University of Texas at Dallas

ONLINE RETAIL APPLICATION DATABASE

Final Report

MIS6308.001 - System Analysis and Product Management

Professor Sri Kannan Srikanth

Group #4

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3. Meeting Minutes

Group Name: Group 4

Project Title: Online Retail Application Database

Course Code: MIS6308.001

Group Members:

1. Disha Suresh Gabani
2. Atharva Shripad Kahu
3. Tina Liu
4. Amulya Suravarjhula
5. Pujithaa Vijayanand
6. Nihar Vinnakota

Meeting Dates & Summary

Date	Focus	Attendees	Discussion Points	Tasks Assigned
9/23	Project brainstorming & task allocation	All Members	- Brainstormed project ideas. - Defined scope & objectives. - Initial task assignments.	- Disha: Draft initial Project Charter. - Atharva: Research target customers. - Tina: Document initial ideas. - Amulya: Create timeline. - Pujithaa: Prepare for UI design. - Nihar: Research tools.
9/30	Finalizing Project Charter & Scope	All Members	- Reviewed Project Charter.	- Disha: Finalize Project Charter.

			- Set milestones for deliverables.	- Atharva: Research user pain points. - Tina: Draft design philosophy. - Amulya: BPMN model draft. - Pujithaa: Start FIGMA UI sketches. - Nihar: Context Diagram.
10/7	UI Design & Modeling Discussions	All Members	- Shared UI drafts on FIGMA. - Discussed BPMN & Context Diagrams.	- Tina: Revise FIGMA screens. - Amulya: Work on Use Case Diagram. - Pujithaa: Draft Use Case Descriptions. - Nihar: Refine BPMN & Context Diagram.
10/14	Review Static Modeling Progress	All Members	- Reviewed BPMN, Context, & Use Case Diagrams. - Identified gaps in Activity Diagram.	- Disha: Complete Activity Diagram. - Atharva: Draft Project Plan. - Tina: Collaborate on Use Case Descriptions.

10/21	Dynamic Modeling & UI Enhancements	All Members	- Discussed Sequence Diagram & State Chart Diagram. - Continued working on UI designs.	- Nihar: Complete Sequence Diagram. - Pujithaa: Start State Chart Diagram.
10/28	Data Modeling Discussions	All Members	- E-R Diagram draft presented. - Started Data Flow Diagram.	- Amulya: Finalize E-R Diagram. - Atharva: Complete Data Flow Diagram.
11/4	Finalization of Static Models	All Members	- Reviewed & finalized diagrams.	- Disha: Compile all static models. - Pujithaa: Integrate models into project write-up.
11/11	Project Writeup & Resource Planning	All Members	- Discussed storytelling approach for project writeup.	- Tina: Lead complete writeup. - Atharva: Outline development resources.
11/25	Review and Feedback	All Members	- Conducted a review of all sections.	- Nihar: Integrate feedback into modeling sections.
12/2	Submission Preparation	All Members	- Reviewed final report & presentation materials.	- All Members: Collaborate on final touches for submission.

4. Project Charter

Description

The project focuses on developing an efficient and user-friendly Online Retail Application Database (ORAD) to streamline the retail operations, from inventory management to customer transactions. By automating key processes like order tracking, stock updates, and sales reporting, the system aims to provide a seamless shopping experience for customers while enhancing operational efficiency for retailers.

Additionally, the ORAD will integrate multiple sales channels, ensuring real-time synchronization of data across platforms. This will enable better decision-making based on accurate and up-to-date information, ultimately boosting customer satisfaction and business profitability. The project will also focus on scalability and adaptability, making the system suitable for businesses of various sizes.

To further enhance functionality, the system will incorporate customer relationship management (CRM) tools, allowing businesses to analyze customer preferences and trends. This will lead to personalized marketing efforts and improved customer loyalty. The project will prioritize data security and compliance with industry standards to protect sensitive customer and business data. Through these enhancements, the Online Retail Application Database will serve as a comprehensive tool for modernizing retail operations.

Project Objective

We aim to develop an effective database system for a shopping platform with key goals including:

- Develop a system for handling product information updates and customer records maintenance while managing orders and inventory consistently.
- Enhance the speed at which customer and order details are accessed to elevate service standards and reduce response times.
- Create a database system that can easily scale up as the company expands to manage growing amounts of data.
- Utilize software that offers up-to-the-minute analysis to assist the company in making informed choices and extracting knowledge from examining data.

Scope

The scope of the Online Retail Application Database (ORAD) project encompasses the design and implementation of a comprehensive relational database to manage core business operations for an online retail platform. This includes product management, customer information storage, order processing automation, payment integration, and real-time inventory tracking. Scalability and adaptability will be key features, making ORAD suitable for businesses of varying sizes and supporting future business growth. The project will prioritize data security and compliance with industry standards to safeguard sensitive customer

and business information. With these enhancements, ORAD will serve as a comprehensive platform for modernizing retail operations, improving customer satisfaction, and driving business profitability.

Roles and Responsibilities

Sponsor:

- Provides financial resources and support for the project.
- Ensures that the project aligns with strategic business goals.
- Approves major deliverables, milestones, and key decisions.
- Resolves high-level issues and conflicts.
- Champions the project within the organization and ensures stakeholder buy-in.

Name	Email / Phone
Atharva Shripad Kahu	atharvashripad.kahu@utdallas.edu
Tina Liu	tina.liu@utdallas.edu

Project Manager:

- Oversees the entire project lifecycle from initiation to closure.
- Develops and manages the project plan, scope, schedule, and budget.
- Coordinates resources and project team activities.
- Monitors progress, identifies risks, and manages mitigation strategies.
- Communicates regularly with stakeholders and ensures timely delivery of milestones.
- Manages day-to-day operations and ensures the project meets its objectives.

Name	Email / Phone
Disha Gabani	dishasuresh.gabani@utdallas.edu

Team Member:

- Works on specific project tasks as assigned by the project manager.
- Contributes to the design, development, testing, and implementation of the database.
- Participates in meetings, provides feedback, and updates on progress.

- Ensures the timely completion of individual deliverables. - Coordinates with other team members for integration tasks.	
Name	**Email / Phone**
Amulya Suravarjhula	axs220478@utdallas.edu
Customer: - Provides input on business requirements and user needs. - Tests and validates that the project outputs meet the functional and performance requirements. - Offers feedback during user acceptance testing (UAT). - Ensures smooth data migration and integration with current systems. - Signs off on project deliverables and approvals.	
Name	**Email / Phone**
Pujithaa Vijayanand	pujithaa.vijayanand@utdallas.edu
Subject Matter Expert: - Provides specialized knowledge in areas such as database design, security, or scalability. - Advises the project team on best practices, standards, and tools. - Reviews technical deliverables such as the database schema and data flow diagrams. - Assists in resolving complex technical issues and ensuring project alignment with industry standards. - Contributes to training and knowledge transfer within the team.	
Name	**Email / Phone**
Nihar Vinnakota	nihar.vinnakota@utdallas.edu

Assumption

- Budget Constraints: The project must operate within the allocated budget, ensuring cost-effective solutions and tools are used for the development and deployment of the system.
- Time Constraints: The project must be completed within approximately 3 months, with key milestones achieved by the planned dates.
- Technology Availability: All required development tools, cloud infrastructure, and software licenses (database management systems, and payment gateway services) will be available throughout the project lifecycle.
- Stakeholder Availability: Stakeholders, including the project sponsor, development team, and testers, will be available for periodic feedback, testing, and approvals without delays.

Impact

1. Business Efficiency

- Improved Decision-Making: The database will allow businesses to analyze purchasing patterns, track sales, and identify trends, leading to better strategic decisions.
- Inventory Management: Automation in tracking stock levels will prevent overstocking and stockouts, improving overall operational efficiency.

2. Customer Experience

- Personalized Shopping Experience: The system can store and analyze customer preferences, enabling personalized product recommendations.
- Faster Order Processing: Streamlining the backend processes like payment, inventory management, and order fulfillment will lead to quicker delivery times and fewer errors.

3. Data Accuracy

- Reduced Human Errors: Automating data collection and storage minimizes errors from manual entries.
- Real-time Data Access: Businesses will have immediate access to updated information, improving responsiveness to market changes.

