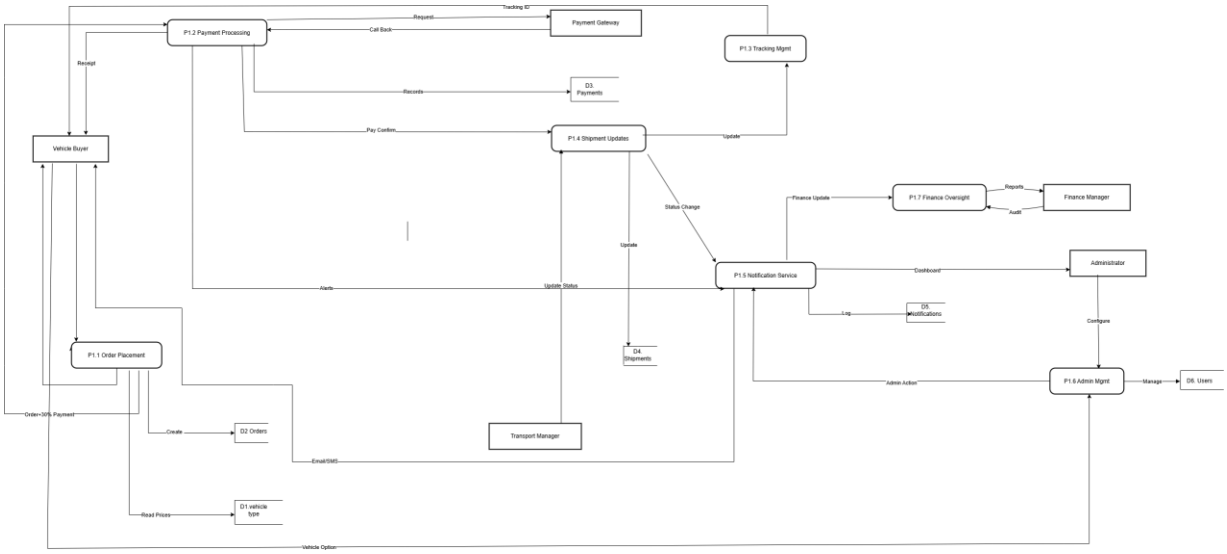
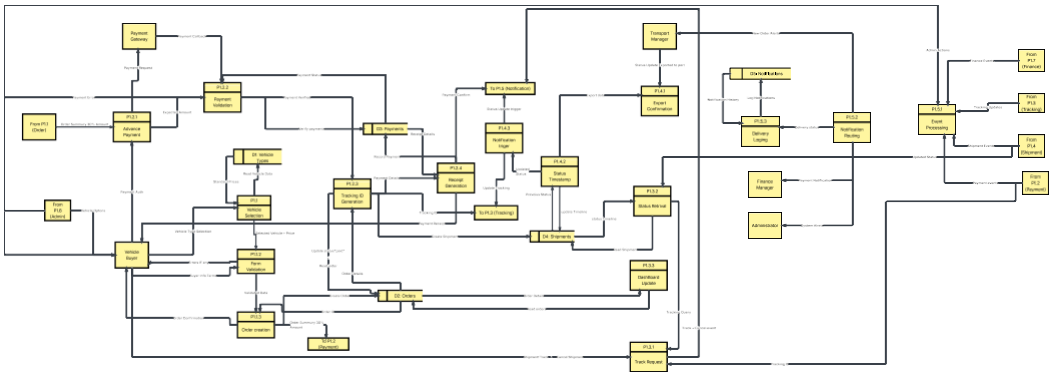