4. Scalability

- Support for Business Growth: As the business grows, the database will handle larger volumes of transactions and customer data without slowing down the system.

5. Security and Compliance

- Improved Data Security: The database will ensure secure storage of sensitive customer data, such as payment information, and help comply with data protection regulations.
- Risk Reduction: Advanced security features reduce the risk of data breaches, protecting both the business and customers.

6. Revenue Growth

- Increased Sales Opportunities: Through better customer insights and improved user experience, businesses can boost sales and customer retention.
- Reduced Costs: Automation reduces labor costs and errors, increasing the overall profitability.

5. Project Overview

Introduction

The **Online Retail Application Database (ORAD)** project aims to revolutionize retail operations by providing a robust, efficient, and user-friendly database system tailored to the needs of modern online retailers. By automating critical processes such as inventory management, order tracking, and sales reporting, the system ensures a seamless shopping experience for customers while optimizing operational efficiency for businesses. ORAD integrates multiple sales channels, enabling real-time synchronization of data and empowering stakeholders with accurate, up-to-date information for decision-making. Designed for scalability, security, and adaptability, ORAD supports businesses of varying sizes and ensures compliance with industry standards.

Target Customer

The ORAD project is designed for:

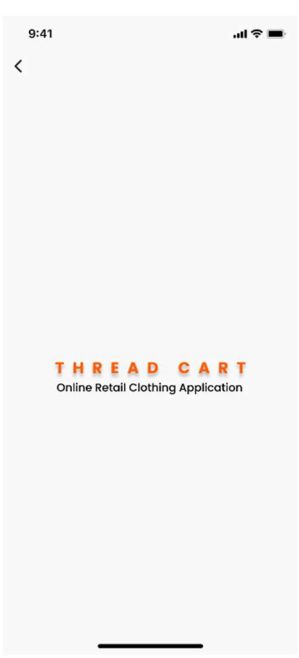
1. **Small to Medium Enterprises (SMEs)**:
    a. Businesses looking to modernize their retail operations with limited technical expertise.
    b. Retailers seeking a cost-effective solution to manage orders, inventory, and customer relationships.
2. **Large Enterprises**:
    a. Established retailers aiming to integrate multiple sales channels and scale operations.
    b. Businesses requiring comprehensive data analytics and reporting capabilities.
3. **E-commerce Startups**:
    a. New entrants in the retail market seeking an all-in-one database solution to streamline their operations.
4. **Retail Chains**:
    a. Businesses with multiple outlets requiring real-time synchronization and centralized data management.

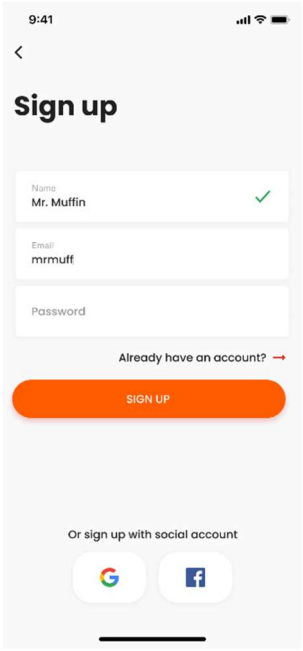
Design Philosophy

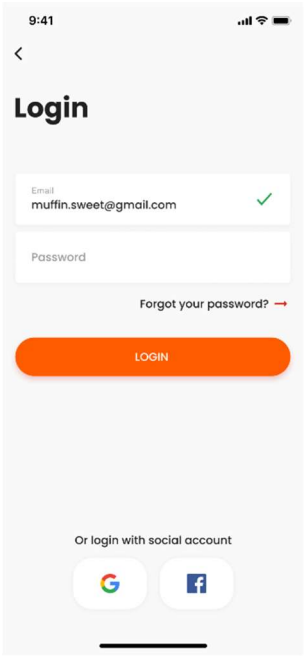
The design philosophy for ORAD focuses on:

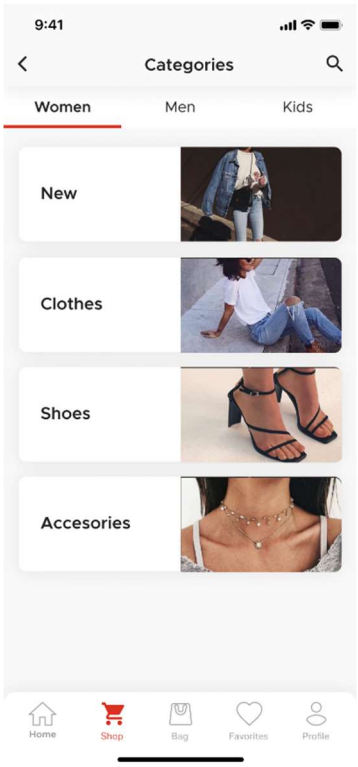
1. **User-Centric Design**:
    a. Ensuring an intuitive interface for both customers and admins.
    b. Prioritizing ease of use and accessibility.
2. **Efficiency and Automation**:
    a. Automating repetitive tasks like inventory updates and order processing.
    b. Minimizing human errors through robust validation mechanisms.
3. **Scalability and Flexibility**:
    a. Designing a modular architecture that accommodates business growth.
    b. Supporting integration with additional functionalities like CRM and advanced analytics.
4. **Data Security and Compliance**:
    a. Implementing encryption and access controls to safeguard sensitive data.
    b. Ensuring compliance with GDPR, PCI DSS, and other industry standards.
5. **Seamless Integration**:
    a. Enabling interoperability with existing systems and sales platforms.
    b. Real-time synchronization for consistent data across channels.
6. **Sustainability**:
    a. Adopting efficient coding practices and optimizing resource utilization.
    b. Ensuring long-term maintainability of the database system.

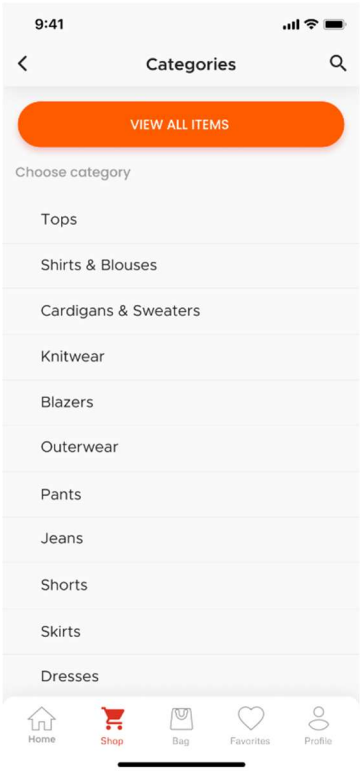
6. UI design using FIGMA

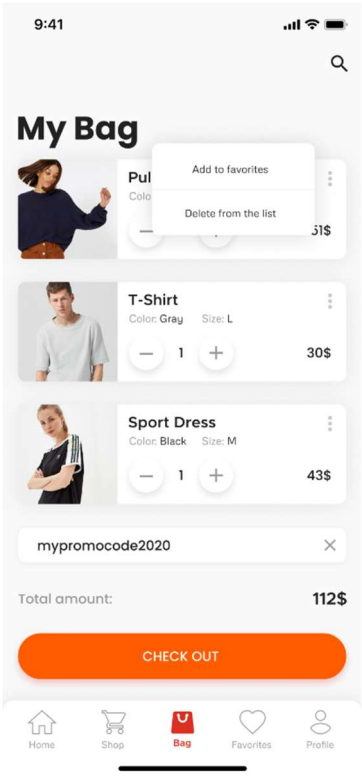


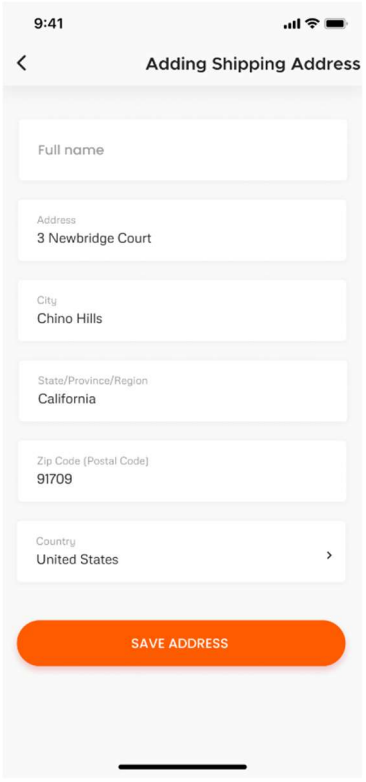


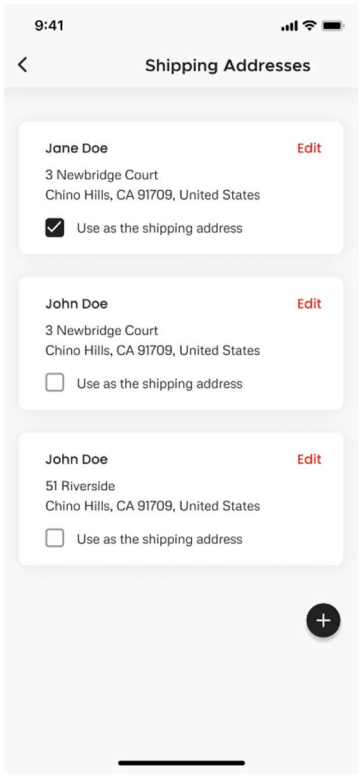









9:41
Adding Shipping Address
Full name
Address
3 Newbridge Court
City
Chino Hills
State/Province/Region
California
Zip Code (Postal Code)
91709
Country
United States
SAVE ADDRESS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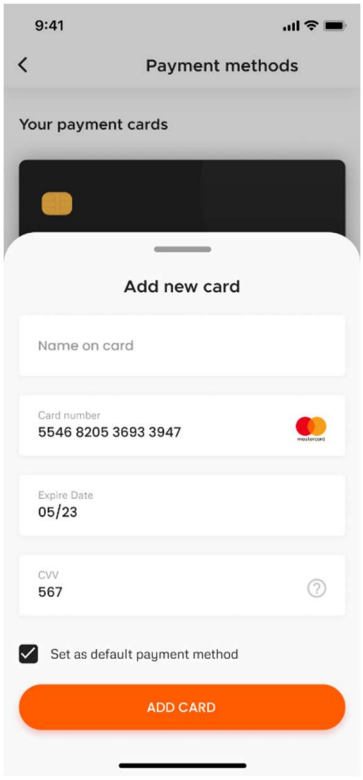
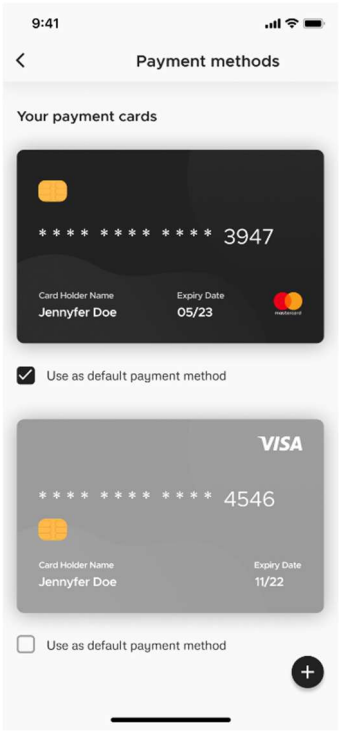
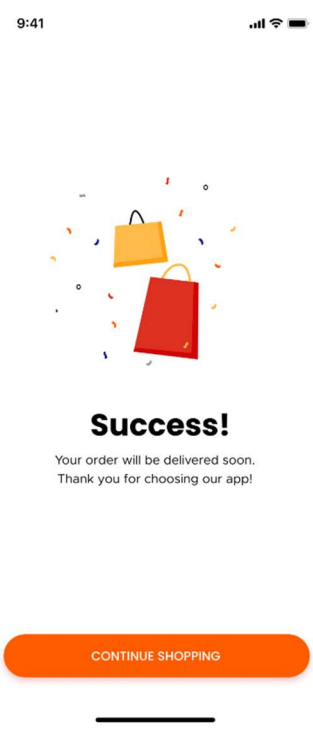
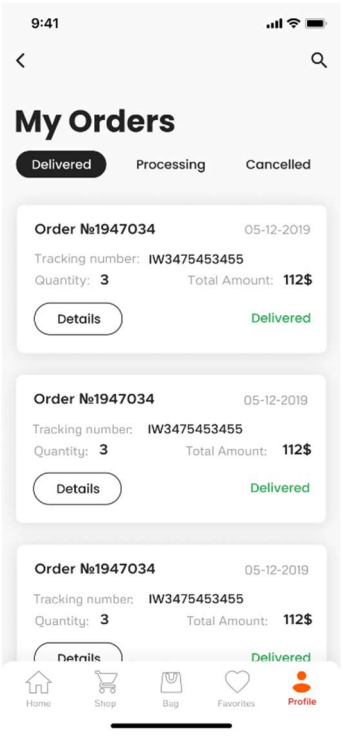
Shipping Addresses
Jane Doe
Edit
3 Newbridge Court
Chino Hills, CA 91709, United States
Use as the shipping address
John Doe
Edit
3 Newbridge Court
Chino Hills, CA 91709, United States
Use as the shipping address
John Doe
Edit
51 Riverside
Chino Hills, CA 91709, United States
Use as the shipping address


9:41
Payment methods
Your payment cards
Add new card
Name on card
Card number
5546 8205 3693 3947
Expire Date
05/23
CVV
567
Set as default payment method
ADD CARD