Figure 2: Context Diagram

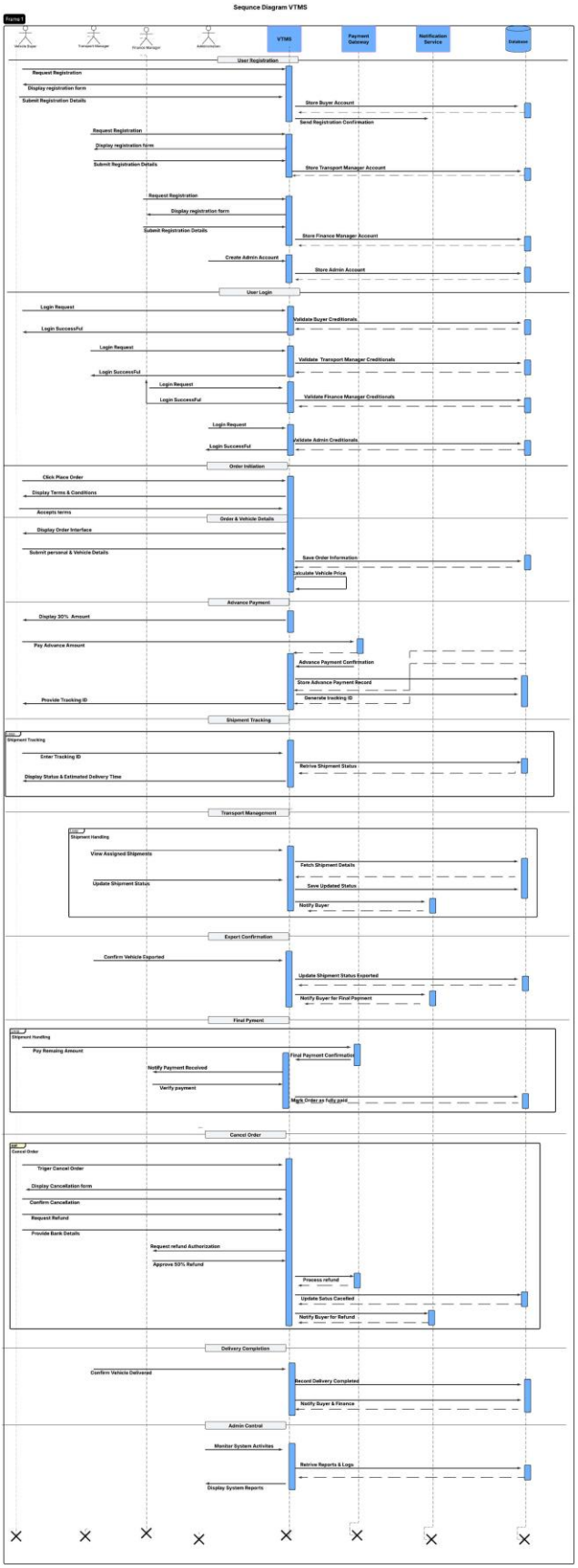
4.2.2 Level 1 DFD



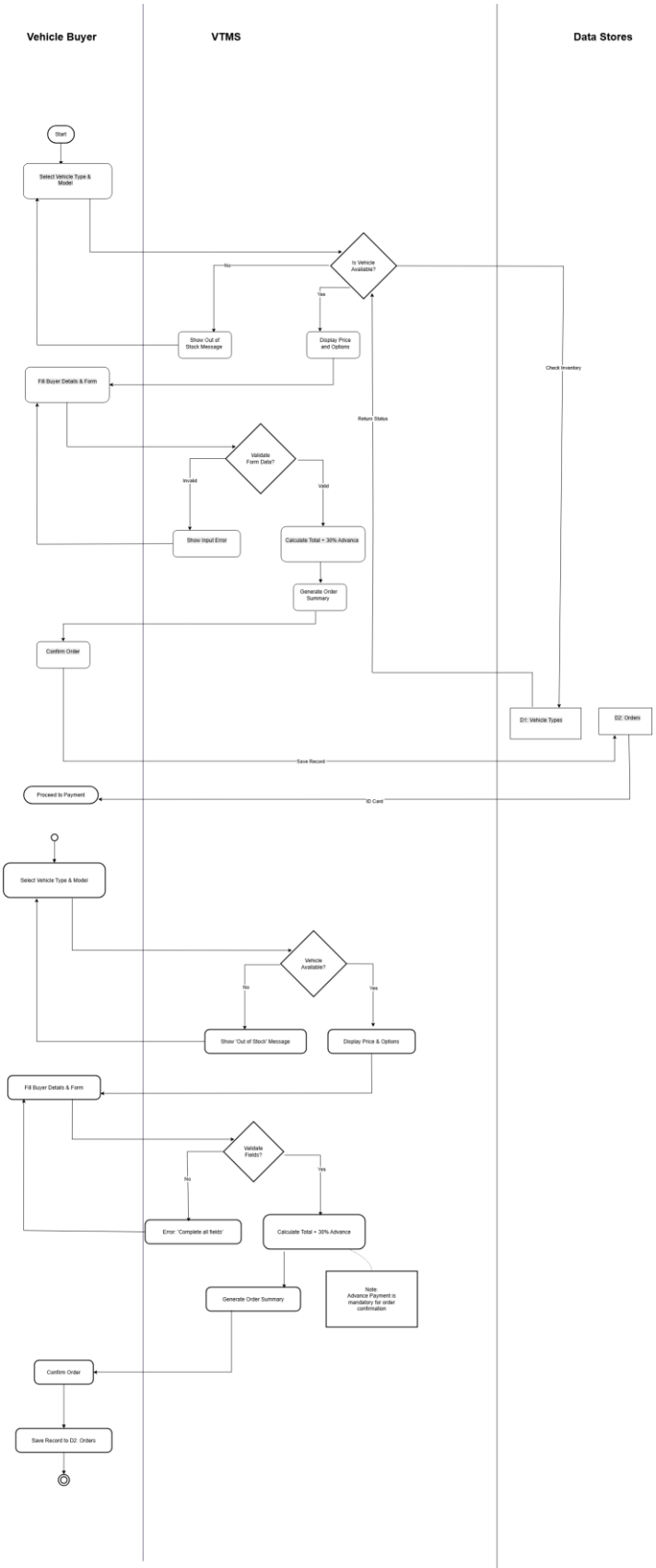
4.2.3 Level 2 DFD



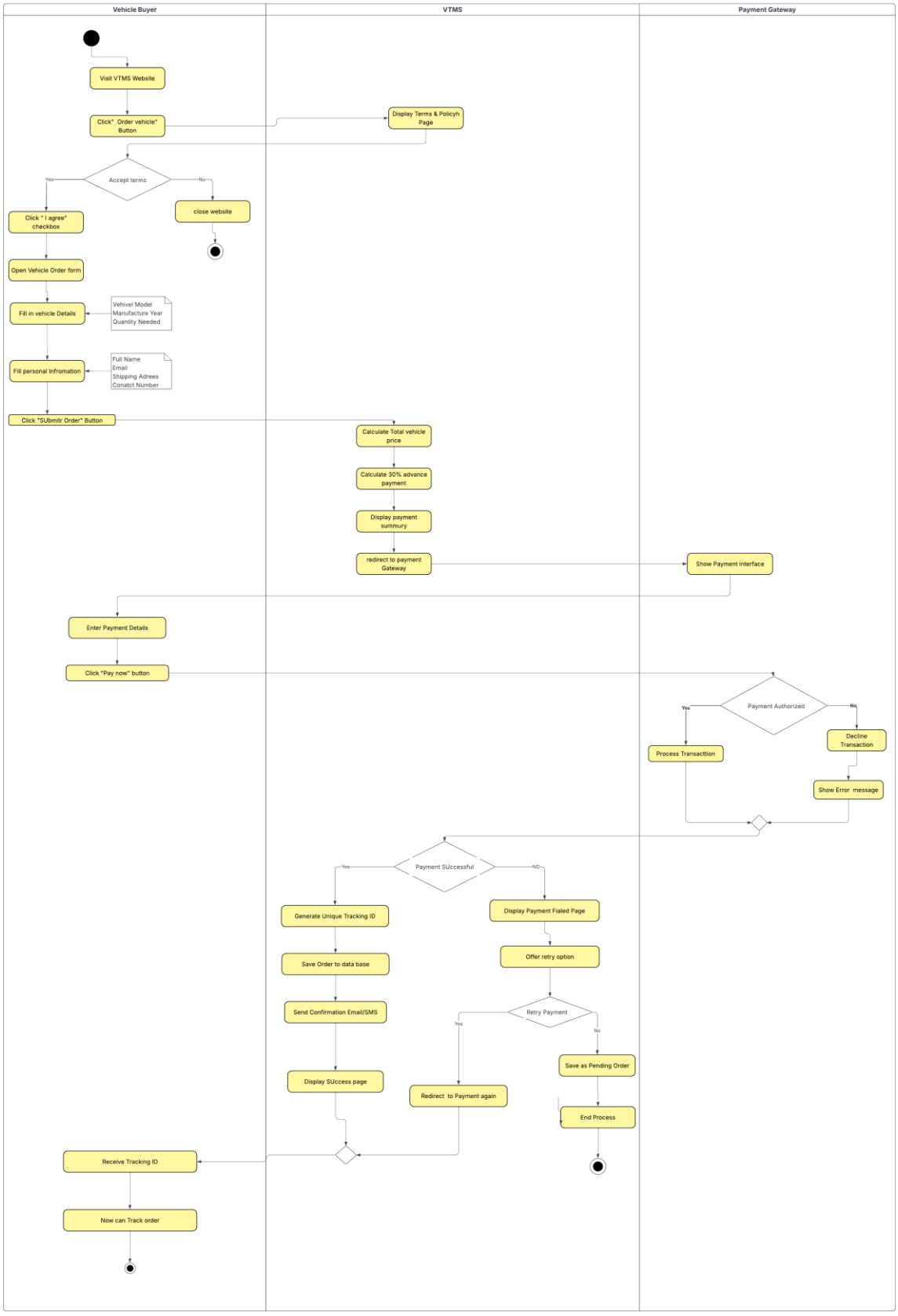
4.3 Sequence Diagram

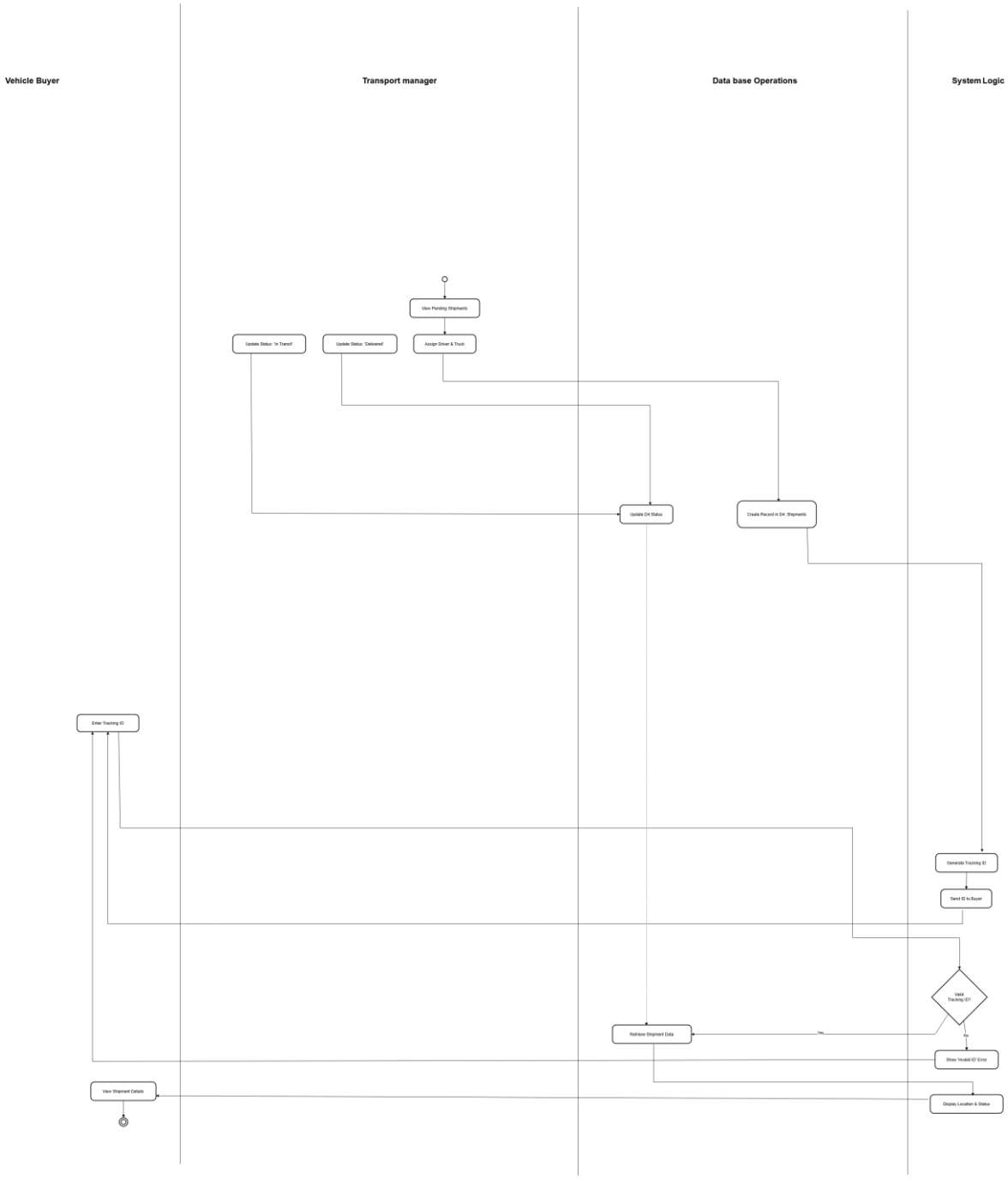