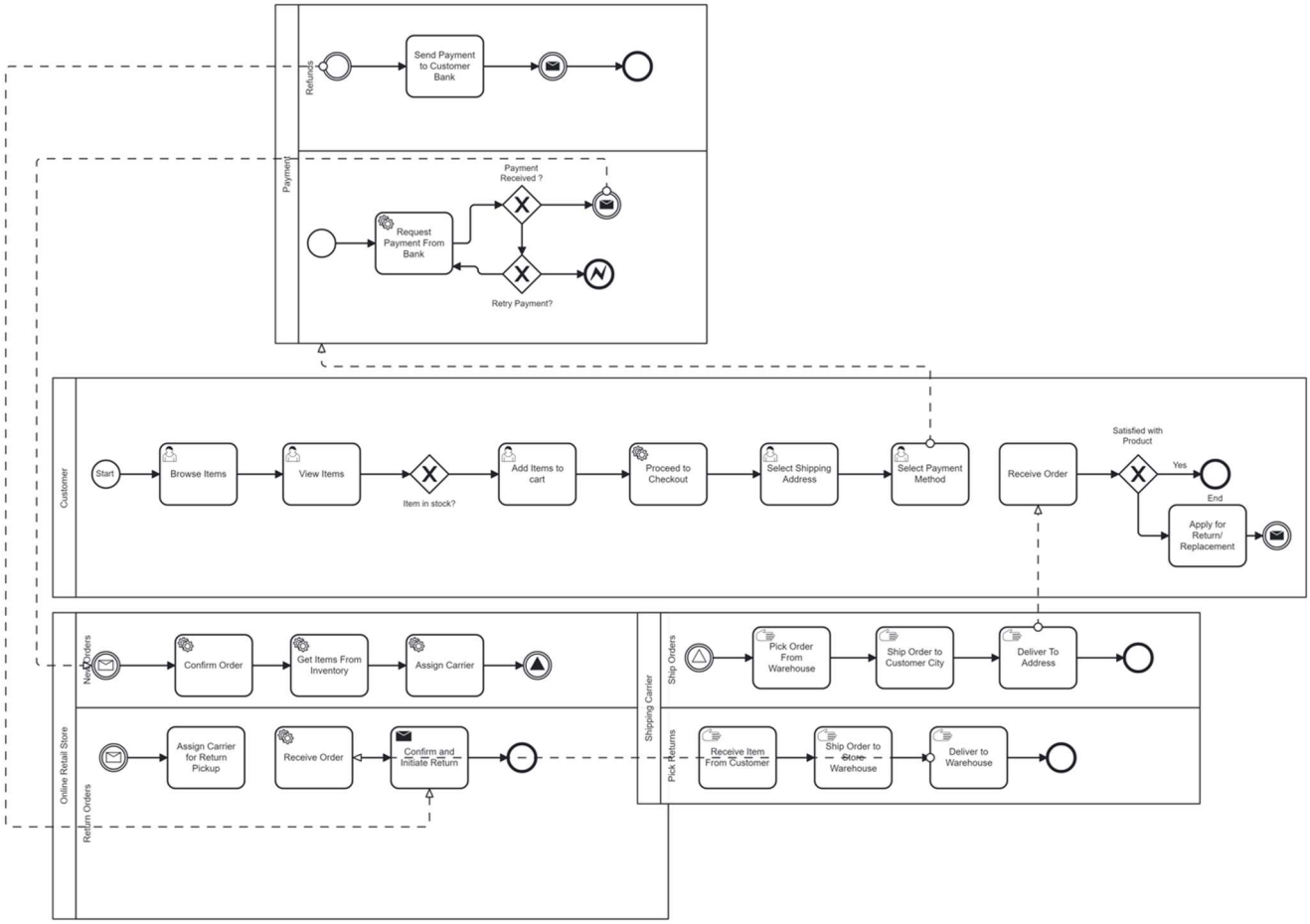

9:41
Payment methods
Your payment cards
**** **** **** 3947
Card Holder Name
Jennyfer Doe
Expiry Date
05/23
Use as default payment method
VISA
**** **** **** 4546
Card Holder Name
Jennyfer Doe
Expiry Date
11/22
Use as default payment method


9:41
Success!
Your order will be delivered soon.
Thank you for choosing our app!
CONTINUE SHOPPING

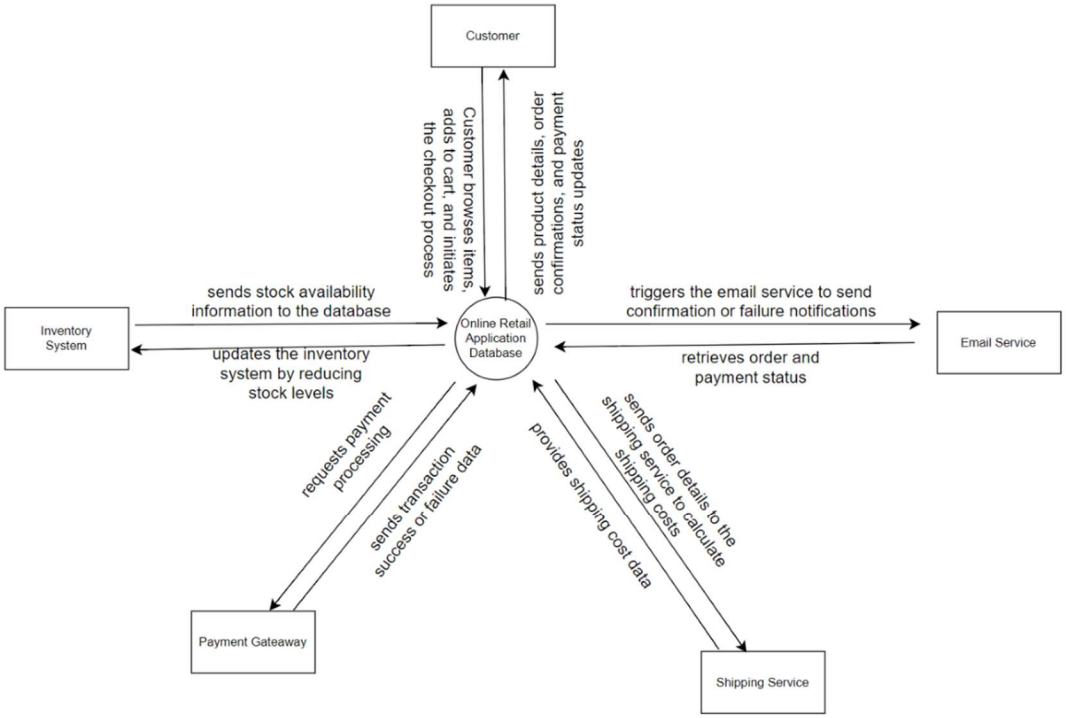

9:41
My Orders
Delivered
Processing
Cancelled
Order №1947034
05-12-2019
Tracking number: IW3475453455
Quantity: 3
Total Amount: 112$
Details
Delivered
Order №1947034
05-12-2019
Tracking number: IW3475453455
Quantity: 3
Total Amount: 112$
Details
Delivered
Order №1947034
05-12-2019
Tracking number: IW3475453455
Quantity: 3
Total Amount: 112$
Details
Delivered
Home
Shop
Bag
Favorites
Profile

7. Static Modeling

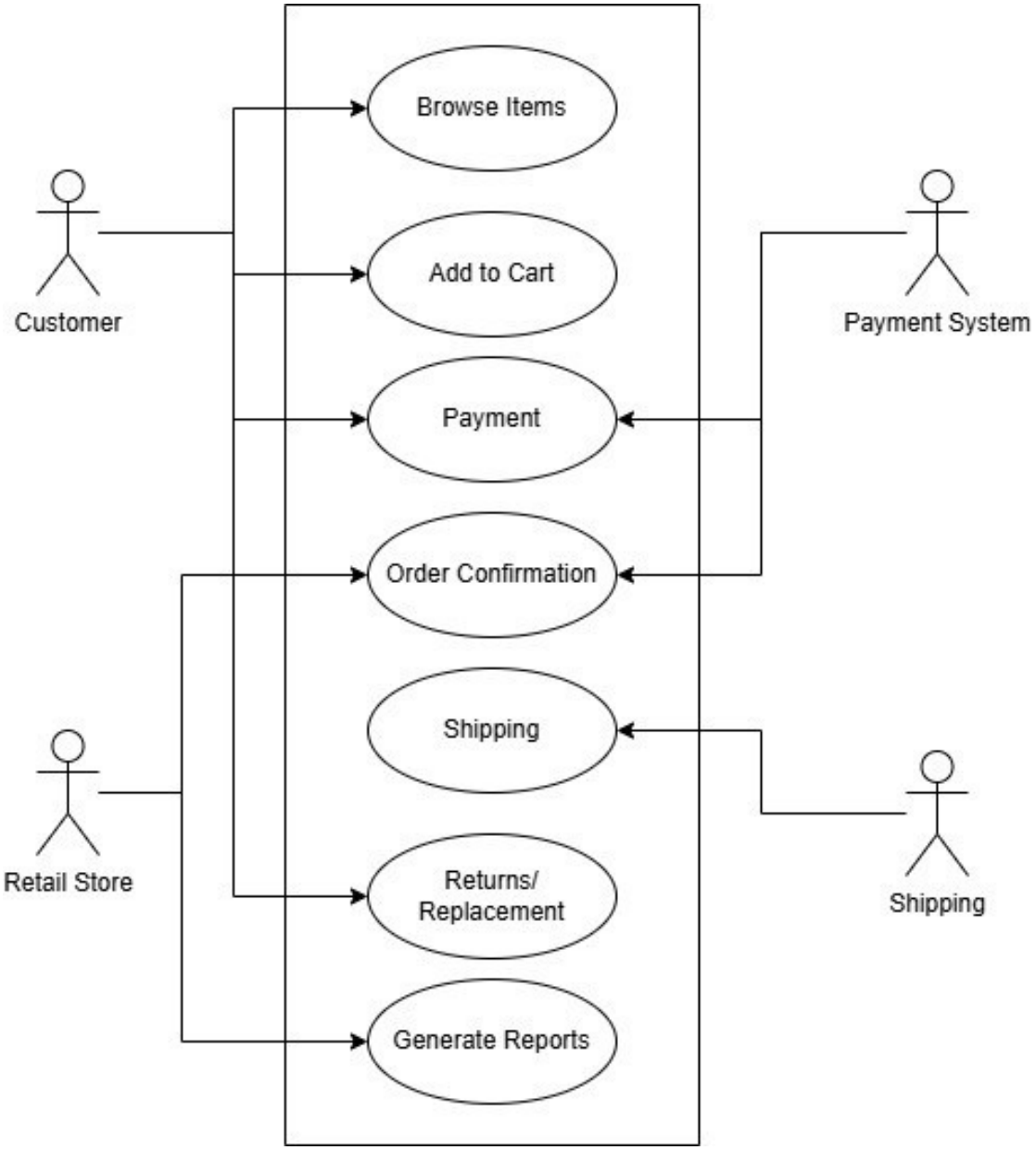
a. BPMN



b. Context Diagram



c. Use Case Diagram



d. Use Case description

Attribute	Details
Use Case Name	Analyze Customer Preferences
Actor	Customer
Goal	To provide personalized shopping experiences through analytics.
Preconditions	- Customer data must be available in the system.
Basic Flow	1. System collects and processes customer data. 2. System identifies patterns and preferences. 3. System generates personalized product recommendations. 4. Recommendations are displayed to the customer.
Postconditions	- Customers receive tailored shopping suggestions.
Exceptions	- Insufficient data for meaningful recommendations.

Attribute	Details
Use Case Name	Place Order
Actor	Customer
Goal	To allow customers to browse, select, and purchase products.
Preconditions	- Customer must be logged into their account. - Products must be available in stock.
Basic Flow	1. Customer browses the product catalog. 2. Customer adds desired items to the cart. 3. Customer proceeds to checkout. 4. Customer confirms the order.
Alternate Flow	- Customer abandons the cart without proceeding to payment.
Postconditions	- The system saves the order details for further processing.
Exceptions	- System downtime or customer session expiration.

Attribute	Details
Use Case Name	Process Payment
Actor	Customer, Admin
Goal	To handle payment processing for confirmed orders.
Preconditions	- Customer must have a valid payment method. - Payment gateway must be operational.
Basic Flow	1. Customer chooses a payment method. 2. System validates the payment method. 3. System processes the payment. 4. System confirms the payment.

Alternate Flow	- **Payment Failure**: If payment fails, the customer is notified and can retry.
Postconditions	- Payment is recorded, and the order is marked as paid.
Exceptions	- Payment gateway errors or insufficient funds.

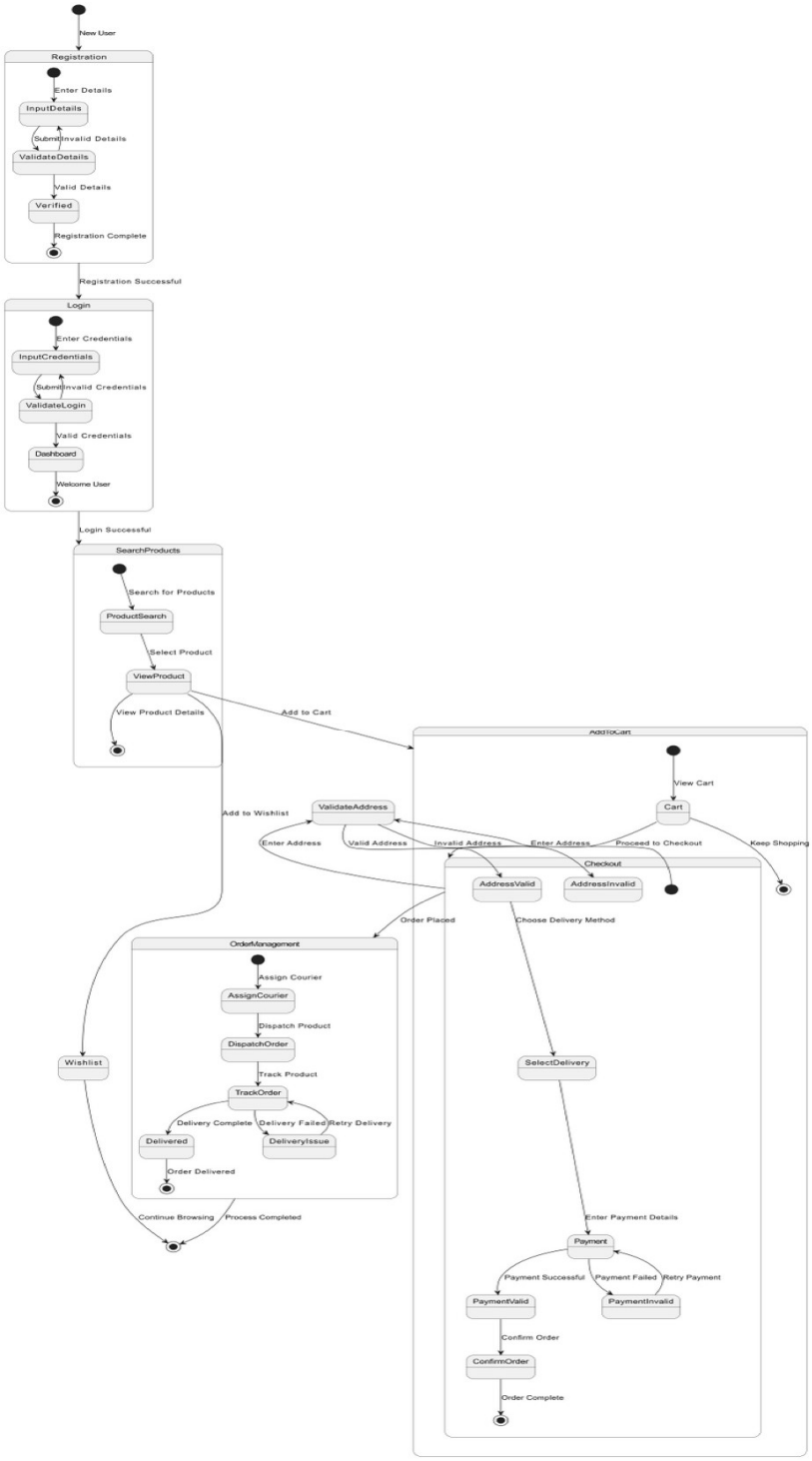
Attribute	Details
Use Case Name	Process Shipping
Actor	Admin, System
Goal	To ensure timely and accurate delivery of orders.
Preconditions	- Payment for the order must be successfully processed.
Basic Flow	1. System generates a shipping label. 2. Admin assigns a delivery service. 3. System updates the order status to "Shipped." 4. Customer receives shipping updates.
Alternate Flow	- **Delivery Issues**: Admin resolves delivery delays or errors.
Postconditions	- Order is marked as shipped in the system.
Exceptions	- Delivery service downtime or incorrect shipping information.

Attribute	Details
Use Case Name	Manage Inventory
Actor	Admin
Goal	To update stock levels, add new products, or remove outdated ones.
Preconditions	- Admin must have proper authentication and access rights.
Basic Flow	1. Admin logs into the system. 2. Admin accesses the inventory module. 3. Admin updates stock quantities or product details. 4. System validates changes and updates inventory records.
Alternate Flow	- System error prevents inventory updates.
Postconditions	- Updated inventory details are reflected in the database.