4.4 Activity Diagrams

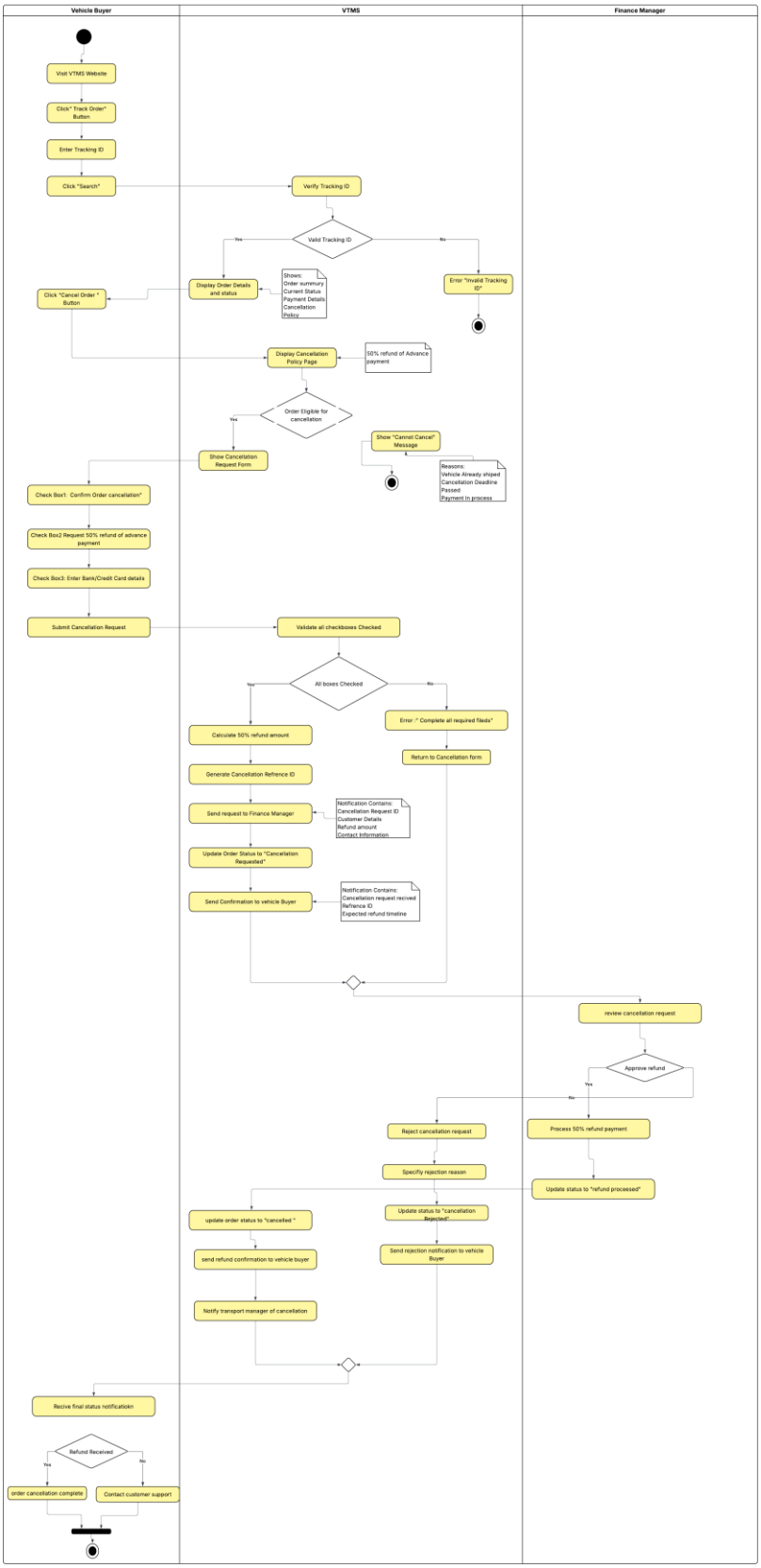


VTMS-Order initiation & Payment Process

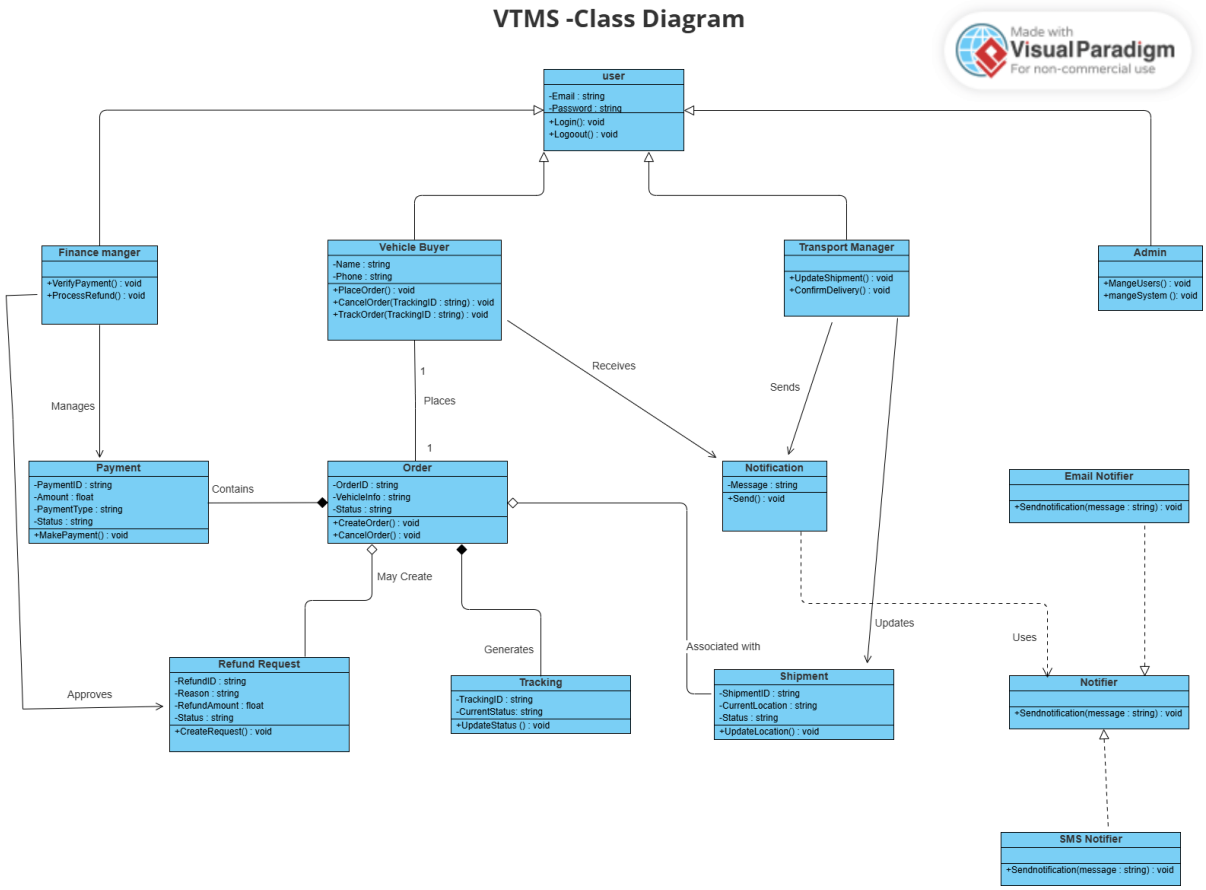



Vehicle Buyer
Transport manager
Data base Operations
System Logic
View Pending Shipments
Update Status: 'In Transit'
Update Status: 'Delivered'
Assign Driver & Truck
Update D4 Status
Create Record in D4: Shipments
Enter Tracking ID
Generate Tracking ID
Send ID to Buyer
Valid Tracking ID?
Yes
No
Retrieve Shipment Data
Show 'Invalid ID' Error
View Shipment Details
Display Location & Status