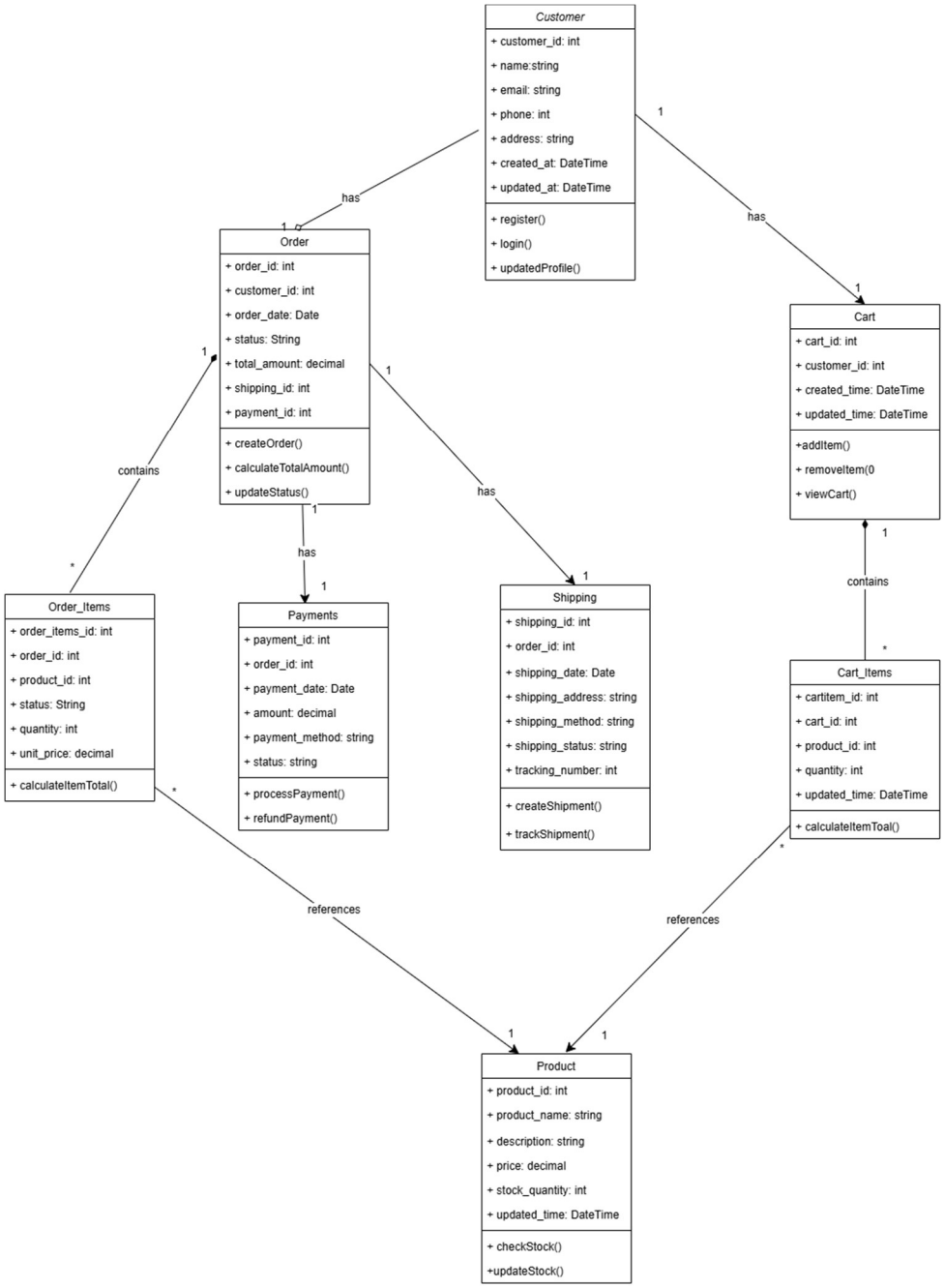
Attribute	Details
Use Case Name	Generate Reports
Actor	Admin
Goal	To generate analytical reports for business insights.
Preconditions	- Admin must be logged into the reporting module.

Basic Flow	1. Admin selects the type of report (e.g., sales, inventory, customer activity). 2. Admin specifies filters such as date range. 3. System retrieves relevant data and generates the report. 4. Admin downloads or views the report.
Postconditions	- Reports are saved or exported for analysis.
Exceptions	- Data retrieval errors due to system downtime.

e. Activity Diagram

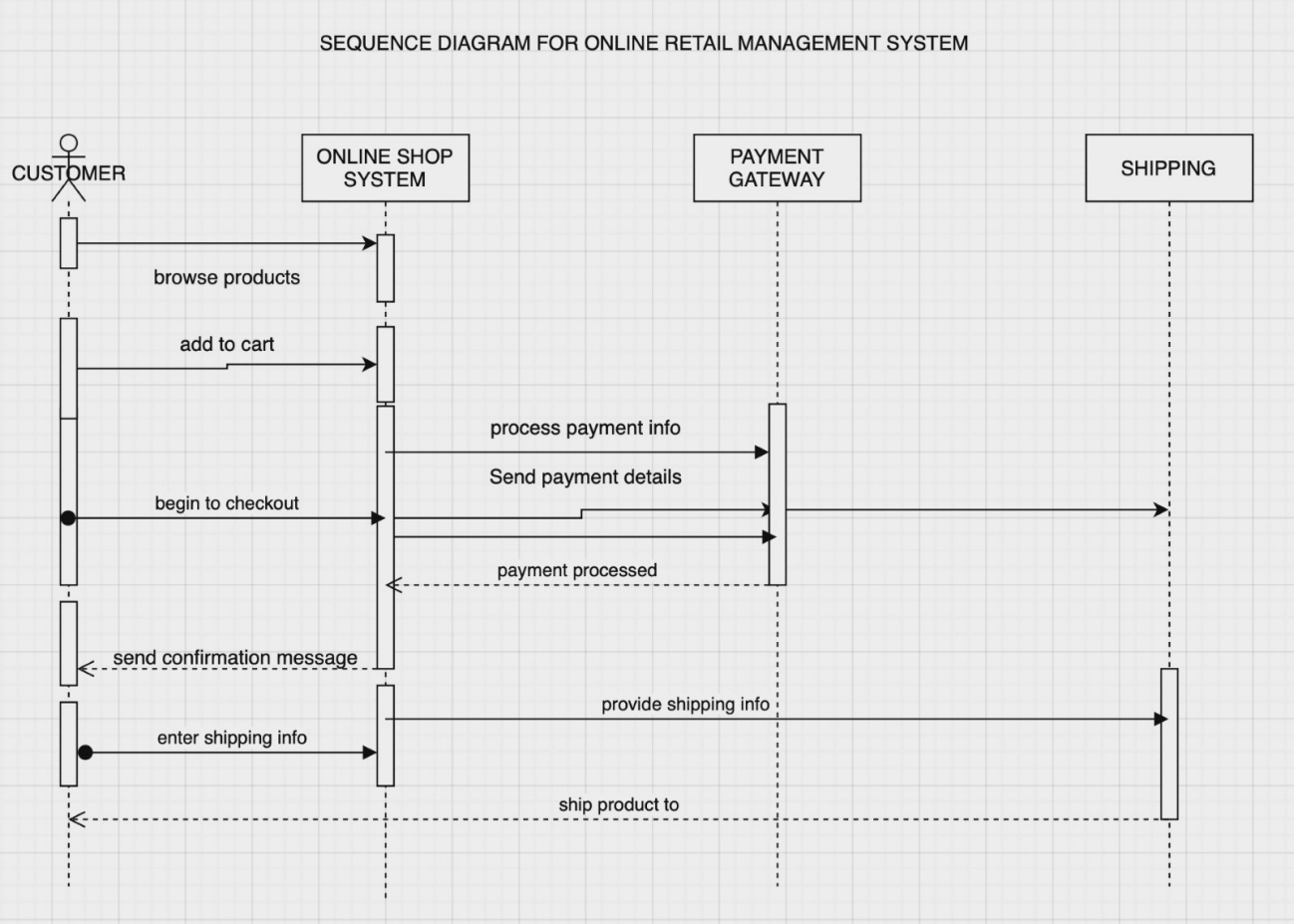


f. Class Diagram

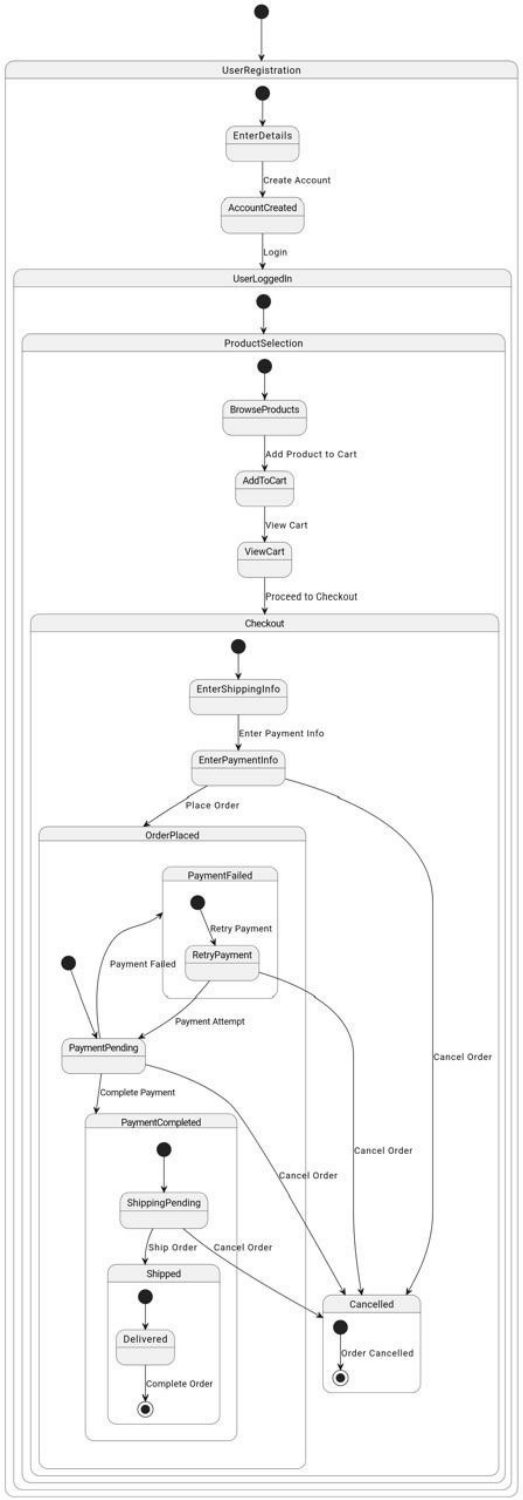


8. Dynamic Modeling

a. Sequence Diagram

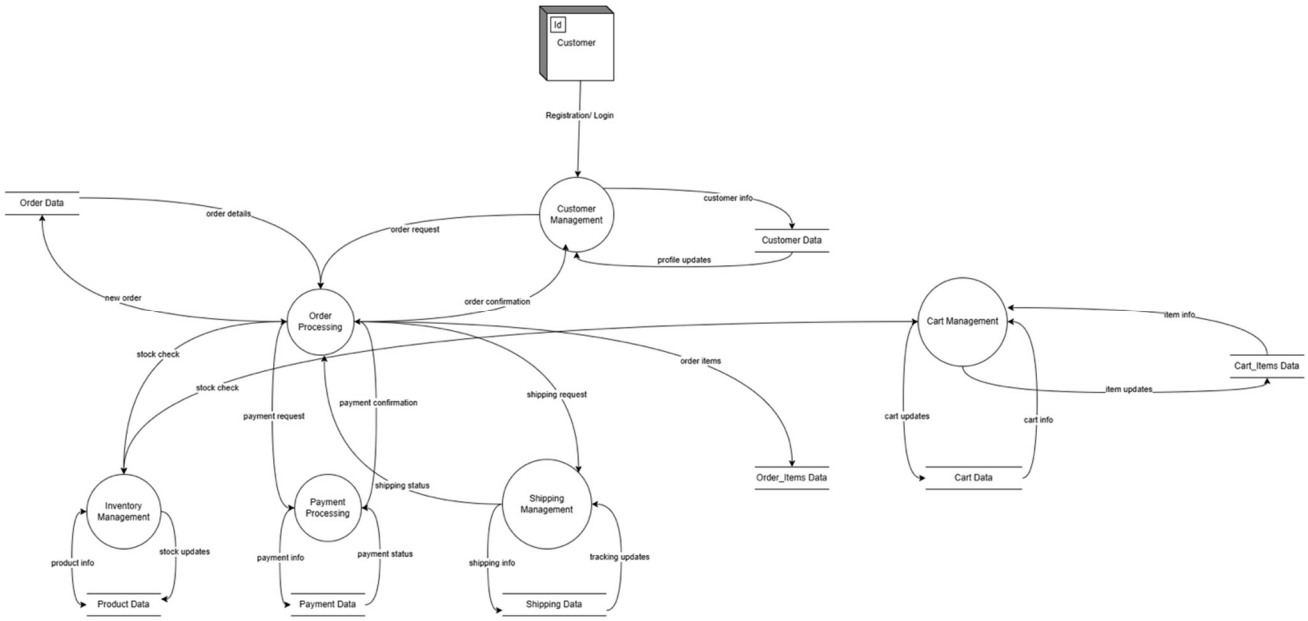


b. State Chart Diagram

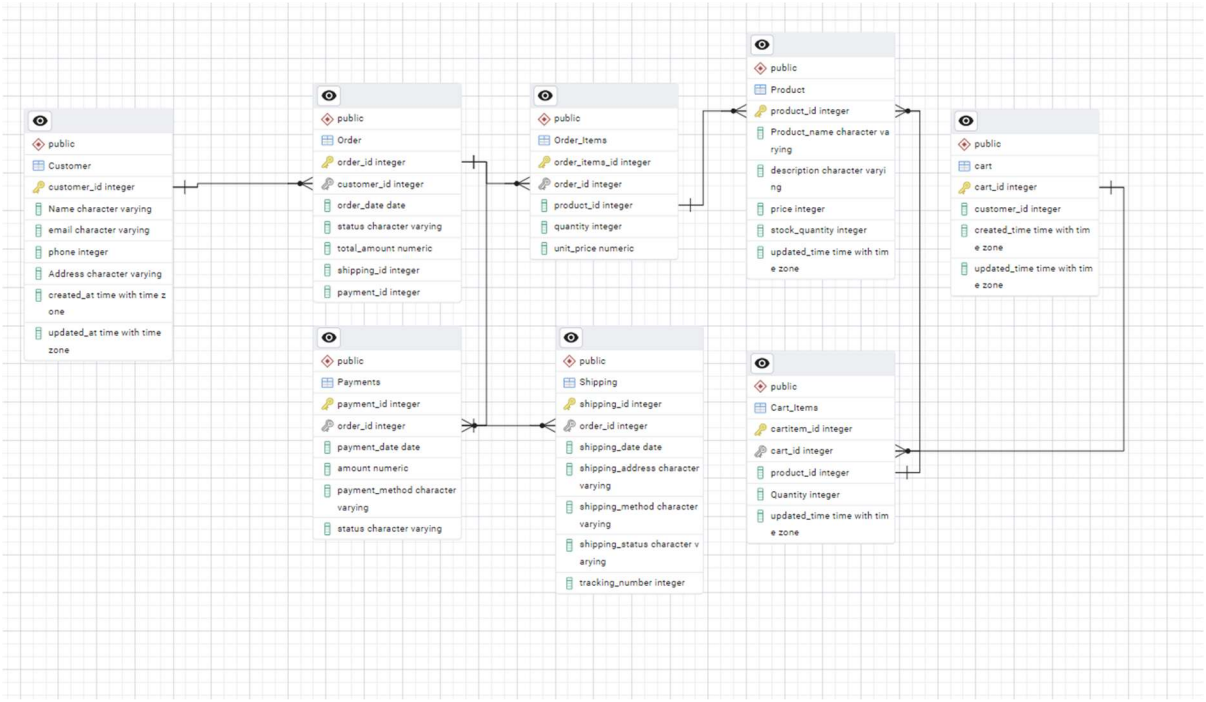


9. Data Modelling

a. Data Flow Diagram



b. E-R Diagram


public
Customer
customer_id integer
Name character varying
email character varying
phone integer
Address character varying
created_at time with time zone
updated_at time with time zone
public
Order
order_id integer
customer_id integer
order_date date
status character varying
total_amount numeric
shipping_id integer
payment_id integer
public
Order_Items
order_items_id integer
order_id integer
product_id integer
quantity integer
unit_price numeric
public
Product
product_id integer
Product_name character varying
description character varying
price integer
stock_quantity integer
updated_time time with time zone
public
cart
cart_id integer
customer_id integer
created_time time with time zone
updated_time time with time zone
public
Payments
payment_id integer
order_id integer
payment_date date
amount numeric
payment_method character varying
status character varying
public
Shipping
shipping_id integer
order_id integer
shipping_date date
shipping_address character varying
shipping_method character varying
shipping_status character varying
tracking_number integer
public
Cart_Items
cartitem_id integer
cart_id integer
product_id integer
Quantity integer
updated_time time with time zone

Testing Strategies for Online Retail Management System

Testing is a vital phase in developing an online retail management system, ensuring the platform delivers a seamless and reliable shopping experience. The following strategies are designed to address the unique requirements of such systems:

1. **Functional Testing**: This ensures that critical functionalities, such as product search, shopping cart management, inventory updates, order placement, and payment processing, operate correctly. For instance, testing ensures that inventory quantities are accurately updated after each purchase, and users receive real-time confirmation of their transactions. Functional testing directly validates that the system meets customer needs and supports day-to-day retail operations.
2. **Performance Testing**: Retail systems often face high traffic during peak periods like Black Friday sales or festive seasons. Performance testing evaluates the system's ability to handle heavy loads and ensures it remains responsive under stress. For example, simulating thousands of concurrent users accessing the platform ensures that checkout processes remain smooth and pages load quickly, even during peak traffic.
3. **Security Testing**: Protecting sensitive customer information, such as credit card details and personal data, is crucial. Security testing identifies vulnerabilities in payment gateways, login mechanisms, and data storage. This ensures compliance with regulations like PCI DSS and builds customer trust by preventing data breaches. For instance, testing encryption protocols for transactions ensures that sensitive information is transmitted securely.
4. **Usability Testing**: Online retail success heavily depends on a user-friendly interface. Usability testing evaluates how easily users can navigate the platform, search for products, and complete transactions. For example, ensuring that the checkout process is straightforward and the site is mobile-friendly directly contributes to customer satisfaction and retention.
5. **Integration Testing**: Retail systems involve multiple interconnected components, such as the inventory database, order management system, and payment gateways. Integration testing ensures that these components work together seamlessly. For example, when a customer places an order, the system should accurately update inventory levels, process payment, and trigger shipping notifications without errors.