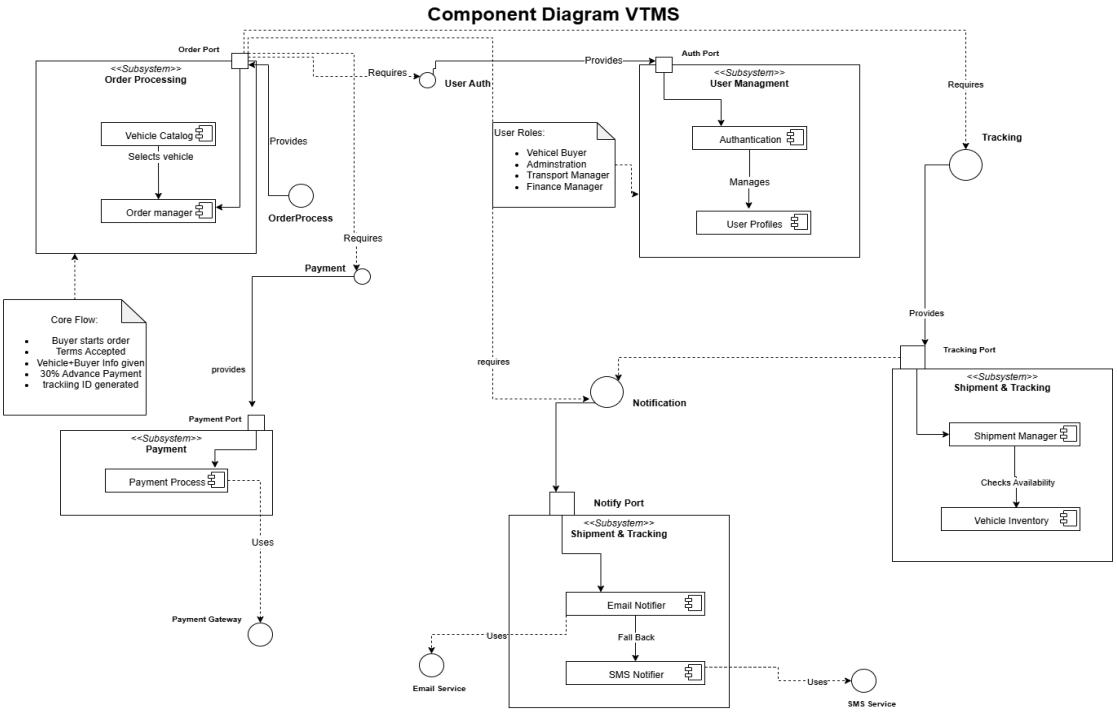
VTMS-Order Cancellation Process



4.5 Class Diagram



4.6 Component Diagram



5 VTMS Requirements-Design Traceability Matrix (No DFD0)

SRS ID	Requirement	Use Case	Activity	Sequence	Class	DFD Level	Component
FR0	User Registra-tion/Login	UC0	-	SD1	UserAccount	-	Web Frontend
FR1	Order Initiation	UC1	AD1	SD1	Order	DFD1	Web Frontend
FR2	Terms Agreement	UC1	AD1	SD1	Order	DFD1	Web Frontend
FR3	Vehicle + 30% Calc	UC1	AD1	SD1	Order, Payment	DFD1	Web Frontend
FR4	Advance Pay-ment	UC1	AD1	SD1	Payment	DFD2	Payment Gateway
FR5	Tracking ID	UC1	AD1	SD1	Tracking	DFD1	Database
FR6	Cancel Order	UC5	AD4	SD3	Refund	DFD3	Web Frontend
FR7	50% Refund	UC5	AD4	SD3	Refund	DFD2	Payment Gateway
FR8	Shipment Update	UC3	AD3	SD2	Shipment	DFD1	Database
FR9	Auto-Notify	UC3	AD3	SD2	Notification	-	Email Service
FR10	Delivery Confirm	UC4	-	SD4	Shipment	DFD1	Database
FR11	Final Payment	UC2	-	SD4	Payment	DFD2	Payment Gateway
FR12	Transport Dash-board	UC3	AD3	SD2	TransportManager	DFD1	Web Frontend
FR13	Admin Control	UC7	-	-	Administrator	-	Web Frontend

6 External Links

- GitHub Repository: https://www.figma.com/community/file/1594775358558253744/vehicle-transport-management-system
- Figma Prototype: https://www.figma.com/community/file/1594775358558253744/vehicle-transport-management-system
- Component Diagram: https://drive.google.com/file/d/1w3I8YHMO7Xnd2BCQXHnyN53aOaGOV view?usp=sharing
- Sequence Diagram: https://lucid.app/lucidchart/314ba7ca-dbd0-4e8d-9c1d-8ef03fcb97a edit?viewport_loc=-2668%2C1176%2C5244%2C2572%2C0_0&invitationId=inv_0165d610-908
- DFD Level 1: https://app.diagrams.net/?src=about#G1IBa3PPwJkU8muPNEltYAi7M4sujmwXE%7B%22pageId%22%3A%22wzwxThsYBGVyAbvD41E5%22%7D
- DFD Level 2: https://lucid.app/lucidchart/f0ccf000-2737-42cf-b963-78265e91edd5/edit?viewport_loc=-4267%2C-2051%2C4318%2C1846%2C0_0&invitationId=inv_5cbe917d-ed50-474d-aa4b-0bafb094d52f
- Activity Diagrams:
- Shipment and tracking
  https://drive.google.com/file/d/1UeZpGKx2lpMUr8VJjtjffXVUjacP9MY4/view?pli=1
- Order work flow https://app.diagrams.net/?src=about
- Order initiate and Paymenthttps://lucid.app/lucidchart/cc8ad20d-f2b1-4f3a-8aca-c7a8a edit?viewport_loc=-3295%2C-4191%2C5366%2C2294%2C0_0&invitationId=inv_

8dc33a94-e1e1-45b9-ae1c-bba582d955e1

- Cancel Order https://lucid.app/lucidchart/38fe5a14-3d99-437b-b470-415166804e94/edit?viewport_loc=-3302%2C1569%2C3966%2C1696%2C0_0&invitationId=inv_c8717c07-d12