These testing strategies are tailored to the intricacies of online retail management systems, ensuring they are robust, scalable, secure, and customer-centric. By addressing these areas, the platform can deliver a superior user experience, support business growth, and maintain operational efficiency.

10. Resources for Development and Implementation

1. Human Resources

- **Team Roles:**
    - Project Manager: Oversees tasks and timelines.
    - UI/UX Designer: Creates user-friendly interfaces (FIGMA).
    - Developers (Frontend & Backend): Build and code the application.
    - QA Engineer: Tests for bugs and ensures quality.
    - System Analyst: Aligns the system with user needs.

2. Tools and Software

- **Design:** FIGMA
- **Development:** Visual Studio Code for version control
- **Modeling:** Lucidchart or Draw.io for diagrams
- **Database:** MySQL for data management
- **Project Management:** Trello or Asana for tracking progress

3. Hardware

- Laptops or desktops for coding and testing
- Cloud-based hosting (e.g., AWS, Azure)
- Smartphones (iOS and Android) for testing

4. Budget

- Subscriptions for tools (e.g., FIGMA, hosting fees)
- Funds for hardware upgrades or additional devices

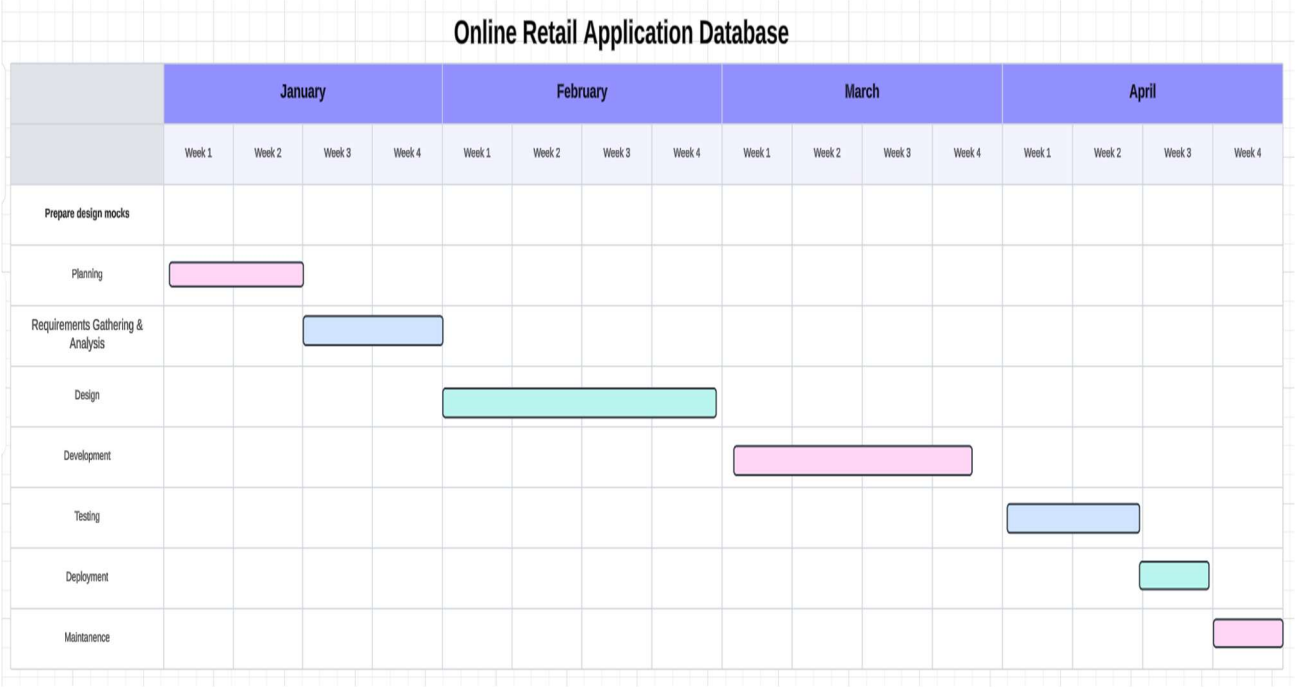
5. Time

- Estimated 5-10 hours/week per team member
- Extra time reserved for testing and revisions

11. A project plan

Phase	Tasks	Duration	Milestones
1. Planning	- Define project goals and objectives. - Identify target customers and stakeholders. - Finalize the project team and roles. - Develop project timeline and allocate resources.	Week 1-2	- Approved project charter. - Stakeholder requirements documented. - Roles assigned. - Project schedule finalized.
2. Requirements Gathering & Analysis	- Conduct stakeholder interviews and gather requirements. - Draft and refine use cases and use case descriptions. - Identify constraints and risks.	Week 3-4	- Requirements document approved. - Use cases validated. - Risk analysis completed.
3. Design	**Static Modeling:** - Create BPMN diagram. - Develop the Context Diagram. - Draft Use Case Diagram and Use Case Descriptions. - Create Class Diagram. **Dynamic Modeling:** - Develop Sequence Diagram. - Draft State Chart Diagram. **UI Design (FIGMA):** - Develop low-fidelity wireframes. - Create high-fidelity UI prototypes. **Database Design:** - Design ER Diagram. - Develop Data Flow Diagram (DFD).	Week 5-8	- BPMN approved. - Context Diagram validated. - Use Cases finalized. - Class Diagram approved. - Sequence Diagram approved. - State Chart Diagram finalized. - Wireframes approved. - UI prototype finalized. - ER Diagram approved. - DFD validated.
4. Development	- Backend development (database implementation).	Week 9-12	- Database setup complete. - Functional UI prototype.

	- Frontend development (UI implementation). - Integration of modules (e.g., inventory, orders). - Implement system features (e.g., analytics, reports).		- Modules integrated. - Key features implemented.
5. Testing	- Conduct functional testing. - Perform integration testing. - Execute performance testing. - Carry out usability testing with stakeholders. - Conduct security testing.	Week 13-14	- Critical bugs resolved. - All systems integrated. - Performance benchmarks met. - Feedback incorporated. - Compliance achieved.
6. Deployment	- Deploy the system on production servers. - Train users and provide documentation. - Conduct soft launch for final testing in real-world scenarios.	Week 15	- System deployed successfully. - Training completed. - Final validation achieved.
7. Maintenance	- Monitor system performance. - Resolve post-deployment issues.	Week 16	- Maintenance plan initiated. - Issues addressed promptly.



Conclusion

The Online Retail Application Database (ORAD) project serves as a comprehensive solution to meet the standards of modern online retails businesses. The integration of user-centric design principles, automation, and robust data security safeguards the system's reliability and usability. This application also synchronizes across multiple sales channels and generates real-time analytics empowers stakeholders with actionable insights, driving informed decision-making. In conclusion, the ORAD project not only modernizes retails operations but also positions businesses for future growth and adaptability, making it a valuable asset in today's competitive market.

Figma UI Link:

https://www.figma.com/proto/uMRG8e465bohKddkbyOzmz/ThreadCraft---Online-Retail-Application-Database?node-id=2-1546&starting-point-node-id=2126%3A4486&t=oXy9Ehl0owKEep7v-1

Youtube Video Link: