



# Shoply

## Software Engineering project

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## 1.0 Project Initiation

### 1.1 Project Overview

Shoply is a comprehensive E-Commerce website designed for users to easily browse and purchase a wide range of grocery and household products. The platform features a clean, intuitive interface with categories like Canned Goods, Snacks, Milk & Eggs, Frozen Food, and more. Shoply ensures a smooth, usable, user-friendly shopping experience, allowing customers to effortlessly find products.

### 1.2 Problem Definition

#### 1.2.1 Problem Statement

Shoply seeks to enhance user experience and operational efficiency. Currently, users face challenges with the usability and reliability of existing grocery e-commerce platforms, including low performance efficiency and user-unfriendly interfaces, resulting in a poor user experience. Common issues include difficulty in navigating the interface, limited search and filtering capabilities, a lack of personalized

recommendations, and a high rate of cart abandonment due to a complex checkout process and limited payment options. Additionally, the platform lacks a mobile-responsive design, impacting usability on various devices, while insufficient inventory management and order tracking features lead to user dissatisfaction. These challenges highlight the need for an optimized, user-friendly system capable of handling high traffic and delivering consistent quality of service.

#### 1.2.2 Issues

**Navigation Complexity:** Users struggle with the interface layout, which affects their ability to find products quickly.

**Lack of Personalization:** Users do not receive tailored product recommendations, limiting customer engagement and sales potential.

**Insufficient Search Features:** The search function does not allow for detailed filtering (e.g., brand preferences), which limits product discovery.

**High Cart Abandonment:** Users often abandon carts due to a complex checkout process and limited payment options.

**Optimize Mobile Experience:** Create a mobile-responsive design that maintains usability and visual appeal across all devices.

#### 1.2.3 Requirements

**User-Centered Design:** The interface must prioritize ease of use and accessibility, ensuring that users can navigate and interact with the platform effortlessly.

**Usability:** The system should provide an intuitive, responsive design with clear navigation, optimized search functionality, and personalized recommendations to enhance the overall user experience.

**Scalability:** The system must handle high user volumes without compromising performance, speed, or reliability.

**Performance:** The platform should maintain fast loading times and responsiveness, ensuring a smooth experience for users even under high traffic and peak load times.

**Security and Compliance:** Ensure robust data security measures and adherence to regulations for protecting customer information.

**Integration Capabilities:** The platform should support compatibility with existing systems and allow for seamless integration with third-party services, such as payment gateways and delivery tracking.

**Analytics for recommendation engine:** Enable tracking of user behavior, purchase trends, and cart abandonment rates to get accurate recommendations.

#### 1.2.4 Constraints

**Budget Constraints:** The project budget is fixed, limiting the scope of certain features or use of external service providers.

**Time Limitations:** The improvements need to be implemented within a 3 months' timeline.

**Data Privacy:** Compliance with privacy laws requires secure handling of user data, potentially limiting personalization options.

**Resource Availability:** Access to skilled personnel, such as developers and UX designers, may be limited, which could impact the project timeline and quality of certain features.

**Vendor Dependencies:** Reliance on third-party vendors for services like payment processing or delivery tracking may introduce delays or affect integration quality.

**User Device Variability:** The system must support a wide range of devices, screen sizes, and internet connection speeds, which could impact design and functionality choices.

## 1.3 Feasibility Study

### 1.3.1 Technical Feasibility

**Technological Compatibility:** Given the current technical resources, developing the new system is feasible. The existing infrastructure can support the addition of new features, though some updates may be needed to enhance performance and compatibility with more recent technologies.

**Scalability:** The current infrastructure is limited in handling a high number of daily users. Enhancing the scalability of our existing infrastructure will allow it to support increased traffic during peak times, ensuring a seamless user experience without performance lags.

**Skills Availability:** The team is proficient in core technologies; however, Additional training or resources may be necessary for team members to manage new third-party integrations effectively.

**Integration with Third-Party Tools:** Adding services like PayPal for payments and Google Analytics for user tracking can improve security, payment options, and data insights. Other options, such as Stripe for flexible payment processing and Mix panel for detailed behavioral analytics, could also be considered based on cost and functionality.

**Data Management and Storage:** Moving to cloud storage solutions will allow the system to handle larger datasets and enable efficient storage and retrieval of user data, supporting future analytics and personalization.

**Security and Compliance:** Ensuring compliance with data privacy regulations and implementing robust security practices, such as encryption and access control, are essential. Existing security protocols should be reviewed and possibly upgraded to protect sensitive customer data.

**User Experience (UX) Considerations:** The technology stack should allow for a responsive, mobile-friendly design to enhance accessibility across devices, ensuring optimal UX.

### 1.3.2 Operational Feasibility

**User Adoption:** The addition of a recommendation engine is likely to increase user engagement by offering relevant product suggestions, while improved navigation and mobile responsiveness can lower user abandonment, especially for mobile users.

**Staff Training:** Customer support teams will need training to effectively navigate the new interface and assist users with new features. Additionally, technical support may need brief training on third-party integrations, such as enhanced payment options, to provide efficient troubleshooting.

**Process Compatibility:** The new system is expected to integrate smoothly with existing workflows, such as order management and inventory tracking. However, staff responsible for product listings may need to manage additional data fields to enable advanced search and filtering features.

### 1.3.3 Economic Feasibility

**Cost Analysis:** The project will cost approximately 5,000 JOD for development, 2,500 JOD for infrastructure upgrades, and 1,000 JOD for staff training and external consultation. Additionally, 500 JOD annually will be needed for software licenses and third-party integrations.

**ROI Projection:** Shoply anticipates a 15-20% increase in sales and a 25% rise in customer retention, likely achieving a break-even point within two years. This will be driven by a reduction in cart abandonment and an improved user experience, fostering higher customer engagement.

**Budget Constraints:** The total project budget is 10,000 JOD, which fits within the estimated costs. Any unforeseen expenses may require adjustments or additional funding.

**Cost-Benefit Consideration:** Although the new features will require initial investment in training and support, the anticipated increase in user engagement and satisfaction is expected to drive higher conversion rates and customer retention, resulting in long-term financial benefits.

#### 1.3.4 Schedule Feasibility

**Timeline Assessment:** The project's three-month schedule follows a structured, plan-driven approach, organized as follows:

- **Planning Phase (1 week):** During this intensive one-week period, detailed requirements will be documented, the project scope will be firmly established, and a comprehensive project plan will be developed, including specific deliverables and deadlines. Each team member will have clear tasks and objectives to minimize deviations during the development phase.
- **Development Phase (9 weeks):** In the 9 weeks development period, tasks will follow a structured sequence, focusing on adhering closely to the predefined requirements and specifications. With a strong emphasis on initial design, coding, and internal reviews, the team will prioritize meeting planned milestones without adjusting the scope mid-phase.
- **Testing and Deployment Phase (1 month):** The final three weeks are designated for systematic testing and deployment, following predefined test cases and criteria. This phase will include thorough quality checks, performance assessments, and resolving any issues within the set timeframe. Deployment will be meticulously planned, with a final review before launch to ensure alignment with initial project specifications.

**Milestone Tracking and Communication:** Milestones will be established at each project phase's end, with documented progress reports shared bi-weekly with stakeholders. This structured communication will ensure stakeholders remain informed and aligned with the project's progress. The plan-driven

approach minimizes timeline adjustments, so any necessary changes will be formally reviewed and approved by stakeholders to manage expectations.

**Risk Management:** To ensure the project stays on track, the following risk management measures will be implemented:

- **Identifying Critical Path Dependencies:** Key dependencies in each phase will be mapped out during the planning stage to avoid potential delays due to task dependencies.
- **Contingency Plans for High-Risk Areas:** Areas such as integration with third-party tools and mobile responsiveness are identified as high-risk. The project plan includes a buffer for each of these, with additional resources available to address any issues swiftly.
- **Weekly Risk Reviews:** Each week, the team will assess progress against the timeline to detect any risks early. Any deviations will be addressed promptly by implementing predefined contingency plans.
- **Stakeholder Communication for Risk Escalation:** If any significant risk threatens the timeline or budget, stakeholders will be informed immediately to approve any necessary adjustments to keep the project on track.

### 1.3.5 Legal Feasibility

**Data Privacy Compliance:** Shoply will comply with Jordan's Personal Data Protection Law (PDPL) by obtaining explicit user consent for data collection and usage. To protect user privacy, data will be anonymized wherever possible, and users will have full control to manage or delete their data through accessible account settings. Regular audits will be conducted to ensure ongoing compliance with data privacy regulations as they evolve.

**E-commerce Regulations:** Shoply will align with Jordan's Electronic Transactions Law by providing transparent pricing, clear return and refund policies, and secure payment methods, upholding consumer rights and trust. Additionally, all terms and conditions will be clearly displayed to avoid misunderstandings and ensure a smooth user experience.

**Third-Party Agreements:** Agreements with third-party providers, such as PayPal and analytics platforms, will be carefully reviewed to ensure full compliance with local data protection laws. Shoply will mandate secure handling of user data by these providers and implement data encryption standards at transmission and at rest to protect against unauthorized access.

**Intellectual Property and Content Compliance:** Shoply will ensure that all product images, descriptions, and other content comply with intellectual property laws, obtaining necessary permissions or licenses where needed. This will prevent potential legal issues related to copyrighted materials.

**Consumer Rights and Refund Policies:** Shoply will establish clear consumer rights policies, including an accessible refund and exchange process. Customer service training will focus on compliance with consumer protection laws to handle customer inquiries and complaints in line with regulatory requirements.

**Regular Compliance Review:** Shoply will implement an ongoing legal compliance review process, conducting semi-annual audits to identify and address any legal risks related to new features, third-party integrations, or regulatory changes.

## 1.4 Recommended Solution and Expected Project Deliverables

### **Recommended Solution**

To address the usability and performance challenges identified in the existing Shoply e-commerce platform, the recommended solution involves a comprehensive upgrade of key components to enhance user experience, scalability, and operational efficiency. This includes:

- **User-Centered Interface design:** Implementing a user-friendly UI/UX design with simplified navigation and improved accessibility to ensure a seamless browsing experience across all devices. This will address user complaints about navigation complexity and create a more intuitive interface.
- **Enhanced Performance and Scalability:** Upgrading the infrastructure to improve scalability will enable the system to handle high traffic and peak load times efficiently. This enhancement will address current limitations in reliability and support expected growth in user engagement.
- **Personalization Features:** Integrating an AI-powered recommendation engine to provide personalized product suggestions based on user preferences and shopping history. This is expected to increase user engagement, enhance product discovery, and ultimately boost sales.
- **Improved Search and Filtering Capabilities:** Upgrading the search functionality to support detailed filtering options (such as brand and price ranges), enabling users to quickly find products that meet their criteria.
- **Secure and Flexible Payment Gateway Integration:** Incorporating additional payment options like PayPal, along with enhanced security measures, to cater to diverse user preferences and ensure compliance with data security regulations.
- **Comprehensive Testing and Quality Assurance:** Conducting thorough testing, including usability testing and performance checks, to ensure all new features meet quality standards before deployment.
- **Staff Training and Support:** Providing training sessions for customer support and technical staff to effectively manage the upgraded system and assist users with new features.

## **Expected Project Deliverables**

The following deliverables are expected to be completed over the project timeline to achieve the recommended solution:

*Table 1 Expected Project Deliverables*

Deliverable	Description
<b>Requirements Document</b>	A detailed project plan outlining scope, objectives, and requirements, including task breakdowns.
<b>UI/UX Design</b>	Design user interface and experience created using Figma, incorporating simplified navigation and accessibility enhancements.
<b>Functional Frontend Interface</b>	Fully implemented frontend code.
<b>Populated Product Database</b>	Structured database with efficient organization of product categories, enabling easier inventory management and retrieval.
<b>Backend Development</b>	Development of server-side logic, APIs, and database connections to support application functionality and scalability.
<b>Order Tracking Integration</b>	Develop and implement a tracking system to monitor delivery personnel in real-time, providing accurate location updates
<b>Payment Gateway Integration</b>	Integration of secure payment methods, supporting multiple options to accommodate user preferences.
<b>Recommendation Engine</b>	AI-powered module for personalized product recommendations, configured to align with user preferences and behavior.
<b>Security Audit Report</b>	Documentation of platform security measures and compliance.
<b>QA Testing Reports</b>	Documentation of testing results, including performance, functionality, and usability tests to verify system reliability.
<b>Training Materials</b>	Guides and resources for customer support and technical staff.
<b>Deployed E-Commerce Platform</b>	Operational system ready for user access.
<b>Post-Launch Feedback Report</b>	Summary of user feedback and implemented adjustments.

## 1.5 Local and Global Impact of the Proposed Solution

### Local Impact

Shoply will positively impact local customers and businesses by:

**Enhancing Customer Experience:** Usability improvements, faster performance, and personalized recommendations will make shopping smoother, reduce cart abandonment, and increase customer satisfaction.

**Boosting the Local Economy:** Local suppliers and retailers will gain visibility and reach a larger audience, benefiting especially small businesses that lack e-commerce resources.

**Job Creation and Skill Development:** Implementing new features will create roles for local IT professionals and offer training in AI and analytics, building workforce skills.

**Inspiring Digital Transformation:** By setting an example with a modern platform, Shoply can motivate other local businesses to adopt digital solutions, fostering regional innovation.

## **Global Impact**

Globally, the Shoply platform can contribute by:

**Expanding Market Reach:** Improved scalability and performance will attract international customers, allowing Shoply to promote local products globally.

**Advancing E-commerce Practices:** Shoply's use of scalable cloud technology, AI, and security measures aligns with global standards, potentially offering case studies for other businesses.

**Setting Design Standards:** Shoply's focus on accessible, user-friendly design can influence global e-commerce trends, promoting inclusivity and ease of use.

## **1.6 Naming Conventions and Definitions**

This section provides an overview of the key terms, acronyms, and abbreviations used throughout the project documentation.

Table 2 Naming Conventions and Definitions

Term/Acronym	Definition
<b>Shoply</b>	The name of the e-commerce platform being developed for grocery and household items.
<b>UX (User Experience)</b>	Refers to the overall experience a user has when interacting with the platform, including ease of use, design, and accessibility.
<b>UI (User Interface)</b>	The visual layout of the platform, including buttons, icons, and other interactive elements.
<b>AI (Artificial Intelligence)</b>	Technology used to enable features like product recommendations, based on user data and patterns.
<b>Database</b>	A structured set of data stored electronically, used to manage product, user, and transaction information.
<b>Personalization</b>	Tailoring the user experience based on individual preferences, such as showing relevant product recommendations.
<b>Payment Gateway</b>	A service that processes online payments, allowing customers to securely make transactions.
<b>Third-Party Integrations</b>	External services or applications integrated with the platform, such as payment processors or analytics tools.
<b>UI/UX Design</b>	The process of designing the user interface and user experience to enhance accessibility and usability.
<b>Recommendation Engine</b>	A system that uses AI to suggest products based on user preferences and browsing history.
<b>Data Privacy</b>	Ensuring user data is protected and handled in compliance with relevant laws and regulations.
<b>Compliance</b>	Adherence to legal and industry standards for data protection and business operations.
<b>Analytics</b>	Data analysis tools and processes used to gather insights on user behavior, sales trends, and platform performance.
<b>ROI (Return on Investment)</b>	A measure of the profitability of the project, calculated by comparing expected benefits against project costs.
<b>Cart Abandonment</b>	When users add items to their online cart but leave the platform before completing the purchase.
<b>Gantt Chart</b>	A project management tool that visually represents the project schedule, showing tasks, durations, and dependencies.
<b>PERT (Program Evaluation and Review Technique)</b>	A project management tool that helps to identify task dependencies and optimize project timelines.
<b>Project Timeline</b>	The planned sequence of project phases and tasks from start to completion.
<b>JOD</b>	Jordanian Dinar, the currency used in the budget calculations.

<b>License</b>	Official permission to use software tools and third-party integrations, often renewed annually.
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## 2.0 Project Management plan

### 2.1 Project Organization

Shoply Enhancement Project will be managed by a structured team with clear roles and responsibilities to ensure smooth execution and accountability across all phases. The project organization is outlined as follows:

*Table 3 Project Organization*

<b>Role</b>	<b>Responsibilities</b>	<b>Team Members</b>
<b>Project Manager</b>	Oversees project planning, execution, and coordination among teams. Ensures timeline, budget adherence, and stakeholder communication.	Anas
<b>Requirement Engineer</b>	Gathers and analyzes project requirements, documents functional and non-functional needs, and ensures clear communication of specifications to the team.	Anas
<b>UI/UX Designer</b>	Designs user-friendly interfaces, ensuring the platform's ease of use, accessibility, and visual appeal. Works closely with the development team to implement design standards.	Anas
<b>Frontend Developer</b>	Develops the client-side of the platform, implementing UI/UX design and ensuring cross-device compatibility and responsiveness.	Anas
<b>Database Developer</b>	Designs, implements, and maintains the database structure, ensuring data integrity, scalability, and optimization. Handles queries and data-related operations.	Reham
<b>Backend Developer</b>	Develops server-side logic, handles business processes, API development, and integrates third-party services such as payment gateways. Ensures platform scalability and security.	Ghalib, Osama, Mohammad
<b>Cybersecurity Specialist</b>	Implements and monitors security protocols, conducts audits and manages compliance with cybersecurity regulations.	Ghalib

<b>Quality Assurance (QA) Specialist</b>	Conducts regular testing and quality checks, identifying bugs and performance issues to ensure a smooth, error-free user experience upon launch.	External Quality Assurance Specialists
<b>Data Analyst</b>	Manages the AI-powered recommendation engine and analytics setup. Develops and oversees algorithms for personalized recommendations and tracks user behavior to enhance customer engagement.	Mohammad
<b>Marketing and Communications Specialist</b>	Creates and implements marketing strategies for product launch, manages promotional content, and communicates platform updates to users.	Reham
<b>IT Consultant</b>	Provides technical guidance for infrastructure setup, ensures smooth third-party integrations, and oversees the overall technical architecture.	Anas
<b>Customer Support Lead</b>	Coordinates training for customer support teams to ensure familiarity with new features. Manages post-launch feedback from users to identify any issues or improvements needed.	Osama
<b>Customer Support</b>	Offers direct support to users for technical issues, assists with troubleshooting, and provides guidance on using new platform features.	External Customer Support team

## Revised Reporting Structure

The Project Manager is the primary point of contact for all team members and ensures alignment with project goals, timelines, and stakeholder expectations.

The Requirement Engineer, UI/UX Designer, Frontend Developer, and QA Specialist report to the Project Manager for progress updates and task alignment.

The Database Developer and Backend Developer report to the Project Manager, working together to ensure seamless integration between database and server-side logic.

The Data Analyst collaborates with the Backend Developer and Project Manager to ensure the recommendation engine operates effectively and aligns with analytics goals.

The Cybersecurity Specialist reports to the Project Manager, providing updates on security assessments, mitigation strategies, and compliance with data protection regulations.

The IT Consultant provides guidance on technical architecture and third-party integrations.

The Customer Support Lead collaborates with the Customer Support to address user concerns, incorporate feedback into training materials, and ensure the support team is well-prepared for handling queries post-launch.

The Marketing and Communications Specialist works with the IT Consultant to ensure platform features are effectively communicated in promotional strategies and user-facing materials. This role also helps align marketing messages with feedback from the Customer Support and Technical Support teams.

## **Team Collaboration**

**Regular Meetings:** The team will hold regular meetings, led by the Project Manager, to discuss project updates, challenges, and next steps. These meetings will include progress checks for each functional team and allow for cross-functional coordination.

## **Cross-Functional Coordination:**

- The UI/UX and Frontend Developer, and QA Specialist will coordinate to ensure the design implementation matches user expectations and meets quality standards.
- The Backend Developer and Database Developer will work together to ensure seamless integration between the database structure and server-side functionalities.
- The Data Analyst will collaborate with the Backend Developer to align the AI-powered recommendation engine with database and user requirements.

- The Cybersecurity Specialist will work closely with the Backend Developer, IT Consultant, and QA Specialist to address potential vulnerabilities, ensuring security compliance and platform resilience against threats.

**Launch Preparation:** The Customer Support Lead, Marketing Specialist, and Cybersecurity Specialist will collaborate with the Project Manager to ensure that user concerns, promotional strategies, and security considerations are addressed before launch.

**Documentation and Feedback:** Key deliverables, such as test reports, user feedback, and deployment progress, will be shared with the Project Manager, ensuring transparency and continuous improvement throughout the project lifecycle.

## 2.2 Roles and Responsibilities

Each team member in the Shoply E-commerce Platform Enhancement Project has specific roles and responsibilities to ensure efficient execution of tasks, accountability, and achievement of project goals.

*Table 4 Roles and Responsibilities*

Role	Responsibilities
Project Manager	<ul style="list-style-type: none"> <li>- Oversees project planning, execution, and coordination.</li> <li>- Manages the budget, timeline, and resource allocation to ensure adherence to the project plan.</li> <li>- Facilitates risk assessment and develops mitigation strategies for potential delays or bottlenecks.</li> <li>- Acts as the primary point of contact for stakeholders, providing regular updates.</li> <li>- Ensures quality standards and deliverables are met.</li> </ul>
Requirement Engineer	<ul style="list-style-type: none"> <li>- Gathers and documents functional and non-functional requirements.</li> <li>- Analyzes user needs and translates them into detailed specifications for the team.</li> <li>- Works with stakeholders to validate and finalize requirements.</li> <li>- Ensures project requirements are clearly communicated to all team members.</li> </ul>

<b>UI/UX Designer</b>	<ul style="list-style-type: none"> <li>- Designs a user-friendly, visually appealing interface aligned with Shoply's branding.</li> <li>- Conducts user research and usability testing to refine the design.</li> <li>- Works closely with frontend developers to ensure consistency between the design and implementation.</li> </ul>
<b>Frontend Developer</b>	<ul style="list-style-type: none"> <li>- Implements the UI/UX design, ensuring responsiveness and cross-device compatibility.</li> <li>- Develops and optimizes the client-side of the platform for user interaction.</li> <li>- Collaborates with backend developers to integrate frontend and backend systems.</li> <li>- Ensures smooth navigation and functionality for an optimal user experience.</li> </ul>
<b>Backend Developer</b>	<ul style="list-style-type: none"> <li>- Develops and maintains server-side logic, including database operations and APIs.</li> <li>- Integrates third-party services (e.g., payment gateways) securely and efficiently.</li> <li>- Optimizes platform performance for scalability and reliability under high traffic.</li> <li>- Ensures robust security measures for data protection and compliance.</li> </ul>
<b>Database Developer</b>	<ul style="list-style-type: none"> <li>- Designs and implements the database structure to organize and store data efficiently.</li> <li>- Ensures data integrity, scalability, and optimization for quick retrieval.</li> <li>- Works closely with backend developers to support seamless integration.</li> <li>- Handles queries and performance tuning for high-traffic scenarios.</li> </ul>
<b>Cybersecurity Specialist</b>	<ul style="list-style-type: none"> <li>- Implements robust security measures, including data encryption, secure authentication methods, and intrusion detection systems.</li> <li>- Conducts regular vulnerability assessments and penetration tests.</li> <li>- Ensures compliance with data protection regulations and mitigates risks of cyber threats.</li> </ul>
<b>Quality Assurance (QA) Specialist</b>	<ul style="list-style-type: none"> <li>- Develops and executes testing plans to identify bugs, usability issues, and performance bottlenecks.</li> <li>- Collaborates with developers to troubleshoot and resolve issues.</li> <li>- Conducts final testing to ensure cross-device compatibility and platform reliability before launch.</li> </ul>

<b>Data Analyst</b>	<ul style="list-style-type: none"> <li>- Develops and manages the AI-based recommendation engine for personalized product suggestions.</li> <li>- Analyzes user data to identify trends and optimize user experience.</li> <li>- Ensures data privacy compliance while leveraging data for recommendations and analytics.</li> </ul>
<b>Marketing and Communications Specialist</b>	<ul style="list-style-type: none"> <li>- Develops and executes marketing strategies for the platform launch.</li> <li>- Manages communication channels to inform users about new features and updates.</li> <li>- Aligns marketing messages with feedback from user interactions to enhance engagement and retention.</li> </ul>
<b>Customer Support Lead</b>	<ul style="list-style-type: none"> <li>- Prepares the customer support team for the platform's new features and functionality.</li> <li>- Conducts training sessions and creates reference materials for the support staff.</li> <li>- Collects and analyzes post-launch user feedback to identify improvements and recurring issues.</li> </ul>
<b>Customer Support Team</b>	<ul style="list-style-type: none"> <li>- Provides direct assistance to users with platform navigation, technical issues, and troubleshooting.</li> <li>- Answers user inquiries and resolves complaints efficiently.</li> <li>- Reports recurring user challenges to the Customer Support Lead for further action or training updates.</li> </ul>

## 2.3 Software Process Model

For the development of the Shoply e-commerce platform, a **plan-driven approach** will be adopted, specifically utilizing the **Waterfall Model**. This structured methodology ensures thorough planning, documentation, and clear milestones, essential for achieving the project's goals within the defined constraints of time, budget, and resources.

### Rationale for Plan-Driven Approach

- **Requirement Stability:** Shoply's core requirements are well-defined, with a primary focus on usability, performance, and user experience improvements. The project benefits from a structured approach to avoid deviations and maintain quality.

- Clear Deliverables: The Waterfall Model provides distinct phases, making it easier to track progress and maintain accountability for each deliverable. This is especially beneficial for stakeholders who require specific deliverables at each stage.
- Risk Management: The step-by-step approach reduces risks by addressing critical areas such as design, security, and scalability early in the project lifecycle. Each phase undergoes a review process, ensuring issues are addressed before moving forward.

#### Key Phases of the Plan-Driven Model (Waterfall)

1. Requirements Analysis: A comprehensive gathering and documentation of requirements from all stakeholders, focusing on usability, integration capabilities, and performance.
2. System and Software Design: Detailed design of the platform's architecture, user interface, and integration points, aligning with scalability and security requirements.
3. Implementation: The development of the front-end, back-end, and database platform features in alignment with the design specifications, while ensuring compliance with standards and adherence to project constraints.
4. Testing and Quality Assurance: Rigorous testing to validate functionality, performance, and security. This phase includes unit testing, integration testing, and user acceptance testing (UAT).
5. Deployment: A controlled release of the platform into the live environment, along with the necessary staff training and user documentation.
6. Maintenance: Post-deployment support, addressing any issues that arise and planning for future enhancements based on user feedback.

## 2.4 Tools and Techniques

To ensure the successful implementation of the Shoply e-commerce platform, a range of tools and techniques will be employed throughout the project lifecycle. These tools and techniques will support efficient development, enhance collaboration, and maintain quality at each stage.

*Table 5 Tools and Techniques*

Category	Tools/Technologies	Purpose
Project Management	Jira, Microsoft Project	Task tracking, project scheduling, and resource management for effective project control.
Collaboration	Microsoft Teams, Google meet, Zoom	Facilitates team communication and real-time updates, ensuring seamless coordination.
Version Control	Git, GitHub	Source code management, enabling version tracking, collaboration, and rollbacks when necessary.
Design and Prototyping	Figma	UI/UX design and prototyping tools for creating and testing user interface layouts and designs.
Development	Visual Studio, Visual Studio Code	Main development environments for coding and debugging, supporting various languages.
Database Management	MySQL	Database systems for managing structured and unstructured data, ensuring scalability and speed.
Order Tracking	RESTful APIs	Integration of real-time tracking and status updates for orders, ensuring customers can monitor their delivery progress.
Payment Gateway	PayPal APIs	Secure payment processing with support for multiple payment methods, ensuring reliable and smooth transactions.
Recommendation Engine	Python	Development of AI-powered personalized recommendation systems to align with user preferences and behavior.
Testing and QA	JUnit	Automated testing (Selenium and JUnit for functionality, Postman for API testing) to ensure quality.

<b>Deployment</b>	Docker	Internal deployment and containerization for scalability and handling high traffic.
<b>Security</b>	OWASP ZAP, SSL Certificates, Custom IAM Solutions	Security assessment, ensuring safe data handling and access control within our infrastructure.
<b>Documentation</b>	Microsoft Word	Project documentation and requirement tracking for transparency and record-keeping.
<b>Customer Support</b>	Zendesk, Freshdesk	Platforms for handling customer queries and support tickets, enhancing post-launch support.

**Wireframing and User Testing:** Early-stage UI/UX wireframing with user testing to gather feedback on design and usability.

**Continuous Integration and Deployment (CI/CD):** Automated CI/CD pipelines to streamline code integration, testing, and deployment for faster and more reliable updates.

**Automated Testing:** Use of JUnit for continuous testing and QA, ensuring issues are identified and resolved early.

## 2.5 Work Breakdown

### 2.5.1 Project Tasks and Description

*Table 6 Project Tasks and Description*

Task	Description	Deliverables	Resources Needed
<b>Project Planning</b>	Define project scope, objectives, timeline, and roles.	Project Plan, Scope Document	Project Manager, Planning Tools
<b>UI/UX Design</b>	Develop a user-friendly interface, wireframes, and mockups aligned with Shoply's branding.	Initial Designs, Wireframes, Mockups	UI/UX Designer, Design Tools (e.g., Figma)

<b>Frontend Development</b>	Implement the UI/UX design into a functional, responsive user interface.	Fully Functional Frontend Interface	Frontend Developer, Development Tools (e.g., HTML, CSS, JavaScript)
<b>Product Database Setup</b>	Structure and populate the database for product details, categories, pricing, and availability.	Fully Populated Product Database	Database Developer, SQL/Database Software
<b>Backend Development</b>	Build and test APIs for browsing, cart management, and account features.	Functional Backend System, APIs	Backend Developer, Server Environment
<b>Order Tracking Integration</b>	Develop and implement a tracking system to monitor delivery personnel in real-time, providing accurate location updates	Order Tracking System	Backend Developer, Order Tracking API
<b>Payment Gateway Integration</b>	Integrate secure payment processing through third-party gateways (e.g., PayPal/Stripe).	Payment Processing System	Backend Developer, Payment Gateway API
<b>Recommendation Engine Integration</b>	Implement an AI-based recommendation system to personalize product suggestions.	Recommendation Engine	AI Specialist, Backend Developer, AI Modeling Tools
<b>Testing and Quality Assurance</b>	Conduct functionality, load, security, and user acceptance tests to ensure reliability and performance.	Test Reports, Fully Functional Platform	QA Specialists, Testing Tools (e.g., Selenium)
<b>Cybersecurity Implementation</b>	Implement and validate platform security measures, including encryption and vulnerability assessments.	Security Audit Reports, Compliance Documentation	Cybersecurity Specialist, Security Tools (e.g., OWASP ZAP)
<b>Customer Support Training</b>	Train customer support staff on new features, updated interfaces, and troubleshooting.	Training Documentation, Staff Proficiency	Customer Support Lead, Training Materials
<b>Deployment and Launch</b>	Deploy the final system to production, monitor initial performance, and resolve issues.	Fully Operational E-Commerce Platform	Deployment Engineer, Server/Hosting Platform

<b>Post-Launch Review</b>	Conduct a performance review, gather initial user feedback, and make minor adjustments as needed.	Post-Launch Report, System Adjustments	Entire Team
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### 2.5.2 Deliverables and Milestones

*Table 7 Deliverables*

Deliverable	Description
<b>Requirements Document</b>	A detailed project plan outlining scope, objectives, and requirements, including task breakdowns.
<b>UI/UX Design</b>	Design user interface and experience created using Figma, incorporating simplified navigation and accessibility enhancements.
<b>Functional Frontend Interface</b>	Fully implemented frontend code.
<b>Populated Product Database</b>	Structured database with efficient organization of product categories, enabling easier inventory management and retrieval.
<b>Backend Development</b>	Development of server-side logic, APIs, and database connections to support application functionality and scalability.
<b>Order Tracking Integration</b>	Develop and implement a tracking system to monitor delivery personnel in real-time, providing accurate location updates
<b>Payment Gateway Integration</b>	Integration of secure payment methods, supporting multiple options to accommodate user preferences.
<b>Recommendation Engine</b>	AI-powered module for personalized product recommendations, configured to align with user preferences and behavior.
<b>Security Audit Report</b>	Documentation of platform security measures and compliance.
<b>QA Testing Reports</b>	Documentation of testing results, including performance, functionality, and usability tests to verify system reliability.
<b>Training Materials</b>	Guides and resources for customer support and technical staff.
<b>Deployed E-Commerce Platform</b>	Operational system ready for user access.
<b>Post-Launch Feedback Report</b>	Summary of user feedback and implemented adjustments.

Table 8 Milestones

Milestone	Description	Expected Completion
<b>Project Kickoff &amp; Requirements Specification</b>	Formal project initiation, finalizing scope, objectives, requirements, and project plan.	Week 1
<b>UI/UX Design and Approval</b>	Completion and approval of the interface design, including wireframes and mockups.	Week 2
<b>Frontend Development</b>	Implement the UI/UX design into a functional, responsive user interface.	Week 3 - 8
<b>Database Setup</b>	Fully functional product database with all necessary categories and data points populated.	Weeks 2 - 8
<b>Backend System Ready</b>	Completed backend setup with all APIs for user management, product browsing, and cart handling.	Weeks 2 - 8
<b>Order tracking Integration</b>	Develop and implement a tracking system to monitor delivery personnel in real-time, providing accurate location updates.	Weeks 9 - 10
<b>Payment Gateway Integration</b>	Integration of a secure payment gateway (e.g., PayPal or Stripe) tested and functional.	Weeks 9 - 10
<b>Recommendation Engine Ready</b>	Implementation of an AI-powered recommendation system, tested for accuracy and performance.	Weeks 9 - 10
<b>Cybersecurity Validation</b>	Completion of platform security tests, including vulnerability assessments and compliance checks.	Weeks 11- 12
<b>System Testing and QA</b>	Comprehensive testing phase completed with load, security, and user acceptance testing.	Weeks 11- 12
<b>Project Handover &amp; Training</b>	Completion of training for customer support teams and technical staff on new features.	Week 13
<b>Go-Live / Launch</b>	Full deployment of the Shoply platform, fully operational and accessible to users.	Week 13
<b>Post-Launch Review</b>	Performance review and minor adjustments after initial user feedback within the first week.	Week 14

### 2.5.3 Resources needed (Skills, HW and SW)

*Table 9 Resources needed*

Resource Type	Details
<b>Skills</b>	Project Management, UI/UX Design, Frontend Development, Database Management, Backend Development, QA Testing, AI Consulting
<b>Hardware (HW)</b>	Development servers, testing devices, deployment servers, design and development workstations
<b>Software (SW)</b>	Design tools (e.g., Figma), frontend development frameworks (e.g., React, Angular), SQL database software, server/hosting platform, payment gateway API, AI modeling tools, testing tools (e.g., JUnit, Selenium)

### 2.5.4 Dependencies and Constraints

*Table 10 Dependencies*

Dependency	Description
<b>Project Planning → UI/UX Design</b>	Planning must be completed to define scope and objectives before UI/UX design begins.
<b>Project Planning → Database Setup</b>	Database setup requires a clear project plan to establish structure and populate data effectively.
<b>Project Planning → Backend Development</b>	Backend setup begins after defining the project scope and technical requirements.
<b>UI/UX Design → Frontend Development</b>	UI/UX design must be completed to provide a blueprint for frontend implementation.
<b>Database Setup → Order Tracking Integration</b>	The database must support order tracking to enable seamless integration of this feature.
<b>Database Setup → Recommendation Engine Integration</b>	The database must provide structured data for real-time recommendation algorithms.
<b>Database Setup → Payment Gateway Integration</b>	The database must be configured to handle transactions and integrate with payment systems securely.
<b>Backend Development → Order Tracking Integration</b>	Backend is required to support order tracking functionality.
<b>Backend Development → Recommendation Engine Integration</b>	Backend must support the recommendation engine to provide real-time product suggestions.
<b>Backend Development → Payment Gateway Integration</b>	Backend setup is essential for integrating secure payment systems.

<b>Frontend Development → Cybersecurity Validation</b>	Frontend must adhere to security protocols for validation.
<b>Frontend Development → Testing and QA</b>	Frontend needs to be evaluated during the testing phase for functionality and usability.
<b>Integrations (All) → Cybersecurity Validation</b>	Cybersecurity validation ensures secure implementation of all integrated systems and features.
<b>Integrations (All) → Testing and QA</b>	All integrated systems, including payment, order tracking, and recommendation engines, must be thoroughly tested to ensure seamless functionality.
<b>Backend Development → Testing and QA</b>	Backend functionalities must be rigorously tested for quality assurance.
<b>Backend Development → Cybersecurity Validation</b>	Backend development must undergo cybersecurity validation to ensure secure APIs, data handling, and integrations.
<b>Database Setup → Cybersecurity Validation</b>	The database setup must be validated to ensure data security, encryption, and protection against vulnerabilities before integration.
<b>Database Setup → Testing and QA</b>	Database functionalities, including data consistency and security, must be tested.
<b>Cybersecurity Validation → Launch</b>	The system can only proceed to launch after cybersecurity approval ensures all components are secure.
<b>Testing and QA → Launch</b>	Testing and QA must be finalized to ensure the platform is stable and functional for users.

*Table 11 Constraints*

Constraint	Description
<b>Budget Constraint</b>	Fixed budget limits the extent of features and the ability to hire additional external resources.
<b>Time Constraint</b>	The project must be completed within 3 months, necessitating strict adherence to schedule.
<b>Data Privacy</b>	Compliance with privacy laws may restrict personalization options due to data handling requirements.
<b>Resource Availability</b>	Limited access to specialized skills may impact task timelines and quality of some features.
<b>Vendor Dependency</b>	Dependency on third-party providers (e.g., payment and delivery) may introduce delays.

<b>Device Compatibility</b>	Platform must support diverse devices and internet speeds, influencing design and functionality decisions.
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## 2.6 Assigning Team Members to Tasks

*Table 12 Assigning Team Members to Tasks*

Task	Team Member(s)	Role
<b>Project Planning</b>	Anas	Project Manager
<b>UI/UX Design</b>	Anas	UI/UX Designer
<b>Frontend Development</b>	Anas	Frontend Developers
<b>Database Setup</b>	Reham	Database Administrator
<b>Backend Development</b>	Ghalib, Osama, Mohammad	Backend Developers
<b>Payment Gateway Integration</b>	Mohammad	Backend Developer
<b>Recommendation Engine Integration</b>	Osama	Backend Developer
<b>Order tracking Integration</b>	Ghalib	Backend Developer
<b>Testing and Quality Assurance</b>	External Quality Assurance Specialists	QA Testers
<b>Cybersecurity Validation</b>	Ghalib	Cybersecurity Specialist
<b>Customer Support Training</b>	Osama	Trainers
<b>Deployment and Launch</b>	Reham	Deployment Engineer
<b>Post-Launch Review</b>	Entire Team	Cross-functional Review

## 2.7 Project Schedule

Gantt chart

#	TASK	Week													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Requirements Specification	Yellow													
2	UI/UX Design and Approval		Yellow												
3	Frontend Development		Light Blue	Yellow	Yellow	Yellow	Yellow	Yellow							
4	Database Setup		Red	Red	Red	Red	Red								
5	Backend System Ready		Blue	Blue	Blue	Blue	Blue								
6	Order tracking Integration									Green	Green				
7	Payment Gateway Integration									Purple	Purple				
8	Recommendation Engine Ready								Yellow	Yellow					
9	Cybersecurity Validation									Green	Green				
10	System Testing and QA									Dark Blue	Dark Blue				
11	Project Handover & Training											Yellow			
12	Go-Live / Launch											Red			
13	Post-Launch Review											Light Blue	Blue		

Figure 1 Gantt chart

PERT diagram

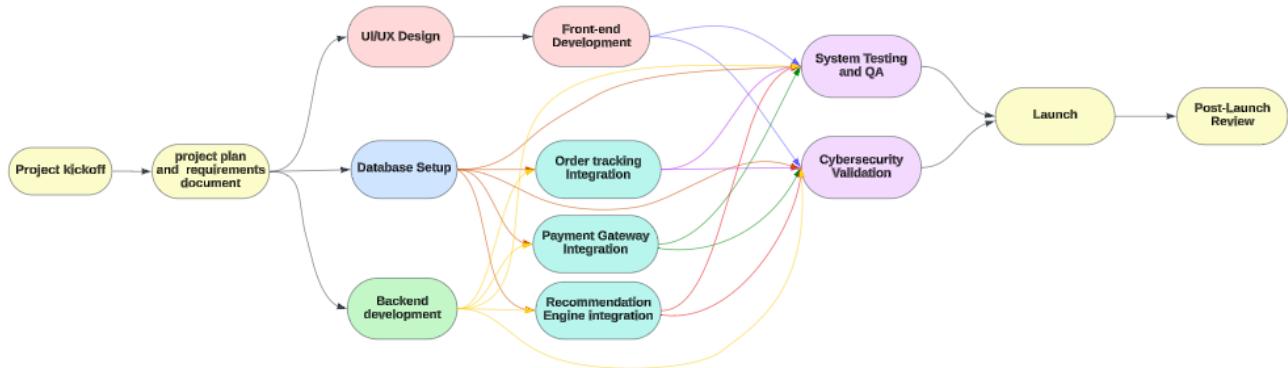


Figure 2 PERT diagram

## 2.8 Risk Analysis and Plans

Table 13 Risk Analysis and Plans table

Risk	Impact	Likelihood	Mitigation Plan	Contingency Plan

<b>Budget Overruns</b>	Could lead to a lack of resources for key features or tasks.	Medium	Regularly review and monitor expenses, prioritizing critical features first.	Reallocate resources from non-essential tasks or seek additional funding if possible.
<b>Delays from Vendor Dependencies</b>	Could affect timeline due to third-party delays in integrations (e.g., payment gateway).	High	Establish clear deadlines with vendors and regular check-ins to track progress.	Have alternative vendors or solutions on standby to minimize dependency delays.
<b>Technical Integration Issues</b>	May impact platform functionality if third-party integrations fail.	Medium	Conduct early testing on integration points and involve technical experts to resolve compatibility issues.	Develop workarounds or fallback features to temporarily replace unavailable features.
<b>Data Privacy Non-Compliance</b>	High risk of legal consequences if not compliant with regulations.	Low	Regular compliance audits, engage legal experts to ensure adherence to data privacy laws.	Implement rapid corrective actions and update privacy policies to align with regulations.
<b>Staff Training Delays</b>	Could lead to unprepared customer support teams upon launch.	Medium	Schedule training sessions early and provide quick-reference materials.	Assign trained team members as support leads temporarily to assist in initial queries.
<b>Performance Bottlenecks</b>	Could degrade user experience during peak times, affecting scalability.	Medium	Perform load testing to identify bottlenecks and optimize code performance.	Allocate resources for scaling up (e.g., cloud solutions) if bottlenecks become critical.

## 2.9 Monitoring, Reporting, and Controlling Mechanisms

*Table 14 Monitoring, Reporting, and Controlling Mechanisms table*

Risk	Impact	Likelihood	Mitigation Plan	Contingency Plan
<b>Budget Overruns</b>	Could lead to a lack of resources for key features or tasks.	Medium	Regularly review and monitor expenses, prioritizing critical features first.	Reallocate resources from non-essential tasks or seek additional funding if possible.

<b>Delays from Vendor Dependencies</b>	Could affect timeline due to third-party delays in integrations (e.g., payment gateway).	High	Establish clear deadlines with vendors and regular check-ins to track progress.	Have alternative vendors or solutions on standby to minimize dependency delays.
<b>Technical Integration Issues</b>	May impact platform functionality if third-party integrations fail.	Medium	Conduct early testing on integration points and involve technical experts to resolve compatibility issues.	Develop workarounds or fallback features to temporarily replace unavailable features.
<b>Data Privacy Non-Compliance</b>	High risk of legal consequences if not compliant with regulations.	Low	Regular compliance audits, engage legal experts to ensure adherence to data privacy laws.	Implement rapid corrective actions and update privacy policies to align with regulations.
<b>Staff Training Delays</b>	Could lead to unprepared customer support teams upon launch.	Medium	Schedule training sessions early and provide quick-reference materials.	Assign trained team members as support leads temporarily to assist in initial queries.
<b>Performance Bottlenecks</b>	Could degrade user experience during peak times, affecting scalability.	Medium	Perform load testing to identify bottlenecks and optimize code performance.	Allocate resources for scaling up (e.g., cloud solutions) if bottlenecks become critical.

## 3.0 Software Requirements Specifications (SRS)

### 3.1 System Stakeholders and Requirements Sources

#### Stakeholders

##### 1. End Users:

- a. Primary users of the Shoply platform, including individuals seeking an efficient online grocery shopping experience.
- b. Expectations:
  - i. User-friendly interface.
  - ii. Quick product search and filtering.
  - iii. Secure and flexible payment options.
  - iv. Personalized product recommendations.

## **2. Shoply Management:**

- a. Overseeing the development and operation of the platform.
- b. Responsibilities:
  - i. Ensuring alignment with business goals and usability improvements.
  - ii. Budget allocation and monitoring.
  - iii. Decision-making regarding feature prioritization and compliance.

## **3. Development Team:**

- a. Includes project managers, developers, UI/UX designers, database administrators, QA specialists, and cybersecurity experts.
- b. Role:
  - i. Building and implementing the platform.
  - ii. Maintaining security and performance.

## **4. Vendors:**

- a. Providers of third-party tools and services such as payment gateways and analytics platforms.
- b. Dependencies:
  - i. Timely integration.
  - ii. Reliable and secure service delivery.

## **5. Regulatory Authorities:**

- a. Ensure compliance with data privacy and e-commerce laws.
- b. Requirements:
  - i. Legal compliance and regular audits.
  - ii. Clear consumer rights and refund policies.

## **6. Customer Support Teams:**

- a. Provide post-launch assistance and address user queries.
- b. Responsibilities:
  - i. Familiarity with new features.
  - ii. Efficient resolution of user complaints.

## **Sources of Requirements**

### **1. Stakeholder Input:**

- a. User surveys and feedback.
- b. Meetings with Shoply management to outline business objectives.

## **2. Market Analysis:**

- a. Identifying common issues in existing e-commerce platforms, such as cart abandonment and lack of personalization.

## **3. Technical Feasibility Studies:**

- a. Evaluation of existing infrastructure's capabilities.
- b. Feasibility of integrating new features like recommendation engines and advanced filtering.

## **4. Compliance Standards:**

- a. Regulations and standards for data security and e-commerce operations.

## **5. Prototyping and Testing:**

- a. Gathering insights through early-stage prototypes and user testing sessions.

### **3.2 User Requirement Definition**

#### **1. Secure User Accounts**

Users require the ability to:

- Register for an account by providing their email, password, and personal details.
- Log in securely using their credentials or through third-party authentication methods (e.g., Google, Facebook).
- Recover their accounts by resetting forgotten passwords.

#### **2. Product Discovery**

Users want to:

- Search for products by category, price, brand.
- Quickly locate items that match their preferences for a smooth shopping experience.

#### **3. Personalized Shopping Experience**

Users expect:

- Recommendations tailored to their purchase history and browsing patterns.

- A homepage that displays suggested items, promotions, or new arrivals relevant to their interests.

## **4. Easy Account Management**

Users should be able to:

- Update their account details, including addresses, preferences, and other personal information.
- Ensure their profiles are always current and tailored to their needs.

## **5. Shopping Cart and Checkout**

Users require:

- The ability to add and remove items from their cart with a clear view of total costs.
- A streamlined "Buy Now" option to bypass the cart for quicker purchases.
- A secure and fast checkout process with multiple payment options.

## **6. Access to Promotions**

Users need:

- A dedicated "Offers" page to view discounts, promotions, and special deals, enabling informed purchasing decisions.

## **7. Order Tracking and Notifications**

User's demand:

- Real-time updates on order statuses, including the location of delivery personnel and estimated delivery times.
- Notifications for order progress, from dispatch to successful delivery.

## **8. Delivery Interaction**

Delivery personnel require:

- Contact options to reach customers directly in case of issues or clarifications during delivery.

## **9. Administrative Oversight**

Admins need:

- Tools to manage the product catalog, including adding, updating, and removing product listings.

## **10. Delivery Operations**

Delivery personnel require:

- Access to assigned orders with detailed customer information (address, order status).
- The ability to update order statuses in real-time for customer visibility.

### 3.3 Use case Diagrams

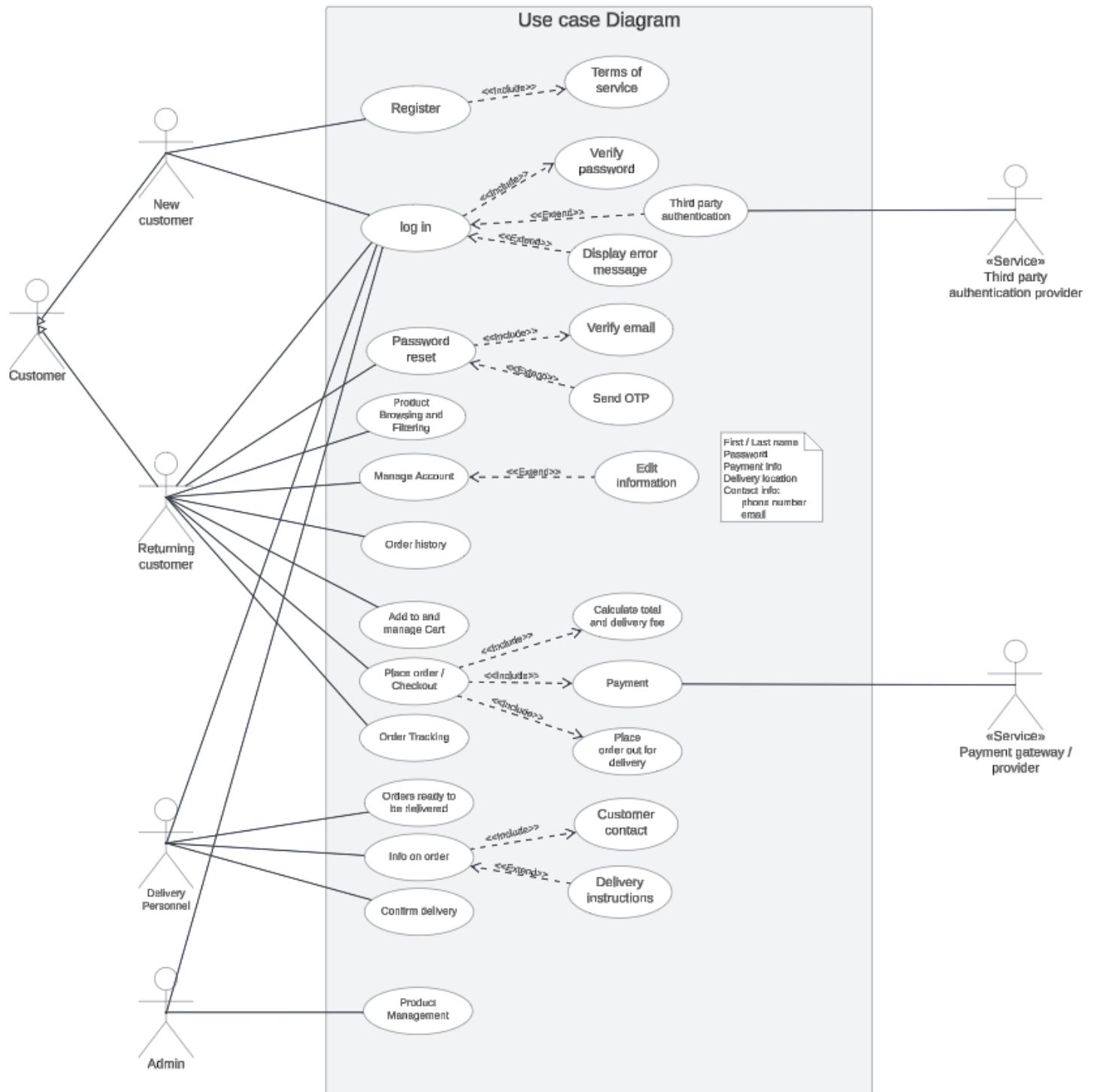


Figure 3 Shoply Use case diagram

## 3.4 System Functional Requirement Specification

### 1. User Authentication

#### User Story:

As a user, I want to securely register, log in, and manage my account so that I can access personalized features and keep my data safe.

#### Requirement Scenario:

- **Scenario:** User registers for an account.  
**Given** the user is on the registration page,  
**When** they enter valid email, password, and personal details,  
**Then** the system should create an account and send a confirmation email.
- **Scenario:** User forgets their password.  
**Given** the user clicks on "Forgot Password,"  
**When** they provide a registered email address,  
**Then** the system should send a password reset link.
- **Scenario:** User logs in using third-party authentication.  
**Given** the user chooses a third-party login option (e.g., Facebook, Google, or Apple),  
**When** they successfully authenticate via the third-party provider,  
**Then** the system should grant access to the user's account and display personalized features.

### 2. Product searching and Filtering

#### User Story:

As a shopper, I want to browse products by category, price, brand so that I can find items that match my preferences quickly.

#### Requirement Scenario:

- **Scenario:** User browses a category.  
**Given** the user selects a product category,  
**When** the system retrieves products,  
**Then** the user should see items in that category along with sorting and filtering options.

### **3. Personalized Recommendations**

#### **User Story:**

As a frequent shopper, I want personalized product recommendations so that I can discover items I'm likely to purchase.

#### **Requirement Scenario:**

- **Scenario:** User views the homepage.  
**Given** the user is logged in,  
**When** they access the homepage,  
**Then** the system should display recommendations based on past purchases and browsing history.

### **4. Account Management**

#### **User Story:**

As a user, I want to update my account details so that my profile reflects my preferences and current information.

#### **Requirement Scenario:**

- **Scenario:** User updates their address.  
**Given** the user accesses their account settings,  
**When** they edit and save the address,  
**Then** the system should update the information and confirm the changes.

### **5. Shopping Cart Management**

#### **User Story:**

As a shopper, I want to manage items in my cart so that I can control my purchase decisions before checkout.

#### **Requirement Scenario:**

- **Scenario:** User adds an item to the cart.  
**Given** the user is viewing a product page,

**When** they click "Add to Cart,"

**Then** the system should add the item to the cart and display a confirmation.

- **Scenario:** User removes an item from the cart.

**Given** the user is viewing their cart,

**When** they click "Remove,"

**Then** the system should update the cart and adjust the total price.

## 6. Offers Page

### User Story:

As a user, I want to access a dedicated Offers page where I can view all available discounts, deals, and promotions so that I can take advantage of them during my shopping.

### Requirement Scenario:

- **Scenario:** User views the Offers page.

**Given** the user clicks on the "Offers" link from the homepage,

**When** the system loads the Offers page,

**Then** it should display a list of all active offers, including their descriptions, terms, and expiration dates.

## 7. Buy now process

### User Story:

As a user, I want to quickly purchase a product using the "Buy Now" button so that I can bypass the shopping cart process and complete my purchase faster.

### Requirement Scenario:

- **Scenario:** User purchases an item using the "Buy Now" button

**Given** the user is on the product page,

**When** they click the "Buy Now" button,

**Then** the system should redirect them to the checkout page, pre-filling the purchase details for the selected item.

## **8. Checkout Process**

### **User Story:**

As a shopper, I want a fast and secure checkout process so that I can complete my purchase with ease.

### **Requirement Scenario:**

- **Scenario:** User selects a payment method.  
**Given** the user is at checkout,  
**When** they choose the payment method,  
**Then** the system should process the payment securely and display a confirmation.

## **9. Order Tracking**

### **User Story:**

As a shopper, I want to track my order in real-time so that I know when to expect delivery.

### **Requirement Scenario:**

- **Scenario:** User checks order status.  
**Given** the user logs into their account,  
**When** they view the "Order Tracking" section,  
**Then** the system should display the current delivery personal location and estimated delivery time.

## **10. Admin Product Management**

### **User Story:**

As an admin, I want to manage product listings so that the inventory is always up-to-date.

### **Requirement Scenario:**

- **Scenario:** Admin adds a new product.  
**Given** the admin is logged into the admin panel,  
**When** they fill out product details and click "Save,"  
**Then** the system should add the product to the database.

## **11. Delivery Personnel: Communication with Customers**

### **User Story:**

As delivery personnel, I want to contact customers directly if needed so that I can resolve delivery issues quickly.

### **Requirement Scenario:**

- **Scenario:** Delivery personnel contacts the customer.  
**Given** an order is marked as "Out for Delivery,"  
**When** the delivery personnel clicks "Contact Customer,"  
**Then** the system should display the customer's contact details (masked or temporary for privacy compliance).

## **12. Delivery Personnel: Order Management**

### **User Story:**

As delivery personnel, I want to view assigned orders so that I can manage my deliveries efficiently.

### **Requirement Scenario:**

- **Scenario:** Delivery personnel views assigned orders.  
**Given** the delivery personnel logs into the system,  
**When** they access the "Assigned Orders" section,  
**Then** the system should display a list of orders with relevant details (e.g., customer address, order status).

## **13. Delivery Personnel: Real-Time Updates**

### **User Story:**

As delivery personnel, I want to update the status of deliveries in real time so that customers and can track progress.

## **Requirement Scenario:**

- **Scenario:** Delivery personnel updates order status.  
**Given** the delivery personnel has picked up an order,  
**When** they update the status to "Out for Delivery,"  
**Then** the system should notify the customer and update the order tracking page.
- **Scenario:** Delivery personnel completes a delivery.  
**Given** the delivery personnel delivers an order to the customer,  
**When** they update the status to "Delivered,"  
**Then** the system should finalize the order and notify the customer and the delivery personnel.

## **3.5 Textual Description for Each Use Case**

### **1. Register**

**Actor(s):** New Customer

#### **Description:**

A new customer registers an account by providing personal details such as first name, last name, email, password, and contact information. The system verifies the information and confirms successful registration. Terms of service are presented for agreement before account creation.

### **2. Log In**

**Actor(s):** New Customer, Returning Customer

#### **Description:**

Customers (new or returning) log in by providing their credentials or through third-party authentication services. If incorrect credentials are entered, an error message is displayed. Email verification may also be required for new users.

### **3. Password Reset**

**Actor(s):** Customer

#### **Description:**

If a customer forgets their password, they can request a password reset. The system sends a One-Time Password (OTP) to their registered email or phone for verification, allowing them to set a new password.

#### **4. Product Browsing and Filtering**

**Actor(s):** Customer

**Description:**

Customers browse the product catalog using filters like categories, price ranges, and ratings to refine their search and view product details.

#### **5. Manage Account**

**Actor(s):** Customer

**Description:**

Customers can edit their personal information, such as delivery address, payment details, and contact information, through the "Manage Account" section.

#### **6. Order History**

**Actor(s):** Returning Customer

**Description:**

Returning customers can view their past orders, including details like product information, delivery dates, and payment statuses.

#### **7. Add to and Manage Cart**

**Actor(s):** Customer

**Description:**

Customers add items to their cart, where they can view the cart total, update quantities, and remove unwanted items. The system calculates the total and displays any applicable delivery fees.

## **8. Place Order/Checkout**

**Actor(s):** Customer

**Description:**

Customers proceed to checkout by selecting payment methods and providing delivery instructions. The system processes the payment through a payment gateway and confirms the order.

## **9. Order Tracking**

**Actor(s):** Customer

**Description:**

Customers track their orders in real time, with updates on statuses like "Order Placed," "Out for Delivery," and "Delivered."

## **10. Orders Ready to be Fulfilled**

**Actor(s):** Delivery Personnel

**Description:**

Delivery personnel view orders assigned to them, including delivery details such as customer address and contact information.

## **11. Info on Order**

**Actor(s):** Delivery Personnel

**Description:**

Delivery personnel access specific order details to ensure the delivery process runs smoothly. This includes options to contact customers directly if needed.

## **12. Delivery Instructions**

**Actor(s):** Delivery Personnel

**Description:**

Delivery personnel update the system with delivery instructions or status changes, such as "Out for Delivery" or "Delivered," to keep customers informed.

## **13. Confirm Delivery**

**Actor(s):** Delivery Personnel

**Description:**

Upon successfully delivering an order, delivery personnel update the status to "Delivered." Notifications are sent to the customer and admin, and the order is marked complete.

## **14. Product Management**

**Actor(s):** Admin

**Description:**

Admins manage the product catalog by adding, editing, or removing products. They also ensure that product details, such as prices and descriptions, are up to date.

### **3.6 Non-Functional Requirements**

#### **3.6.1 Performance Requirements**

**System Responsiveness:** The system must respond to user requests (e.g., page loading, order processing) within 2 seconds under normal load and 5 seconds under peak load conditions.

**Scalability:** The system should support a minimum of 10,000 concurrent users with no degradation in performance, scaling horizontally to accommodate increasing traffic demands.

**Transaction Throughput:** The payment gateway should process a minimum of 100 transactions per second (TPS) under peak conditions.

### 3.6.2 Dependability Requirements

**Availability:** The system must achieve 99.9% uptime, allowing for no more than 8.76 hours of downtime per year.

**Recovery Time Objective (RTO):** In case of a failure, the system must recover within 5 minutes to resume normal operations.

**Backup and Recovery:** Daily backups of critical data must be performed, with recovery testing every 3 months to ensure backup integrity.

### 3.6.3 Security Requirements

**Data Encryption:** All sensitive data, including customer personal information and payment details, must be encrypted using AES-256 encryption for storage and TLS 1.2 or higher for transmission.

**Privacy Compliance:** The system must comply with GDPR and CCPA standards, ensuring customer data is handled lawfully and securely.

**Vulnerability Testing:** Quarterly penetration testing must be conducted, and identified vulnerabilities must be resolved within 30 days.

### 3.6.4 Usability Requirements

**Ease of Use:** A new user must be able to register, search for a product, and complete a purchase within 3 minutes without external assistance.

**Help and Support:** Context-sensitive help (e.g., tooltips, FAQs) must be provided across all major user interfaces to assist users.

### 3.6.5 Operational and Environmental Requirements

**Operating Conditions:** The system must function reliably in regions with low bandwidth (minimum 2 Mbps) or intermittent internet connectivity.

### 3.6.6 Maintainability Requirements

**Code Modularity:** The codebase must be modular, allowing for the addition of new features with minimal impact on existing functionality.

**Issue Resolution:** Critical issues reported by users must be resolved within 24 hours, while non-critical issues must be resolved within 5 business days.

**Documentation:** Comprehensive system documentation must be provided and updated within 2 weeks of any significant system change.

## 3.6 Data Requirements

**Data Volume:** The database must be capable of storing up to 100TB of data, scaling to accommodate growth over the next 5 years.

**Data Integrity:** The system must enforce referential integrity across all relational databases using foreign keys and constraints.

**Data Retention:** Customer transaction data must be retained for 7 years, in compliance with legal requirements, before being archived or deleted.

**Real-Time Data:** Order status updates must propagate to customers, admins, and delivery personnel within 2 seconds of the status change.

## 4.0 Analysis and Design

### 4.1 Activity Diagrams

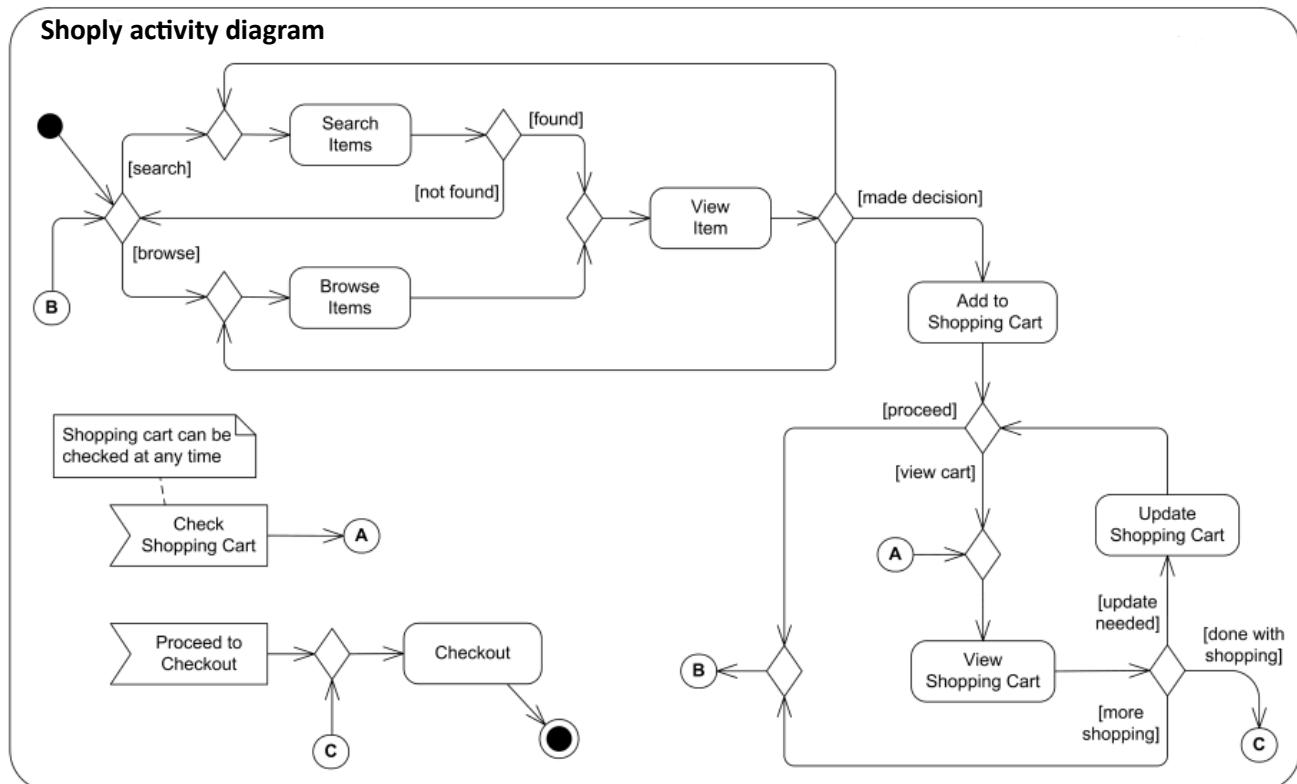


Figure 4 Shoply activity diagram

### 4.2 Sequence Diagrams

Table 15 Sequence Table for User Login

Step	Actor	Object	Interaction Details
1	User	Login System	Sends "login" request with username and password.
2	Load Balancer	Login System	Routes the request to an available Login System server.

<b>3</b>	<b>Login System</b>	<b>Proxy</b>	<i>Sends login request to the Proxy for further processing.</i>
<b>4</b>	<b>Proxy</b>	<b>Database</b>	<i>Forwards login credentials to the Database for validation.</i>
<b>5</b>	<b>Database</b>	<b>Proxy</b>	<i>Verifies credentials and returns authentication result (success or failure).</i>
<b>6</b>	<b>Proxy</b>	<b>Login System</b>	<i>Sends authentication result back to Login System.</i>
<b>7</b>	<b>Login System</b>	<b>User</b>	<i>Sends "authentication successful" or "authentication failed" response to User.</i>
<b>8</b>	<b>User</b>	<b>Login System</b>	<i>If successful, redirected to main page; if failed, receives an error message.</i>

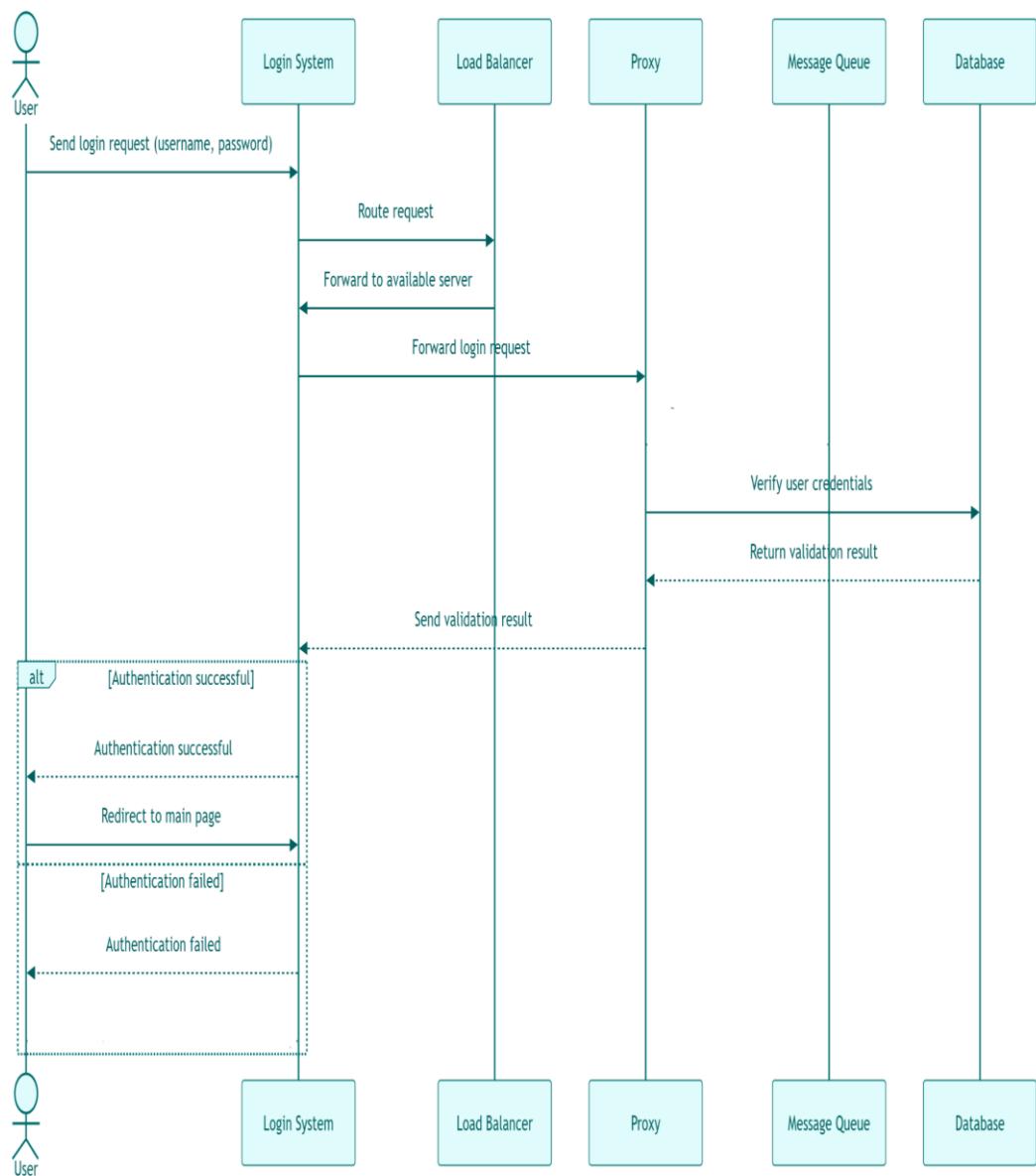


Figure 5 Sequence Diagram for User Login

Table 16 Sequence Table for Password Recovery

Step	Actor	Object	Interaction Details
1	User	Password Recovery System	Sends "forgot password" request.
2	Password Recovery System	Load Balancer	Directs the request to an available server.
3	Password Recovery System	User	Prompts the user for an email address.
4	User	Password Recovery System	Submits the email address.
5	Password Recovery System	Proxy	Forwards the email address to Proxy.
6	Proxy	Message Queue	Forwards the email for validation.
7	Message Queue	Database	Validates the email address.
8	Database	Proxy	Returns the validation result.
9	Proxy	Password Recovery System	Sends the verification result.
10	Password Recovery System	User	Prompts the user to enter a verification code.
11	User	Password Recovery System	Submits the verification code.
12	Password Recovery System	Proxy	Forwards new password to Proxy for Database update.
13	Proxy	Database	Updates password in the Database and confirms to Proxy.

14

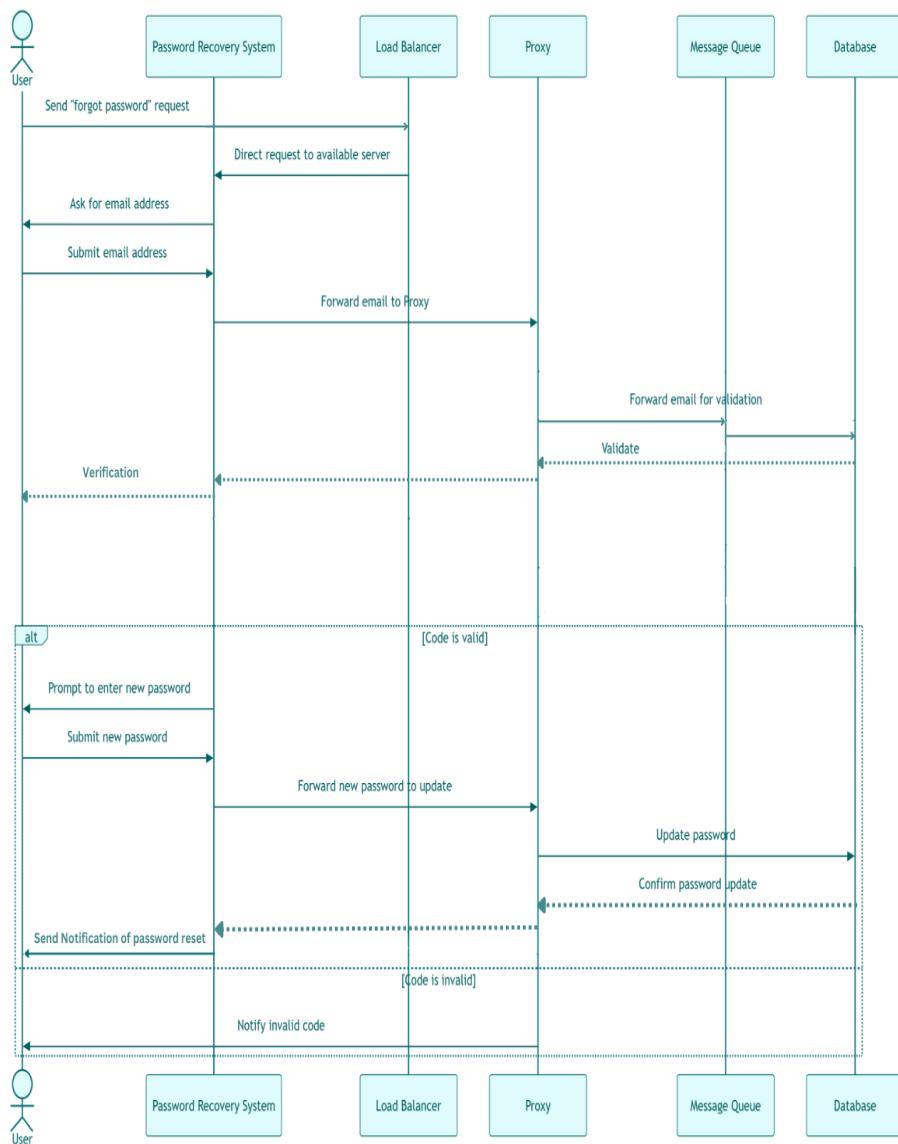
**Message Queue****User****Notifies User of successful password reset.**

Figure 6 Sequence Diagram for Password Recovery

Table 17 Sequence Table for third party authentication

Step	Actor	Object	Action	Interaction Details
1	User	Login System	Initiates login	Chooses the third-party login option.
2	Login System	Load Balancer	Forwards request	Sends the authentication request to the load balancer.
3	Load Balancer	Proxy	Routes request	Routes the authentication request for security.
4	Proxy	Message Queue	Sends authentication request	Sends the request to the message queue for processing.
5	Message Queue	Third-Party Provider	Sends verification request	Sends authentication details for user verification.
6	Third-Party Provider	Message Queue	Authenticates and sends token	Verifies user and returns the authentication token.
7	Message Queue	Proxy	Forwards token	Forwards the authentication token to the proxy.
8	Proxy	Load Balancer	Forwards token	Sends the token back to the load balancer.
9	Load Balancer	Login System	Forwards token	Delivers the token to the login system.
10	Login System	User	Grants access	Grants access and displays personalized features.

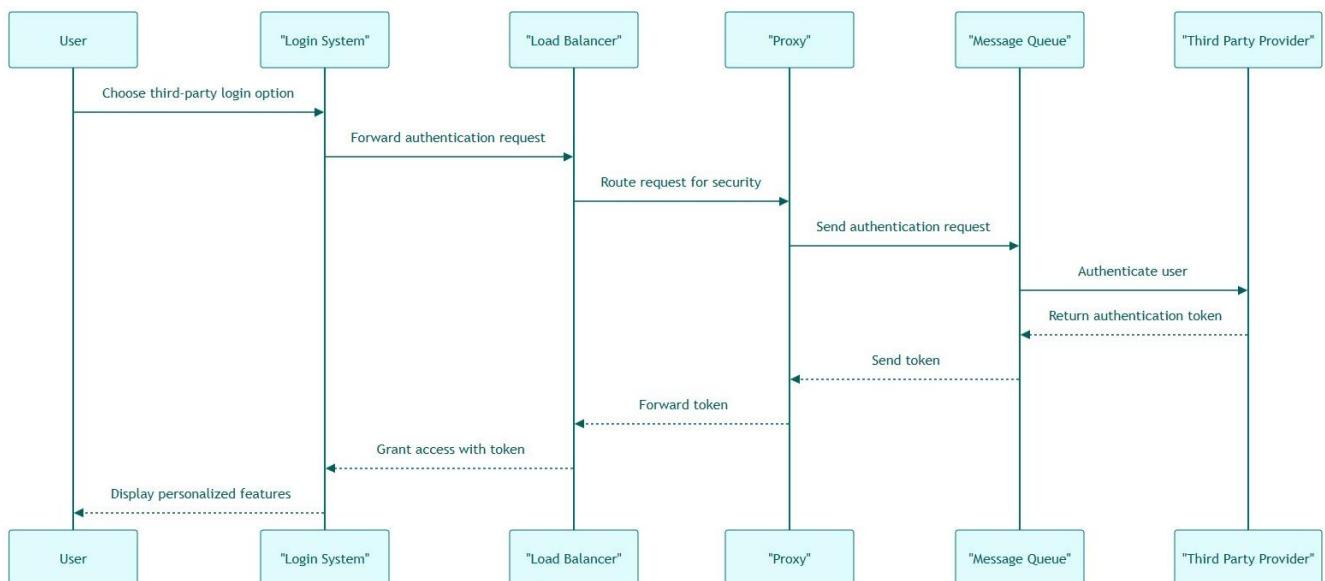


Figure 7 Sequence diagram for third party authentication

*Table 18 Sequence Table for User Registration*

Step	Actor	Object	Interaction Details
1	User	Registration System	Sends "sign up" request.
2	Load Balancer	Registration System	Routes request to an available Registration System server.
3	Registration System	User	Prompts User for username, email, and password.
4	User	Registration System	Sends registration details to Registration System.
5	Registration System	Proxy	Forwards user data to Proxy for validation.
6	Proxy	Database	Checks if username and email are available in the Database.
7	Database	Proxy	Validates username and email. Returns result to Proxy.
8	Proxy	Registration System	Sends validation result to Registration System.
9	Registration System	Database	If valid, creates new user account in Database.
10	Message Queue	User	Notifies User of successful registration.

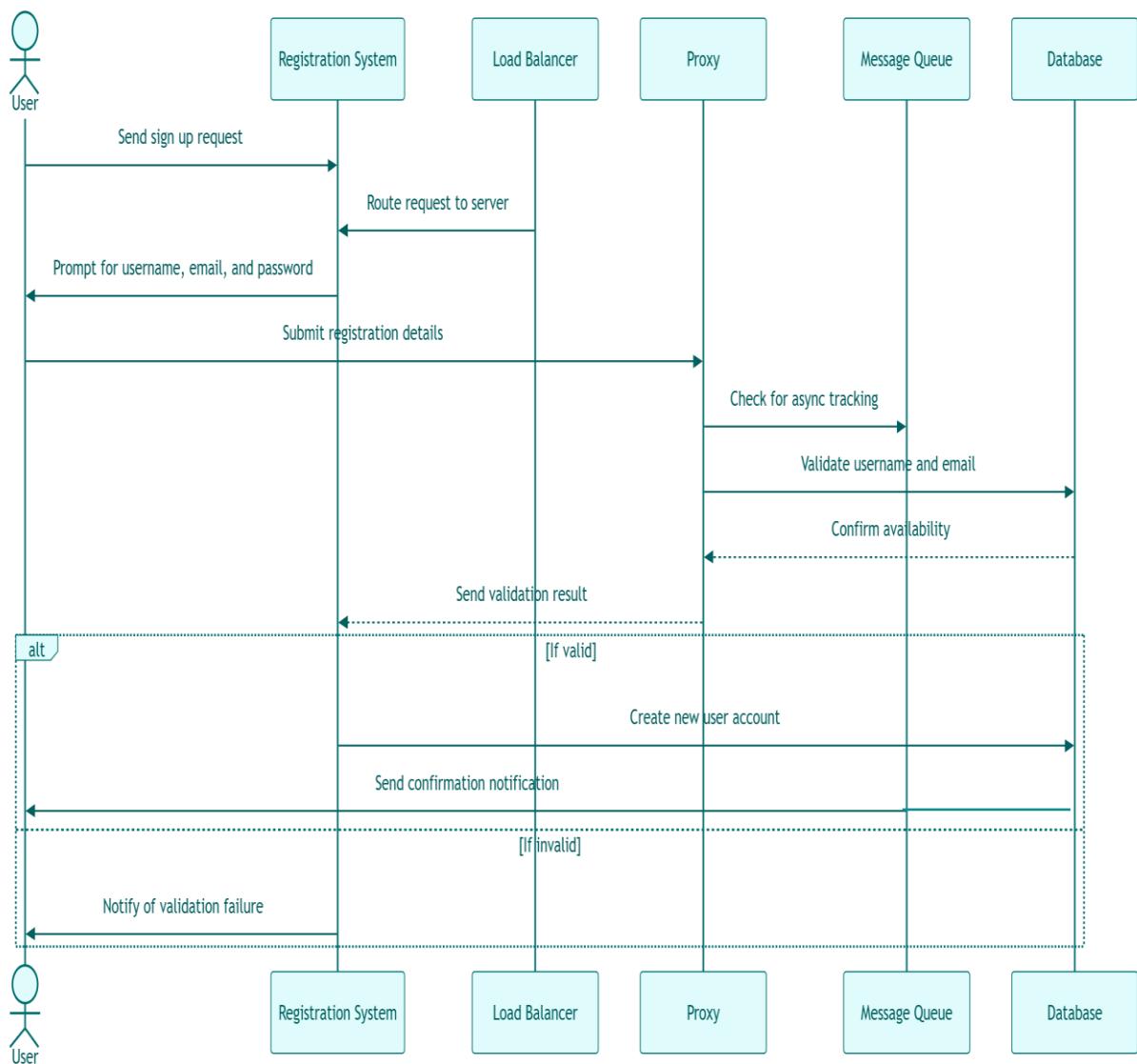


Figure 8 Sequence Diagram for User Registration

Table 19 Sequence Table for Browsing Products

Step	Actor	Object	Interaction Details
1	User	Product Catalog	Sends "view products" request.
2	Load Balancer	Product Catalog	Routes request to an available Product Catalog server.
3	Product Catalog	Proxy	Forwards request to Proxy.
4	Proxy	Message Queue	Optionally logs the request in Message Queue.
5	Proxy	Database	Retrieves product categories from the Database.

<b>6</b>	<b>Database</b>	<b>Proxy</b>	<b>Returns product categories to Proxy.</b>
<b>7</b>	<b>Proxy</b>	<b>Product Catalog</b>	<b>Sends categories data back to Product Catalog.</b>
<b>8</b>	<b>User</b>	<b>Product Catalog</b>	<b>Selects a category.</b>
<b>9</b>	<b>Product Catalog</b>	<b>Proxy</b>	<b>Forwards selected category to Proxy for fetching related products.</b>
<b>10</b>	<b>Proxy</b>	<b>Database</b>	<b>Retrieves products from the Database.</b>
<b>11</b>	<b>Database</b>	<b>Proxy</b>	<b>Returns products to Proxy.</b>
<b>12</b>	<b>Proxy</b>	<b>Product Catalog</b>	<b>Sends product list to Product Catalog for display.</b>
<b>13</b>	<b>User</b>	<b>Product Catalog</b>	<b>Optionally filters products by criteria (e.g., price, brand).</b>

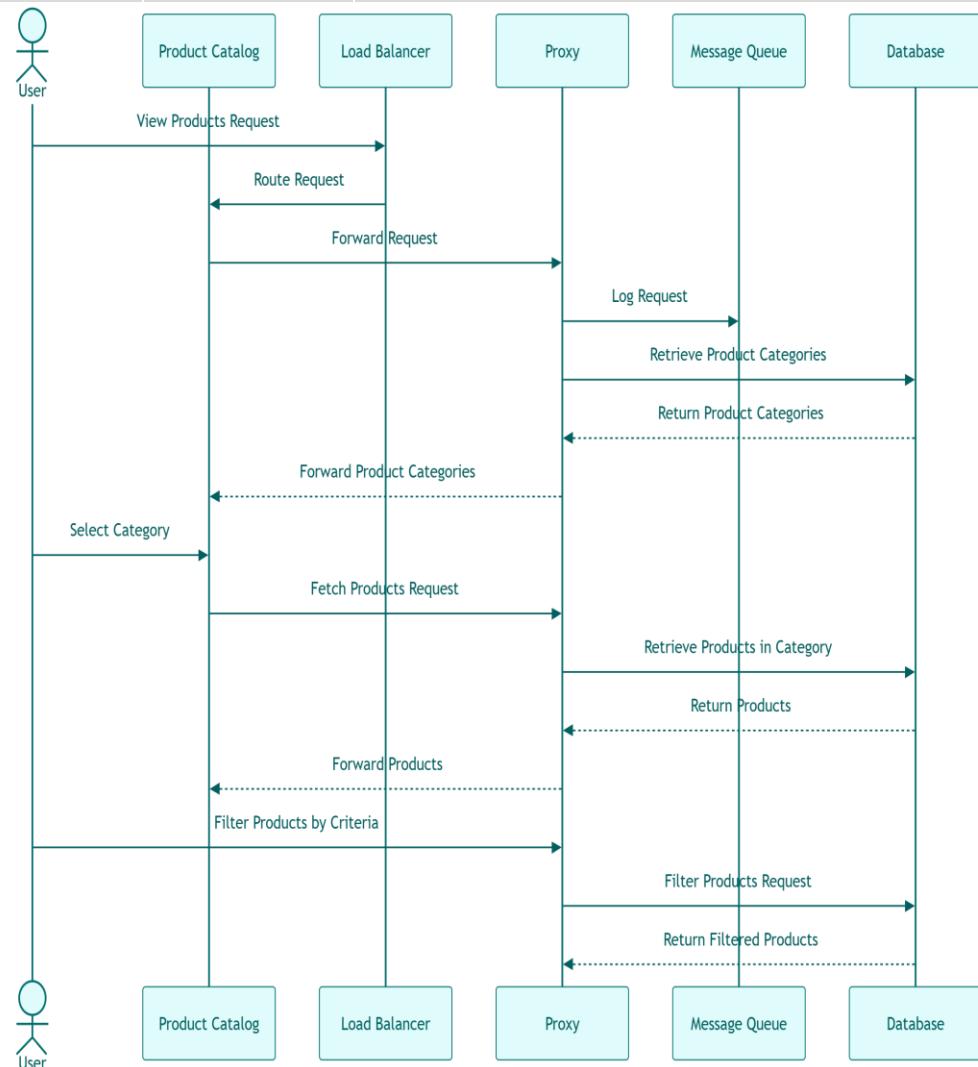


Figure 9 Sequence Diagram for Browsing Products

Table 20 Sequence Table for offers checking process

Step	Actor	Object	Interaction Details
1	User	Offers Service	Clicks on "Offers" link.
2	Offers Service	Load Balancer	Sends request to load the Offers page.
3	Load Balancer	Message Queue	Forwards request to the Message Queue.
4	Message Queue	Offers Database	Fetches active offers from the Offers Database.
5	Offers Database	Message Queue	Returns active offers data.
6	Message Queue	Load Balancer	Sends offers data to the Load Balancer.
7	Load Balancer	Offers Service	Forwards offers data to the Offers Service.
8	Offers Service	User	Displays the list of active offers (discounts, deals, promotions).

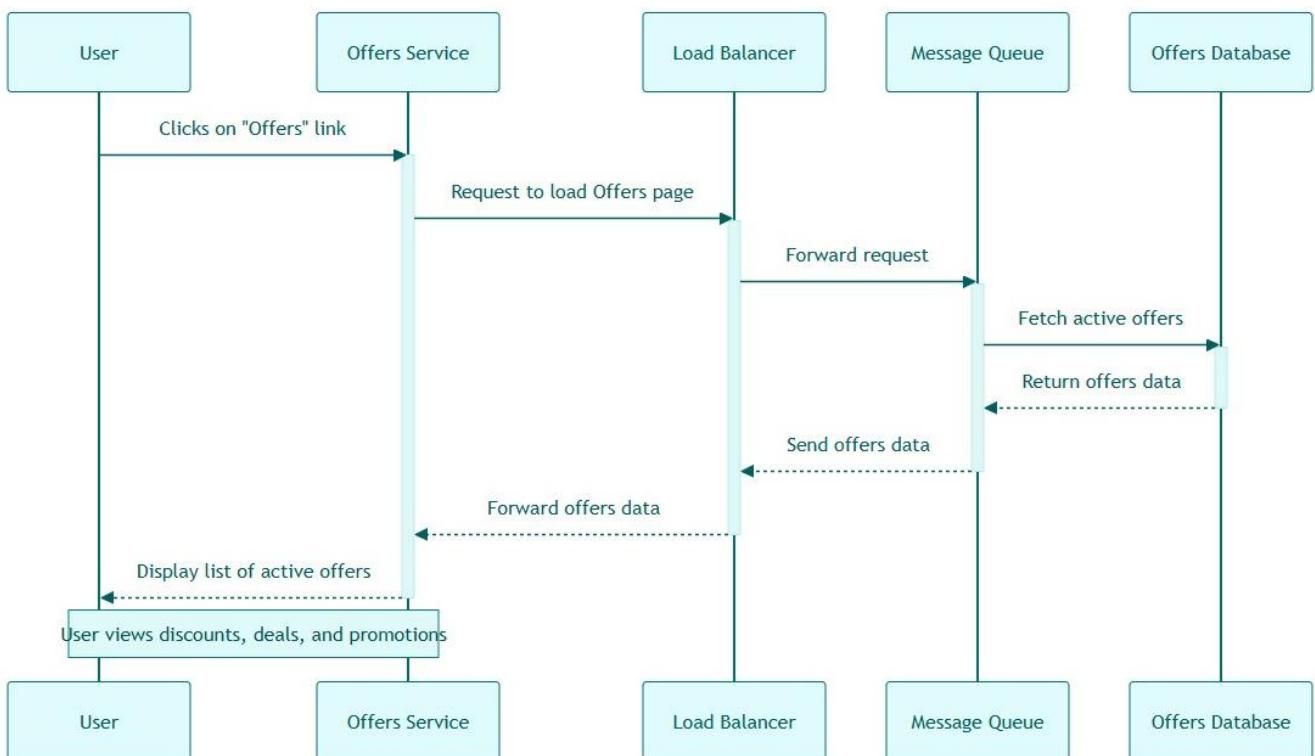


Figure 10 Sequence diagram for offers checking process

Table 21 Sequence Table for Adding Products to Cart

Step	Actor	Object	Interaction Details
1	User	Shopping Cart	Selects a product to add to the cart.
2	User	Shopping Cart	Sends "add to cart" request.
3	Load Balancer	Shopping Cart	Routes request to an available Shopping Cart server.
4	Shopping Cart	Proxy	Forwards request to Proxy for cart update.
5	Proxy	Message Queue	Optionally logs or tracks cart update in Message Queue.
6	Proxy	Database	Updates the cart with the selected product in the Database.
7	Database	Proxy	Confirms cart update to Proxy.
8	Proxy	Shopping Cart	Sends updated cart data to Shopping Cart for display.
9	Shopping Cart	User	Displays updated cart contents.

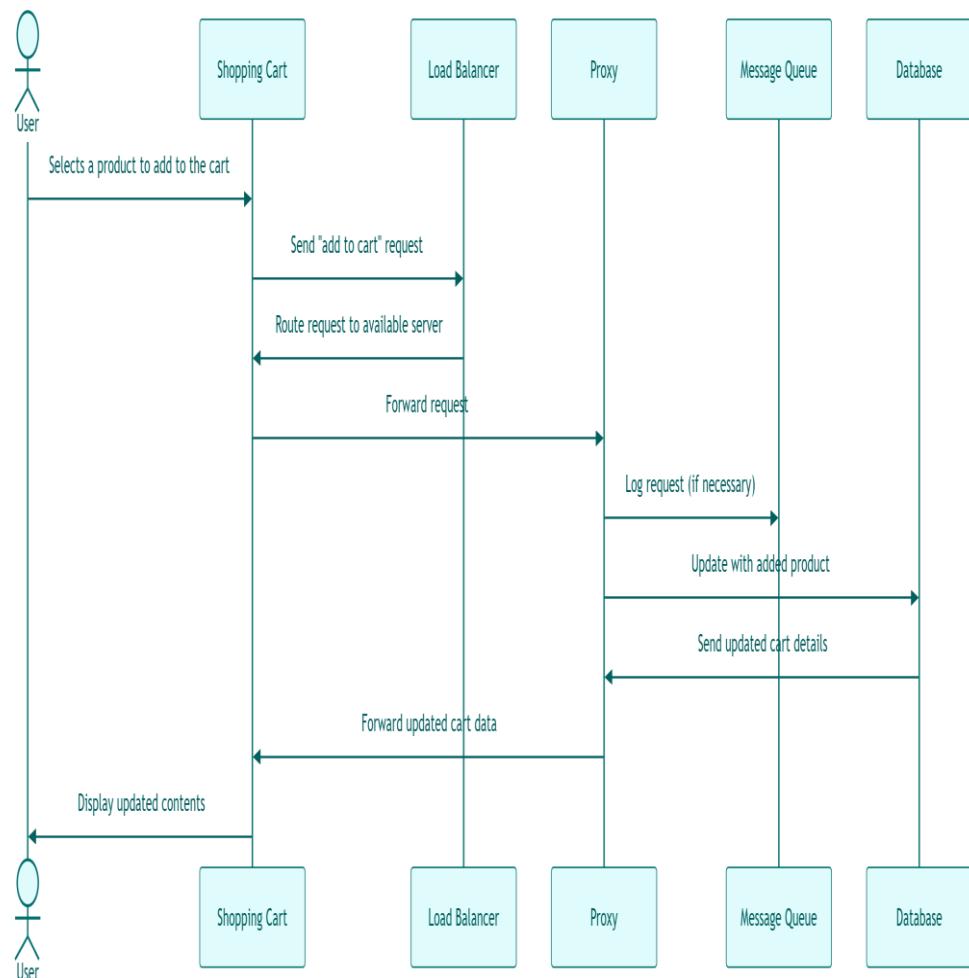


Figure 11 Sequence Diagram for Adding Products to Cart

Table 22 Sequence Table for Checkout Process

Step	Actor	Object	Interaction Details
1	User	Checkout System	Sends "checkout" request.
2	Load Balancer	Checkout System	Routes request to an available Checkout System server.
3	Checkout System	Proxy	Retrieves cart contents from Proxy.
4	Proxy	Database	Retrieves cart contents from Database.
5	Checkout System	User	Prompts for shipping and payment details.
6	User	Checkout System	Sends shipping and payment details.
7	Checkout System	Proxy	Forwards details to Proxy for validation.
8	Proxy	Database	Validates shipping and payment details in Database.
9	Checkout System	Payment Gateway	Sends payment request to Payment Gateway.
10	Payment Gateway	Checkout System	Processes payment and returns success or failure.
11	Checkout System	User	If payment is successful, sends order confirmation and email; otherwise, prompts for retry.
12	Message Queue	User	Optionally sends confirmation email to User asynchronously (using Message Queue).

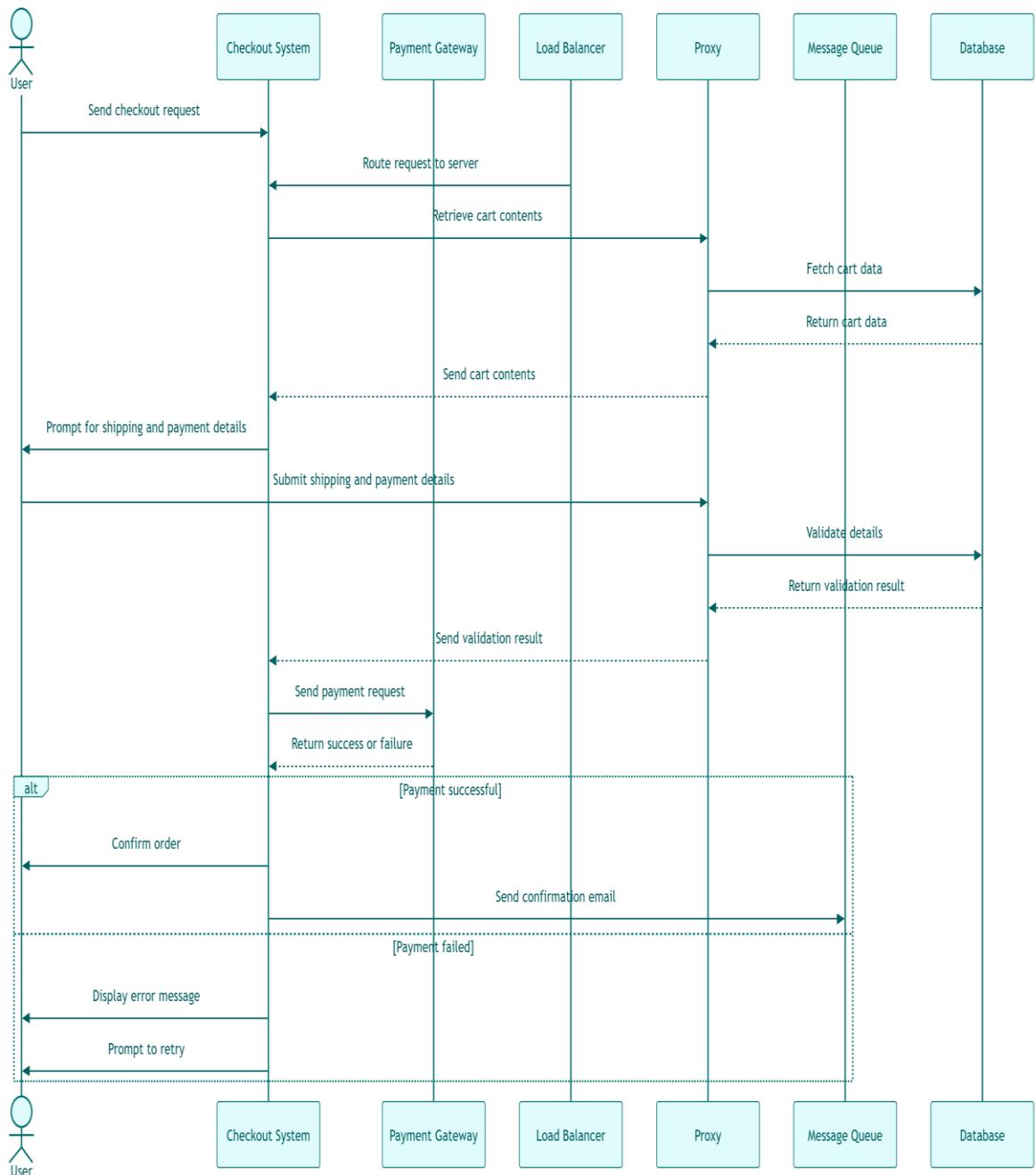


Figure 12 Sequence Diagram for Checkout Process

Table 23 Sequence Table for Product searching and Filtering

Step	Actor	Object	Interaction Details
1	User	Product Service	Selects product category.
2	Product Service	Load Balancer	Retrieves products request.
3	Load Balancer	Security Proxy	Forwards request.
4	Security Proxy	Message Queue	Sends request for products.
5	Message Queue	Database	Queries products by category.
6	Database	Message Queue	Returns products.
7	Message Queue	Security Proxy	Sends products list.
8	Security Proxy	Load Balancer	Forwards products list.
9	Load Balancer	Product Service	Returns products.
10	Product Service	User	Displays products with filters.
11	User	User	Browses products and applies filters.

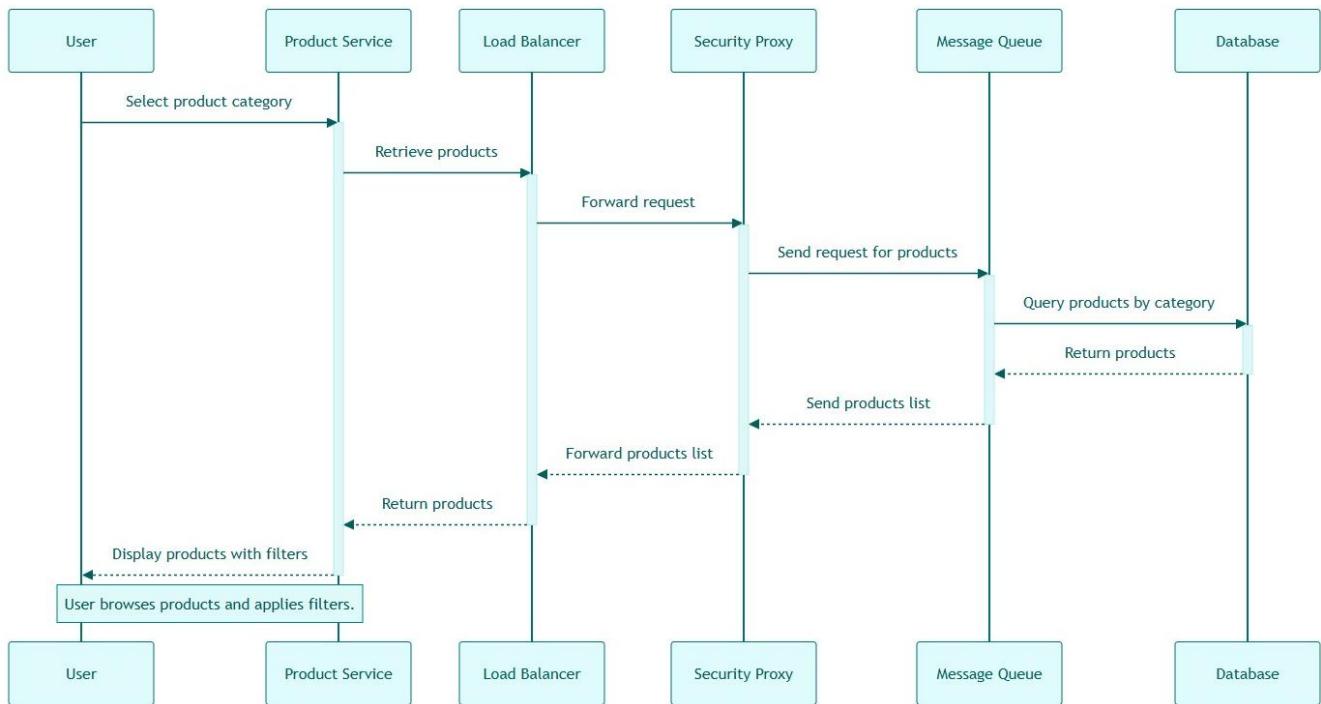


Figure 13 Sequence Diagram for Product searching and Filtering

Table 24 Sequence Table for Shopping Cart Management

Step	Actor	Object	Interaction Details
1	User	Account Service	Access account settings.
2	Account Service	Load Balancer	Forwards the request.
3	Load Balancer	Security Proxy	Routes the request to the proxy.
4	Security Proxy	Message Queue	Sends update request.
5	Message Queue	Database	Updates the address in the database.
6	Database	Message Queue	Confirms the update.
7	Message Queue	Security Proxy	Acknowledges the receipt of the update.
8	Security Proxy	Load Balancer	Confirms the update.
9	Load Balancer	Account Service	Forwards confirmation of the update.
10	Account Service	User	Notifies the user: "Address updated successfully."

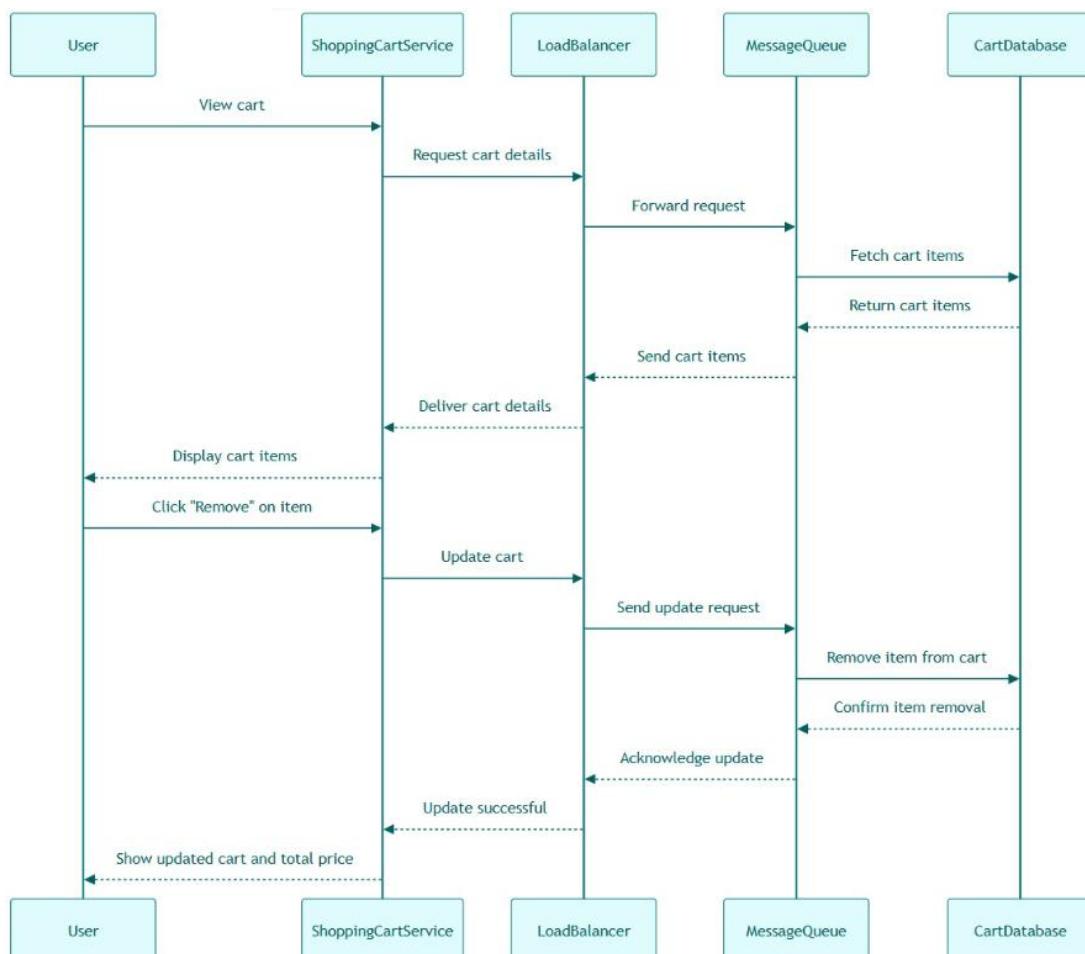


Figure 14 Sequence Diagram for Shopping Cart Management

Table 25 Sequence Table for Buy now process

Step	Actor	Object	Interaction Details
1	User	Product Service	User visits product page.
2	User	Product Service	Clicks "Buy Now" button.
3	Product Service	Load Balancer	Redirects to the checkout page.
4	Load Balancer	Checkout Service	Forwards the request to the checkout page.
5	Checkout Service	Message Queue	Sends purchase details.
6	Message Queue	Database	Stores purchase information.
7	Database	Message Queue	Acknowledges storage of purchase information.
8	Message Queue	Checkout Service	Notifies completion of purchase process.
9	Checkout Service	Load Balancer	Redirects system to display the checkout page.
10	Load Balancer	Product Service	Redirects back to the system.
11	Product Service	User	Displays checkout page with pre-filled details.
12	User	Product Service	User completes the purchase process.

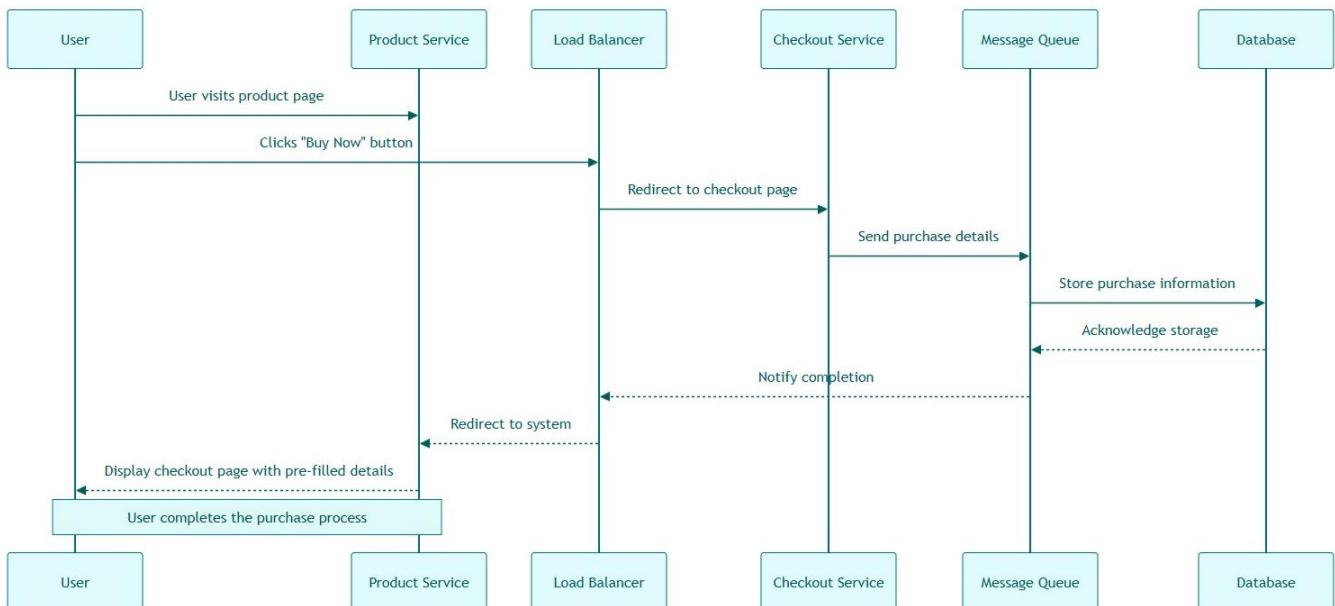


Figure 15 Sequence Diagram for Buy now process

Table 26 Sequence Table for Admin Product Management

Step	Actor	Object	Interaction Details
1	Admin	Product Service	Logs in to the admin panel.
2	Product Service	Admin	Admin logged in successfully.
3	Admin	Product Service	Fills out product details.
4	Admin	Product Service	Clicks "Save" to save product details.
5	Product Service	Inventory Database	Adds new product to inventory.
6	Inventory Database	Product Service	Confirms product added successfully.
7	Product Service	Admin	Sends confirmation of product addition.
8	Admin	-	Successfully manages product listings.

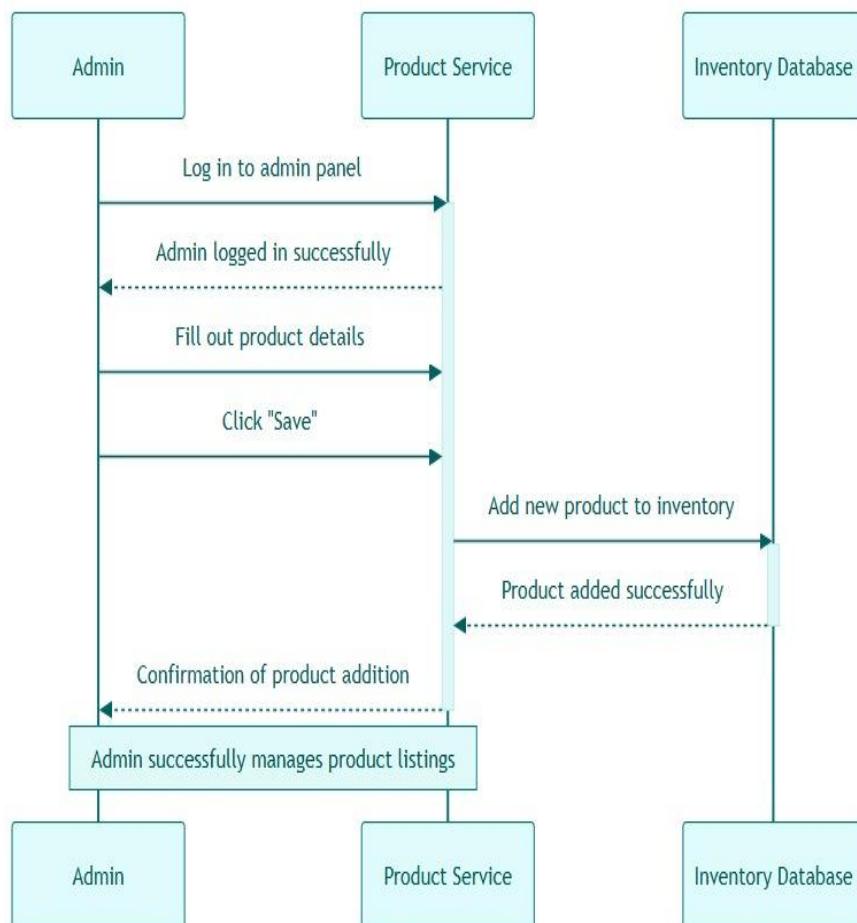


Figure 16 Sequence Diagram for Admin Product Management

Table 27 Sequence Table for Order tracking

Step	Actor	Object	Interaction Details
1	Shopper	Order Tracking Service	Logs in to account.
2	Order Tracking Service	Shopper	Verifies account.
3	Shopper	Order Tracking Service	Views "Order Tracking" section.
4	Order Tracking Service	Load Balancer	Requests current order status.
5	Load Balancer	Delivery Tracking Service	Fetches delivery personnel location.
6	Delivery Tracking Service	Load Balancer	Returns delivery location and estimated time.
7	Load Balancer	Order Tracking Service	Sends delivery details.
8	Order Tracking Service	Shopper	Displays current delivery location and estimated delivery time.

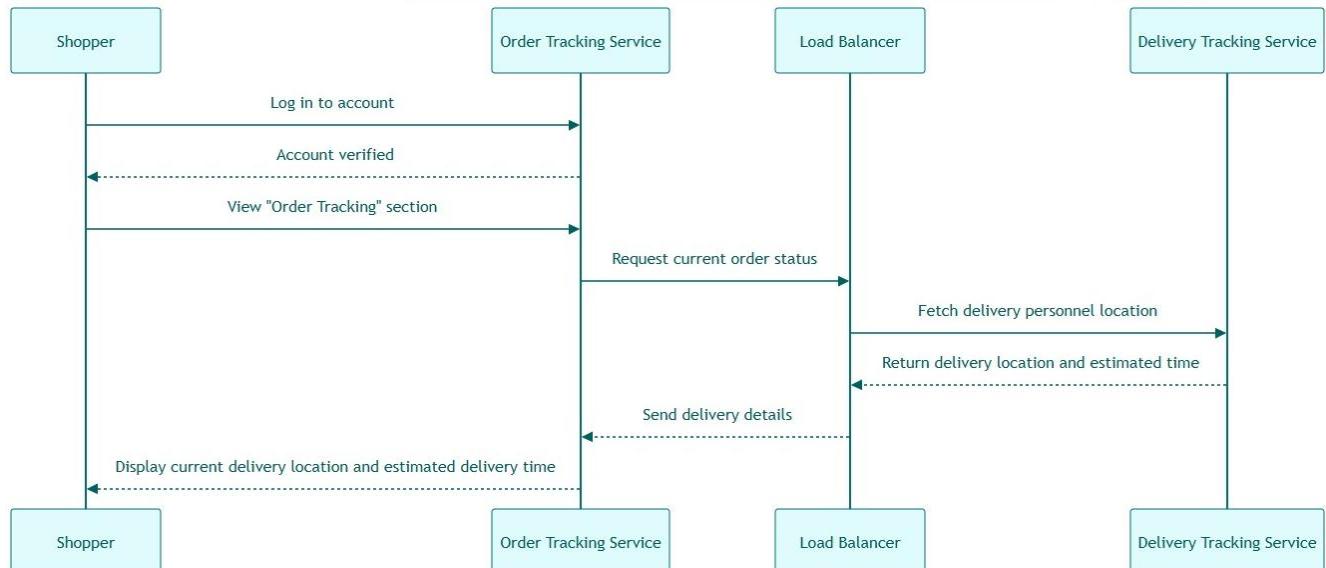


Figure 17 Sequence Diagram for Order tracking

Table 28 Sequence Table for Delivery Personnel: Communication with Customers

Step	Actor	Action	Receiver	Description
1	Delivery Personnel	Mark order as "Out for Delivery"	Delivery Management System	Delivery personnel updates the status of the order to "Out for Delivery".
2	Delivery Management System	Route request to appropriate service	Load Balancer	The system routes the request to the load balancer to process the status update.
3	Load Balancer	Send order status update	Message Queue	Load Balancer forwards the order status update to the Message Queue.
4	Message Queue	Update order status in database	Customer Database	Message Queue updates the order status in the Customer Database.
5	Customer Database	Confirm order status update	Message Queue	Customer Database confirms the update of the order status.
6	Message Queue	Notify status update success	Load Balancer	Message Queue sends a notification of the successful status update back to the Load Balancer.
7	Load Balancer	Notify status update success	Delivery Management System	Load Balancer informs the Delivery Management System of the successful status update.
8	Delivery Management System	Order marked as "Out for Delivery"	Delivery Personnel	The system notifies the Delivery Personnel that the order status has been successfully updated.
9	Delivery Personnel	Click "Contact Customer"	Delivery Management System	Delivery Personnel requests customer contact details to initiate communication.
10	Delivery Management System	Request customer contact details	Load Balancer	The system routes a request to retrieve customer contact details through the Load Balancer.
11	Load Balancer	Fetch customer contact information	Message Queue	Load Balancer forwards the request to fetch customer contact information to the Message Queue.

12	Message Queue	Retrieve customer contact details	Customer Database	Message Queue requests customer contact details from the Customer Database.
13	Customer Database	Provide masked contact details	Message Queue	Customer Database responds with the masked contact details to maintain privacy.
14	Message Queue	Send masked contact details	Load Balancer	Message Queue sends the masked contact details back to the Load Balancer.
15	Load Balancer	Send masked contact details	Delivery Management System	Load Balancer forwards the masked contact details to the Delivery Management System.
16	Delivery Management System	Display customer contact details	Delivery Personnel	The system displays the masked contact details to the Delivery Personnel.
17	Delivery Personnel	Initiate contact regarding delivery issue	Customer	Delivery Personnel contacts the customer using the provided contact details for delivery-related inquiries.
18	Customer	Respond to delivery inquiry	Delivery Personnel	Customer responds to the inquiry from the Delivery Personnel.

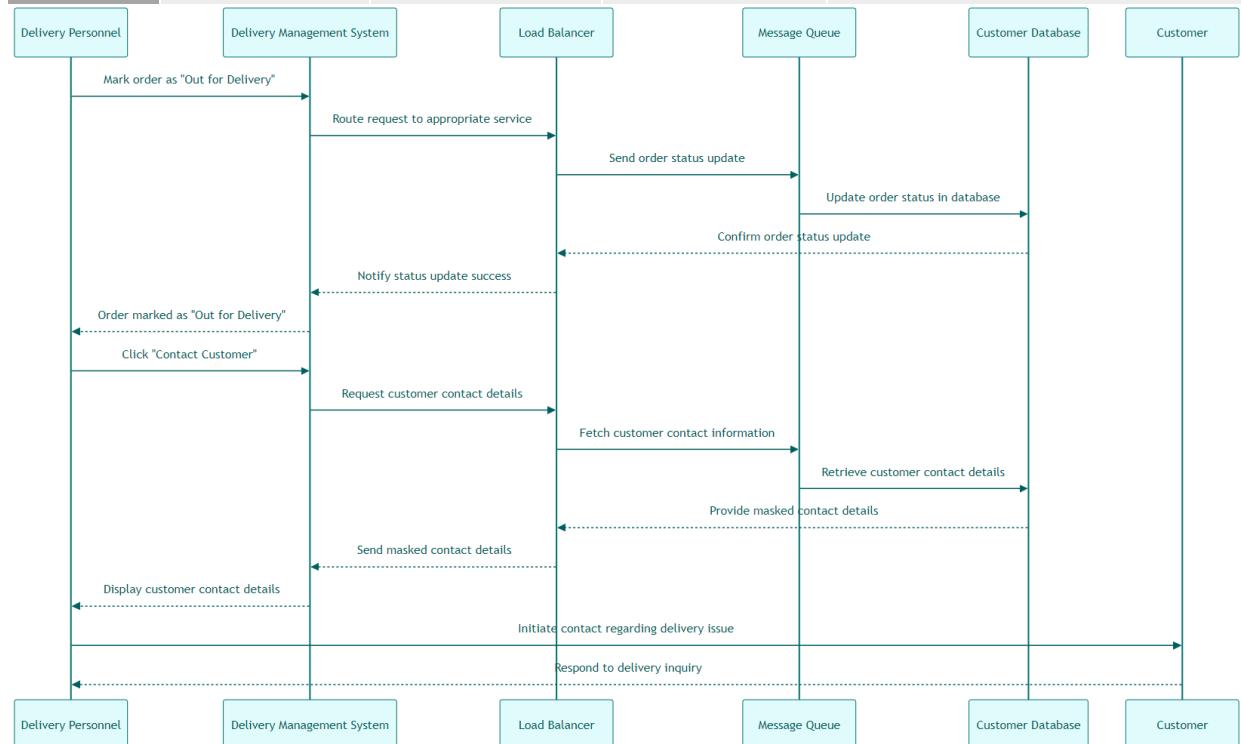


Figure 18 Sequence Diagram for Delivery Personnel: Communication with Customers

Table 29 Sequence Table for Delivery Personnel: Order Management

Step	Actor	Action	Receiver	Description
1	Delivery Personnel	Log in to the system	Order Management System	Delivery personnel logs into the system to access their assigned orders.
2	Order Management System	Authentication successful	Delivery Personnel	The system authenticates the delivery personnel and confirms successful login.
3	Delivery Personnel	Access "Assigned Orders" section	Order Management System	Delivery personnel navigates to the section displaying their assigned orders.
4	Order Management System	Request assigned orders	Load Balancer	The system sends a request to retrieve the list of assigned orders via the Load Balancer.
5	Load Balancer	Forward request for assigned orders	Message Queue	Load Balancer forwards the request to the Message Queue to fetch the required data.
6	Message Queue	Retrieve assigned orders	Order Database	Message Queue retrieves the assigned orders information from the Order Database.
7	Order Database	Return list of assigned orders	Message Queue	The Order Database sends the list of assigned orders back to the Message Queue.
8	Message Queue	Send list of assigned orders	Load Balancer	Message Queue forwards the list of assigned orders to the Load Balancer.
9	Load Balancer	Deliver assigned orders list	Order Management System	Load Balancer sends the retrieved list of assigned orders back to the Order Management System.
10	Order Management System	Display list of assigned orders	Delivery Personnel	The system displays the list of assigned orders with details to the delivery personnel.
11	Delivery Personnel	-	-	Delivery personnel can now manage their deliveries efficiently using the provided details.

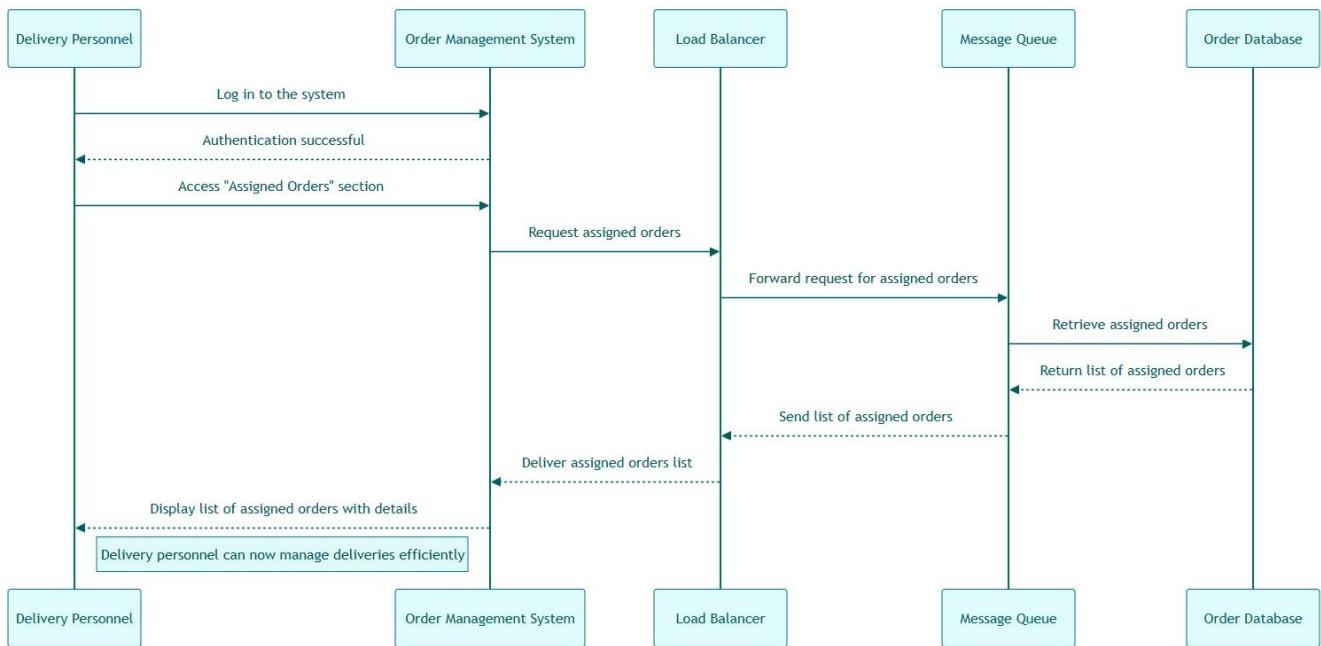


Figure 19 Sequence Diagram for Delivery Personnel: Order Management

Table 30 Sequence Table for Delivery Personnel: Real-Time Updates

Step	Actor	Action	Receiver	Description
1	Delivery Personnel	Picked up order	Order Management System	The delivery personnel inform the system that they have picked up the order.
2	Order Management System	Forward update to load balancer	Load Balancer	The system sends the order update to the load balancer to process the status change.

3	Load Balancer	Send status update to message queue	Message Queue	Load balancer forwards the status update to the message queue for further processing.
4	Message Queue	Update order status to "Out for Delivery"	Database	The message queue updates the order status in the database to "Out for Delivery."
5	Database	Confirm status update	Message Queue	The database confirms that the status update has been successfully applied.
6	Message Queue	Notify load balancer of update completion	Load Balancer	The message queue informs the load balancer that the status update process is complete.
7	Load Balancer	Status update processed	Order Management System	The load balancer notifies the order management system that the update was successfully processed.
8	Delivery Personnel	Deliver order	Order Management System	The delivery personnel complete the delivery and informs the system.
9	Order Management System	Forward delivery completion	Load Balancer	The system forwards the delivery completion update to the load balancer.
10	Load Balancer	Send delivery status to message queue	Message Queue	The load balancer sends the delivery status update to the message queue.
11	Message Queue	Update order status to "Delivered"	Database	The message queue updates the order status in the database to "Delivered."
12	Database	Confirm delivery status update	Message Queue	The database confirms that the delivery status update has been applied successfully.
13	Message Queue	Notify load balancer of delivery completion	Load Balancer	The message queue informs the load balancer that the delivery completion process is finished.
14	Load Balancer	Delivery status processed	Order Management System	The load balancer notifies the system that the delivery status has been successfully updated.
15	Order Management System	Delivery process completed	Delivery Personnel	The system confirms to the delivery personnel that the delivery process is successfully completed.

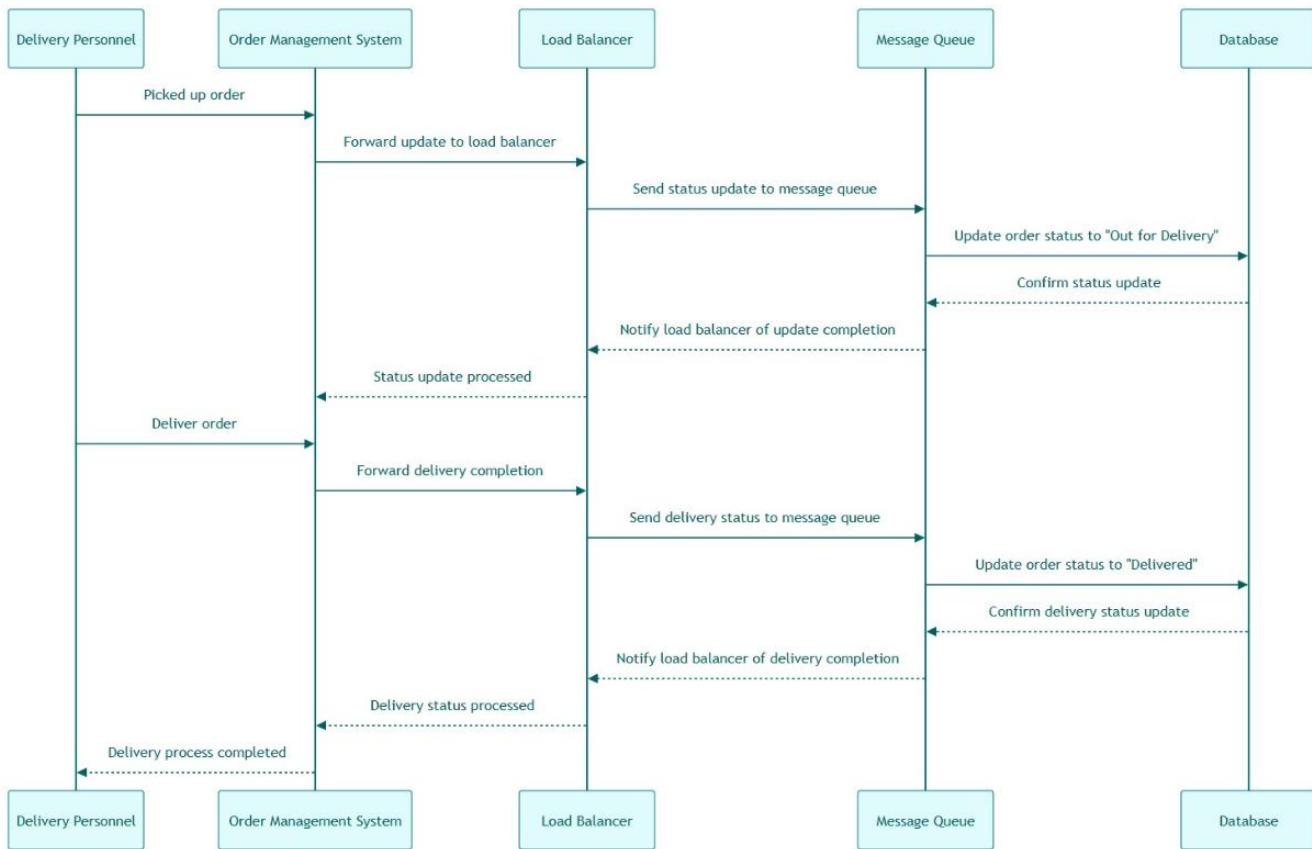


Figure 20 Sequence Diagram for Delivery Personnel: Real-Time Updates

## 4.3 Class Diagram

[Access to clear drawing](#)

Icon for field	Icon for method	Visibility
□	■	private
○	○	protected
△	△	package private
○	●	public

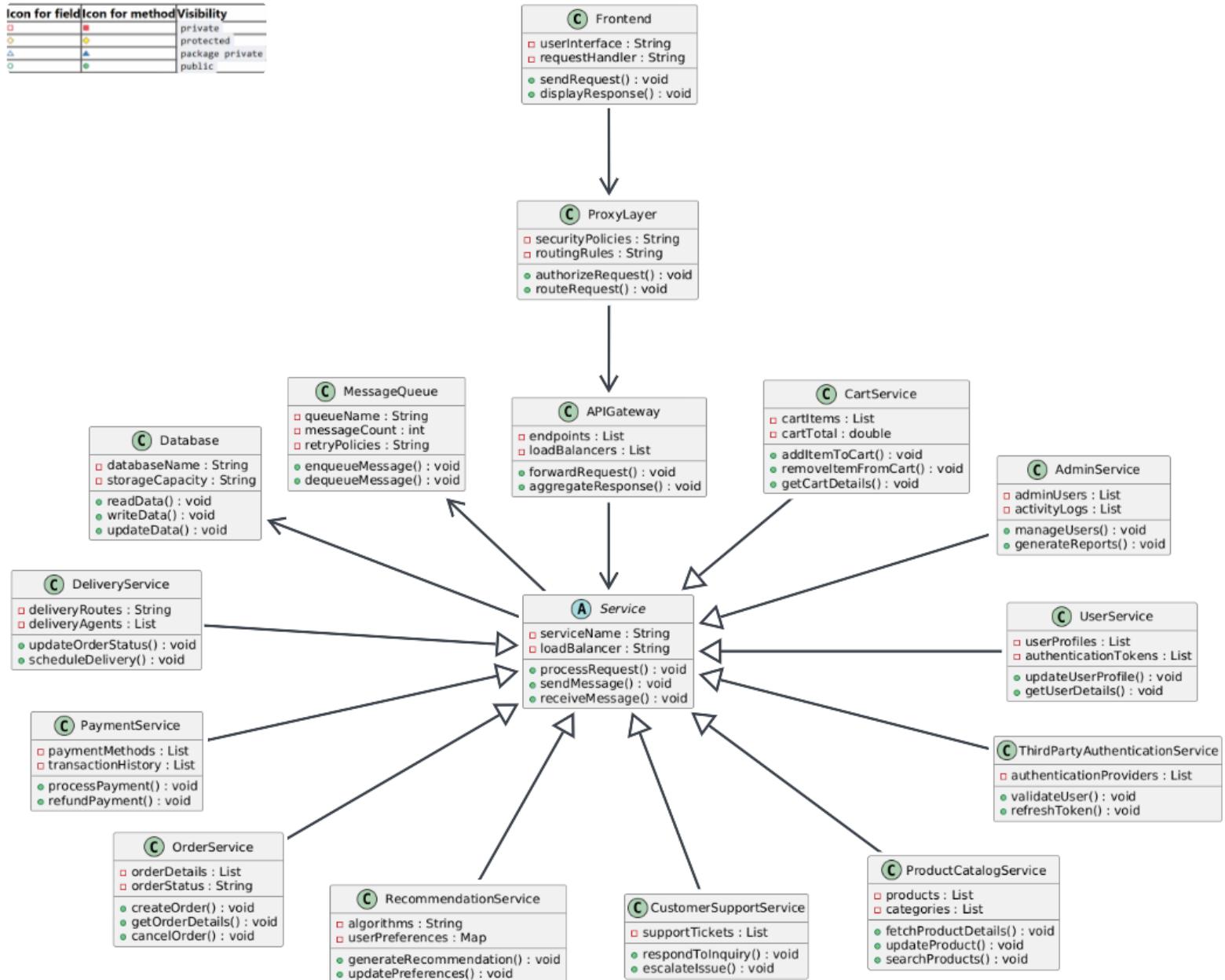


Figure 21 Shoply's class diagram

## 4.4 Architecture Design

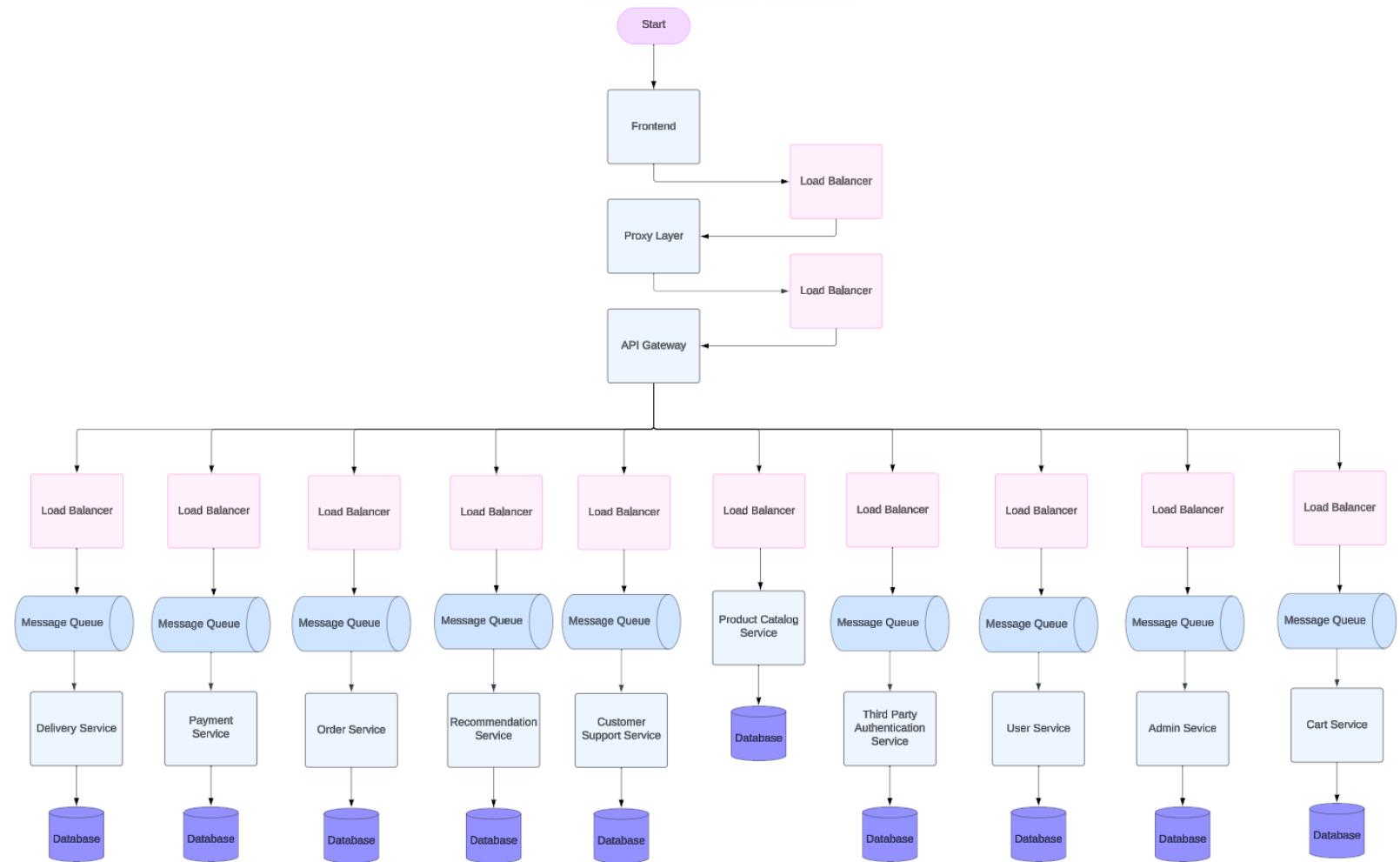


Figure 22 Shoply's Architecture Design

## 4.5 Classes and Components Design

Table 31 Shoply's Classes and Components Design

Class/Component	Attributes	Methods
<b>Frontend</b>	userInterface: String requestHandler : String	sendRequest(), displayResponse()
<b>Service</b>	serviceName : String loadBalancer : String	processRequest() : void sendMessage() : void receiveMessage() : void
<b>ProxyLayer</b>	securityPolicies: String, routingRules: String	authorizeRequest(), routeRequest()
<b>MessageQueue</b>	queueName: String, messageCount: int, retryPolicies: String	enqueueMessage(), dequeueMessage()
<b>Database</b>	databaseName: String, storageCapacity: String	readData(), writeData(), updateData()
<b>CartService</b>	cartItems: List, cartTotal: double	addItemToCart(), removeItemFromCart(), getCartDetails()
<b>DeliveryService</b>	deliveryRoutes: List, deliveryAgents: List	updateOrderStatus(), scheduleDelivery()
<b>PaymentService</b>	paymentMethods: List, transactionHistory: List	processPayment(), refundPayment()
<b>OrderService</b>	orderDetails: List, orderStatus: String	createOrder(), getOrderDetails(), cancelOrder()
<b>RecommendationService</b>	algorithms: List, userPreferences: Map	generateRecommendation(), updatePreferences()
<b>CustomerSupportService</b>	supportTickets: List	respondToInquiry(), escalateIssue()
<b>AdminService</b>	adminUsers: List, activityLogs: List	manageUsers(), generateReports()
<b>UserService</b>	userProfiles: List, authenticationTokens: List	updateUserProfile(), getUserDetails()
<b>ProductCatalogService</b>	products: List, categories: List	fetchProductDetails(), updateProduct(), searchProducts()
<b>ThirdPartyAuthenticationService</b>	authenticationProviders: List	validateUser(), refreshToken()
<b>API Gateway</b>	endpoints: List, loadBalancers: List	forwardRequest(), aggregateResponse()
<b>Notification Service</b>	notifications: List, status: List	sendNotification(), trackNotificationStatus()

## 4.6 Graphical User Interface Design

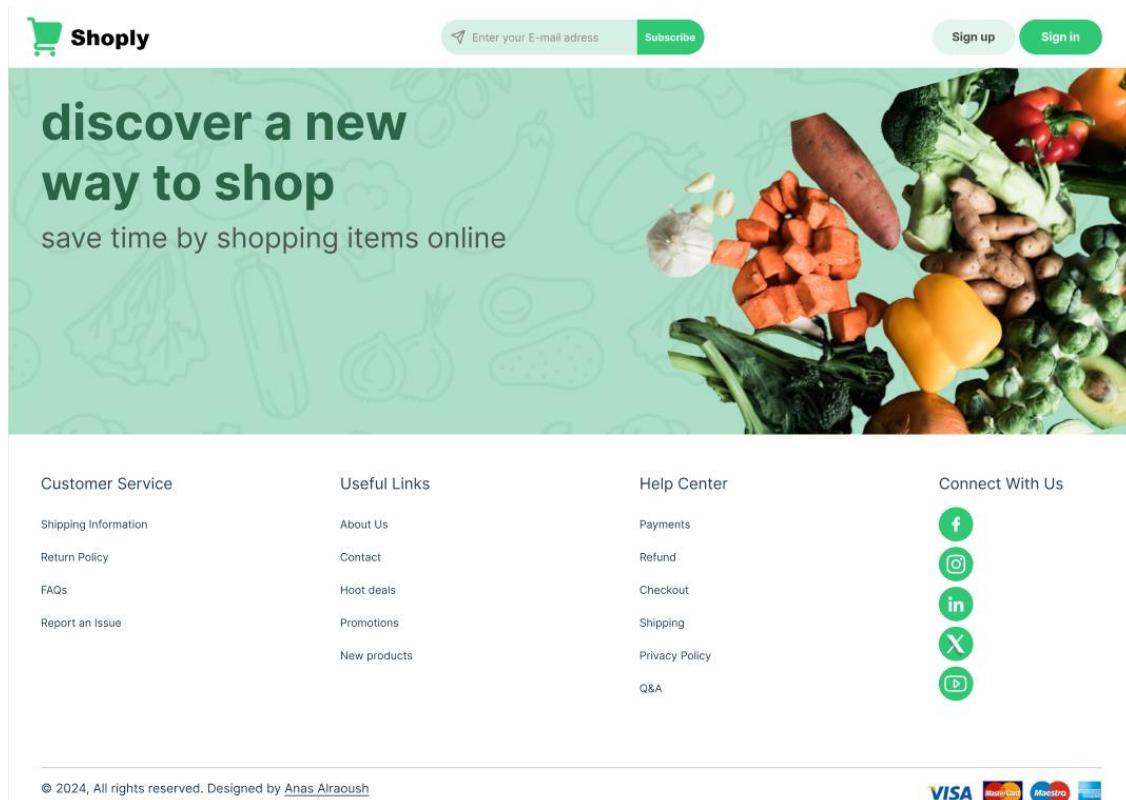
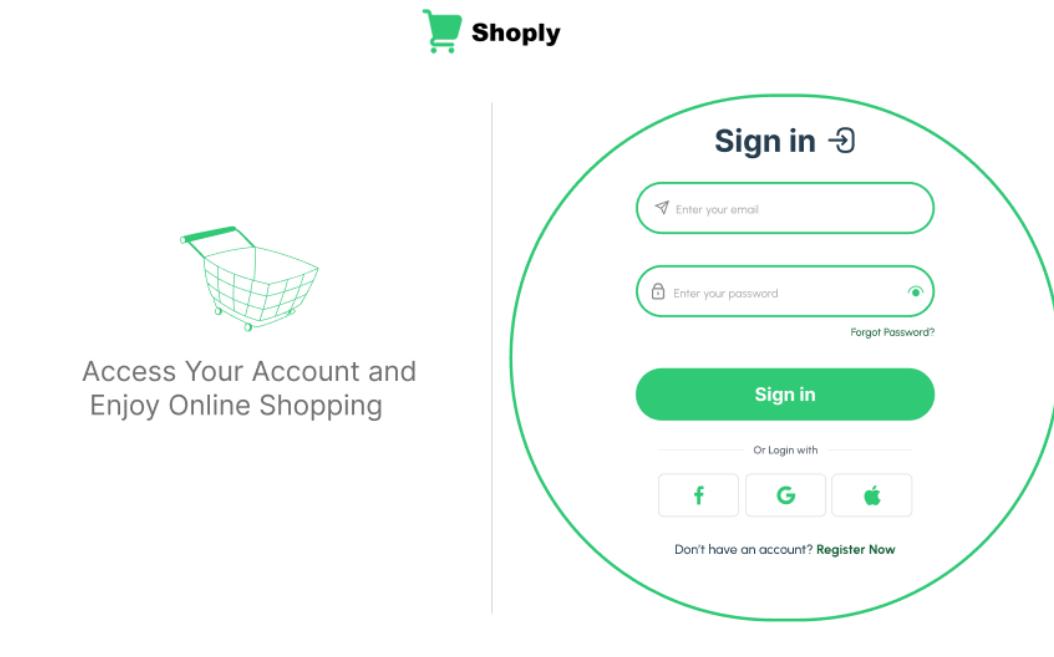
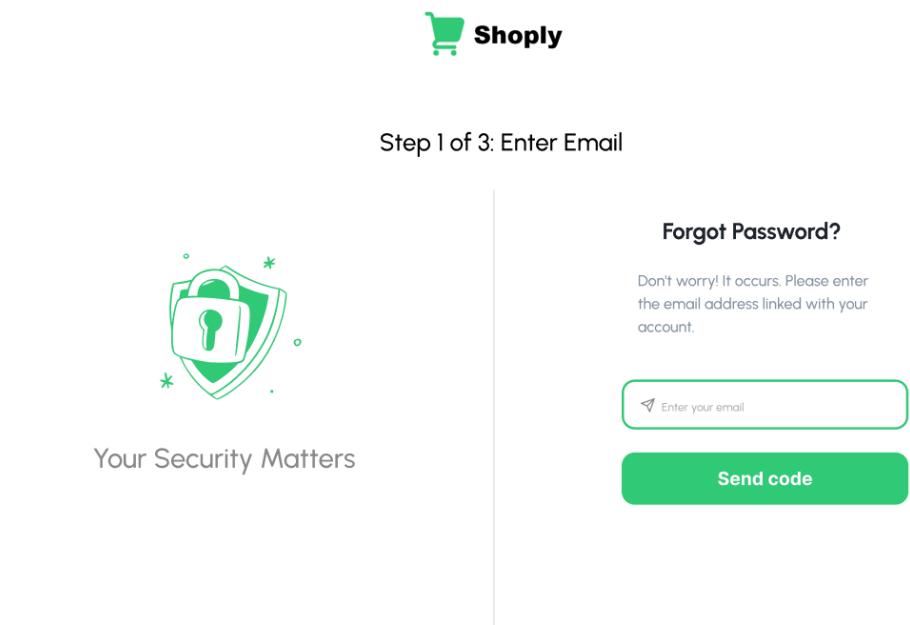


Figure 23 Main Home Page



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Figure 24 Sign in page



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Figure 25 Forgot Password-1



### Step 2 of 3: Verify your Email



Your Security Matters

**OTP Verification**

Enter the verification code we just sent on your email address.

5    1    0   

**Verify**

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Figure 26 Forgot Password-2



Your Security Matters

**Create new password**

Your new password must be unique from those previously used.

New Password

confirm your password

**Reset Password**

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Figure 27 Forgot Password-3



**Password Changed!**

Your password has been changed  
successfully.

*Figure 28 Forgot Password-4*



 Create Your Account and Start Shopping

Enter your first name

Enter your last name

Enter your phone number

Enter your email

Create a password  Confirm your password

I agree to the Terms of Service and Privacy Policy

**Sign up**

Already have an account? [Sign in](#)

Or Login with

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Figure 29 Sign up page



## Terms of Service

Welcome to Shoply! By accessing or using our website, you agree to comply with the following terms and conditions. Please read them carefully.

### 1. Acceptance of Terms

By creating an account or using Shoply, you agree to these Terms of Service and our Privacy Policy. If you do not agree, please discontinue use of our website.

### 2. Eligibility

You must be at least 18 years old to create an account or make purchases. Minors may use the site only under parental supervision.

### 3. Account Responsibilities

- You are responsible for maintaining the confidentiality of your login details.
- Notify us immediately of unauthorized use of your account.

### 4. Prohibited Activities

You agree not to:

- Use the website for illegal purposes.
- Attempt to hack, reverse engineer, or disrupt the site's functionality.
- Submit false or misleading information.

### 5. Orders and Payments

- All purchases are subject to availability.
- Prices are subject to change without notice.
- Refunds and returns are governed by our refund policy.

### 6. Liability

Shoply is not liable for any direct or indirect damages resulting from your use of our services, except as required by law.

### 7. Termination

We reserve the right to suspend or terminate accounts that violate these Terms of Service.

### 8. Changes to Terms

We may update these terms at any time. Continued use of the website constitutes your acceptance of any changes. If you have questions, contact us at [support@shoply.com](mailto:support@shoply.com).

## Privacy Policy

At Shoply, we value your privacy and are committed to protecting your personal information.

### 1. Information We Collect

We collect the following information when you interact with our site:

- Account Information: Name, email, password, etc.
- Transaction Details: Purchase history, payment information.
- Usage Data: IP address, browser type, and browsing activity.

### 2. How We Use Your Information

Your information is used to:

- Process your orders and manage your account.
- Improve our website and personalize your experience.
- Send updates, promotions, or other communications.

### 3. Cookies

We use cookies to track site activity and improve functionality. You can disable cookies in your browser settings.

### 4. Sharing Your Information

We do not sell your personal data. However, we may share it with:

- Trusted service providers (e.g., payment processors).
- Legal authorities if required by law.

### 5. Your Rights

You have the right to:

- Access, correct, or delete your personal data.
- Opt-out of promotional communications.

### 6. Security

We implement appropriate technical and organizational measures to protect your data.

### 7. Changes to Privacy Policy

We may update this policy periodically. Updates will be posted on this page.

For inquiries, contact us at [support@shoply.com](mailto:support@shoply.com).



## Welcome to Shoply Your One-Stop Online Shopping Destination!

Discover amazing deals, trending products,  
and exclusive offers – all in one place.

Get 50% Off on Your First Order!

What do you looking for?

### For You

#### Recommended For You

Products you'll love, based on your activity

[shop now →](#)



### Offers

#### Exclusive Offers

Limited-time discounts just for you

[shop now →](#)



Fresh fruit



Vegetables

Milk and Eggs



Meat and Chicken

Snacks



Frozen food



Cooking ingredients



Canned goods



Bakeries



Fizzy drinks



Fresh Juices



Water



Tissues



Roasters

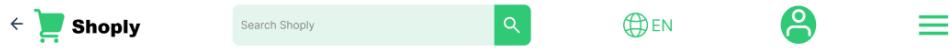


Cleaning and washing supplies

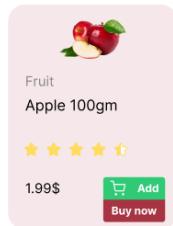


Shisha





Personalized for You



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Figure 32 Recommendations

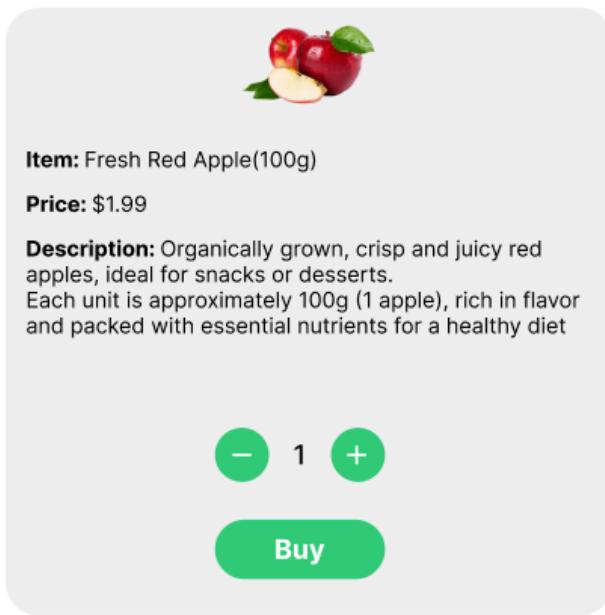
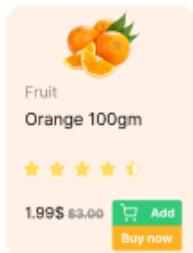


Figure 33 Apple Popup



Discover Your Exclusive Offers



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Figure 34 Offers

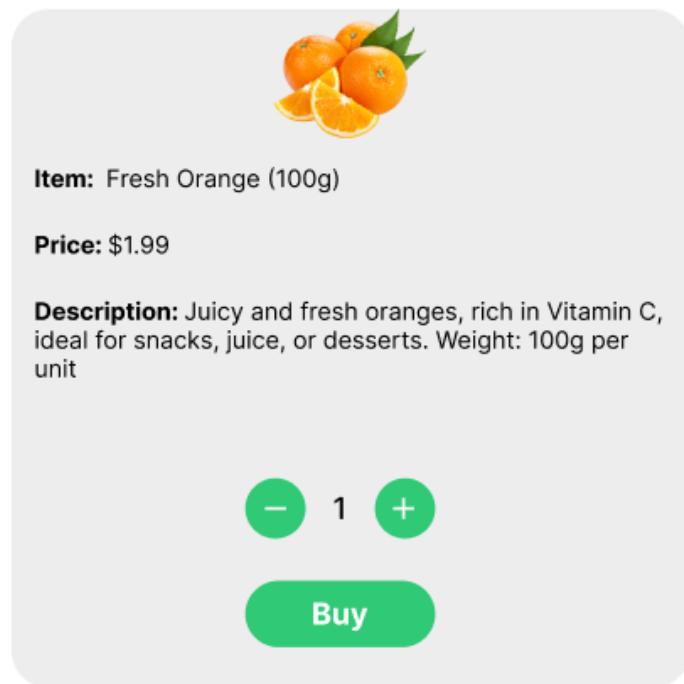
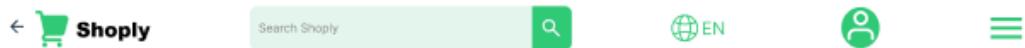
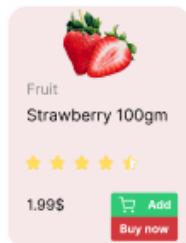


Figure 35 Orange Popup



Fresh fruit



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Figure 36 Fresh fruit

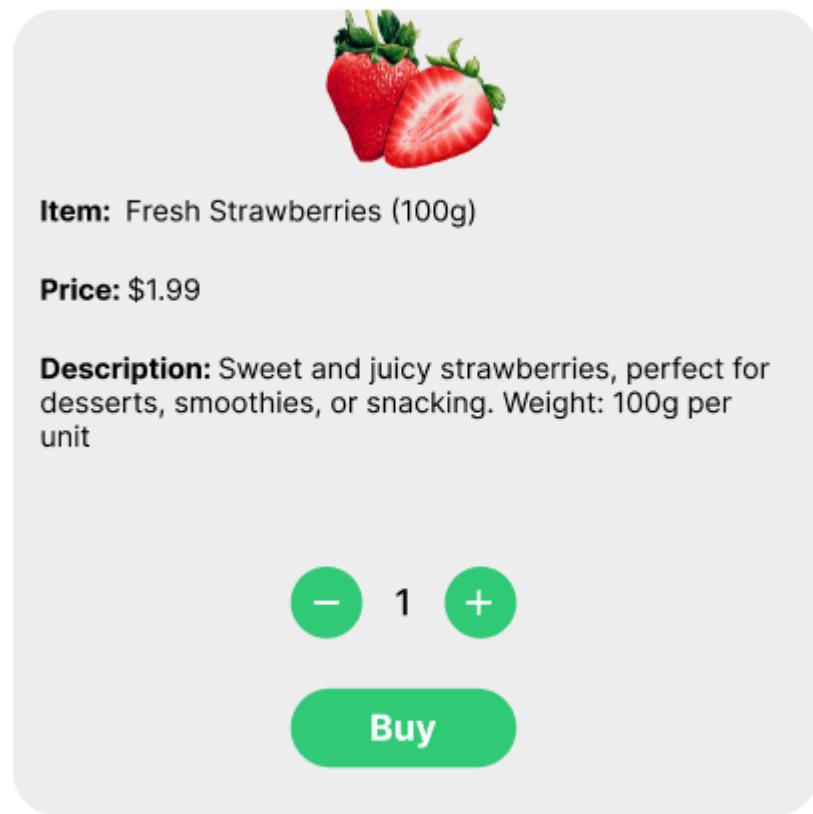


Figure 37 Strawberry Popup

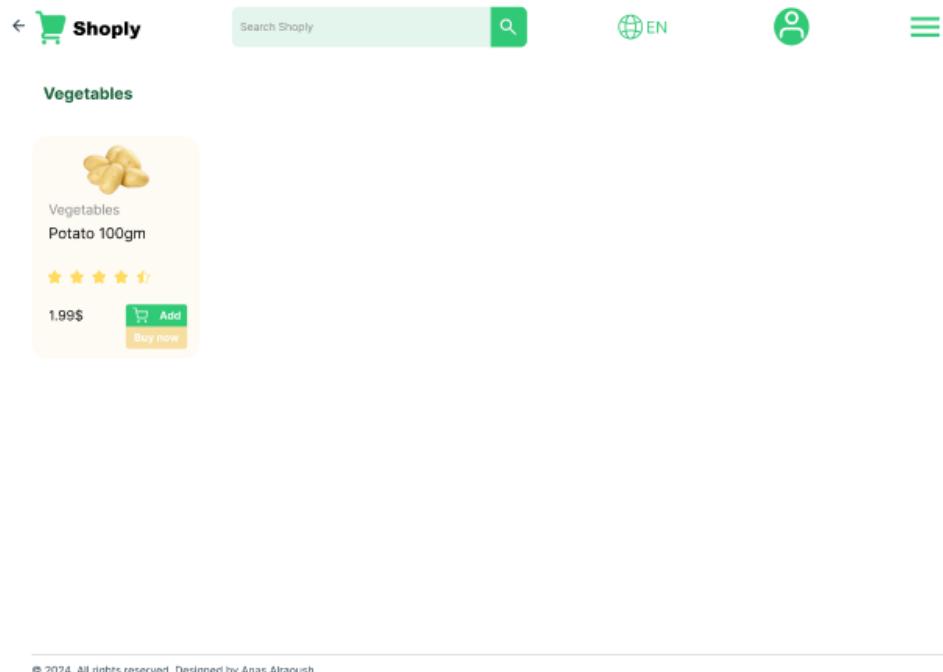


Figure 38 Vegetables

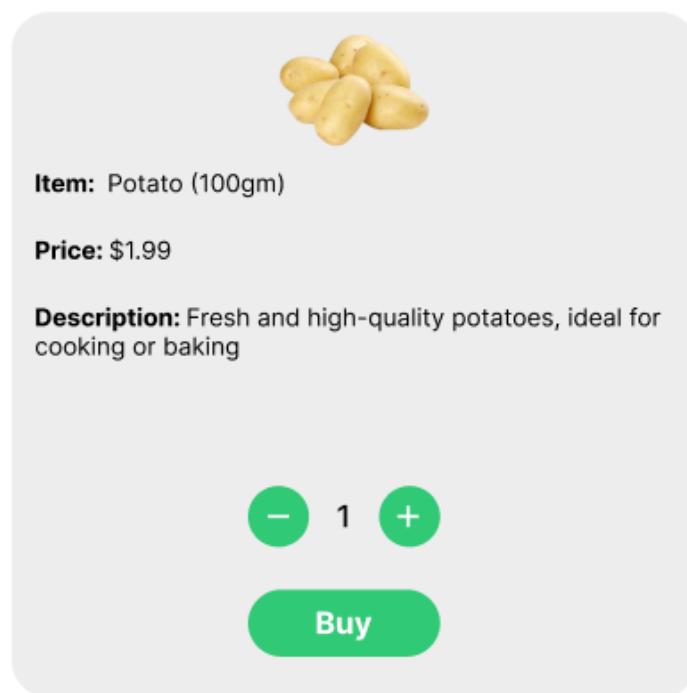


Figure 39 Potato Popup

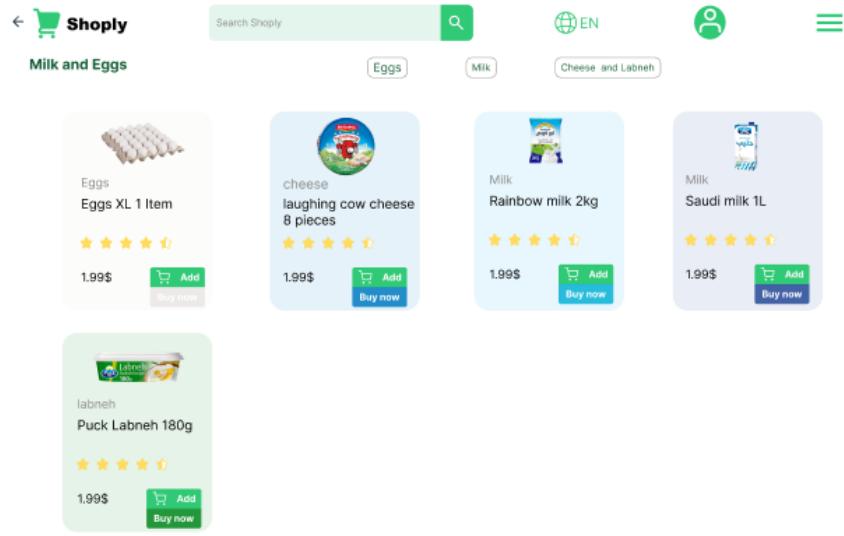


Figure 40 Milk and Eggs

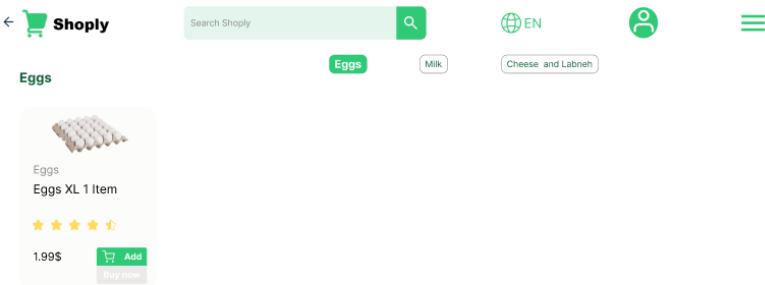


Figure 41 Eggs

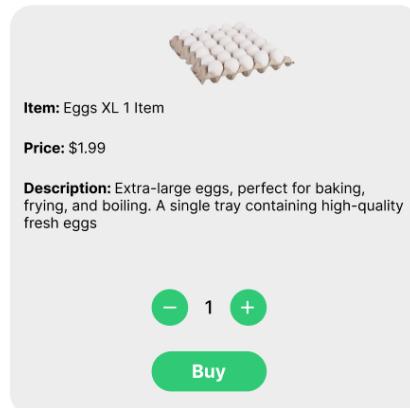


Figure 42 Eggs Popup

A screenshot of the Shoply mobile application. At the top, there's a navigation bar with a back arrow, a shopping cart icon, and the 'Shoply' logo. To the right is a search bar with the placeholder 'Search Shoply' and a magnifying glass icon. Further right are language settings ('EN'), user profile, and a menu icon. Below the navigation is a category bar with tabs: 'Milk' (highlighted in green), 'Eggs', 'Milk Liquid' (highlighted in green), and 'Cheese and Labneh'. The main content area shows a product card for 'Saudi milk 1L'. It features a thumbnail image of a milk carton, the product name 'Milk Saudi milk 1L', a five-star rating icon, a price of '1.99\$', and two buttons: a green 'Add' button and a blue 'Buy now' button. The background shows other parts of the app interface.

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Figure 43 Milk Liquid



**Item:** Saudi Milk 1L

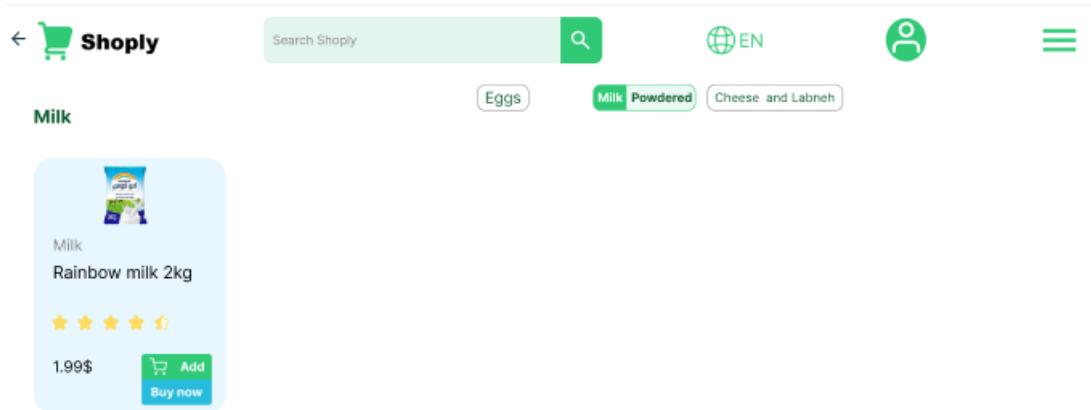
**Price:** \$1.99

**Description:** High-quality liquid milk, 1-liter pack. A great source of calcium and essential nutrients for daily consumption

− 1 +

Buy

Figure 44 Saudi Milk Popup



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Figure 45 Milk Powdered

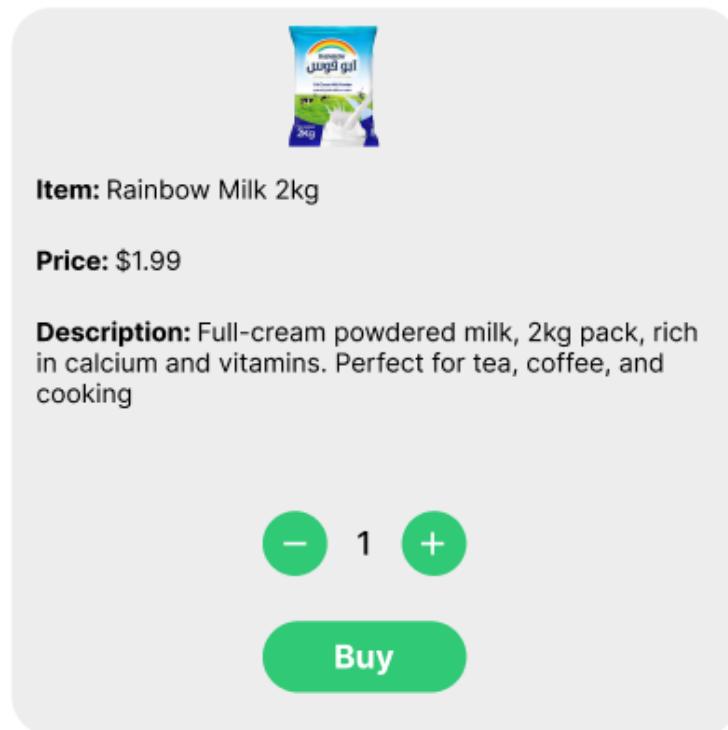
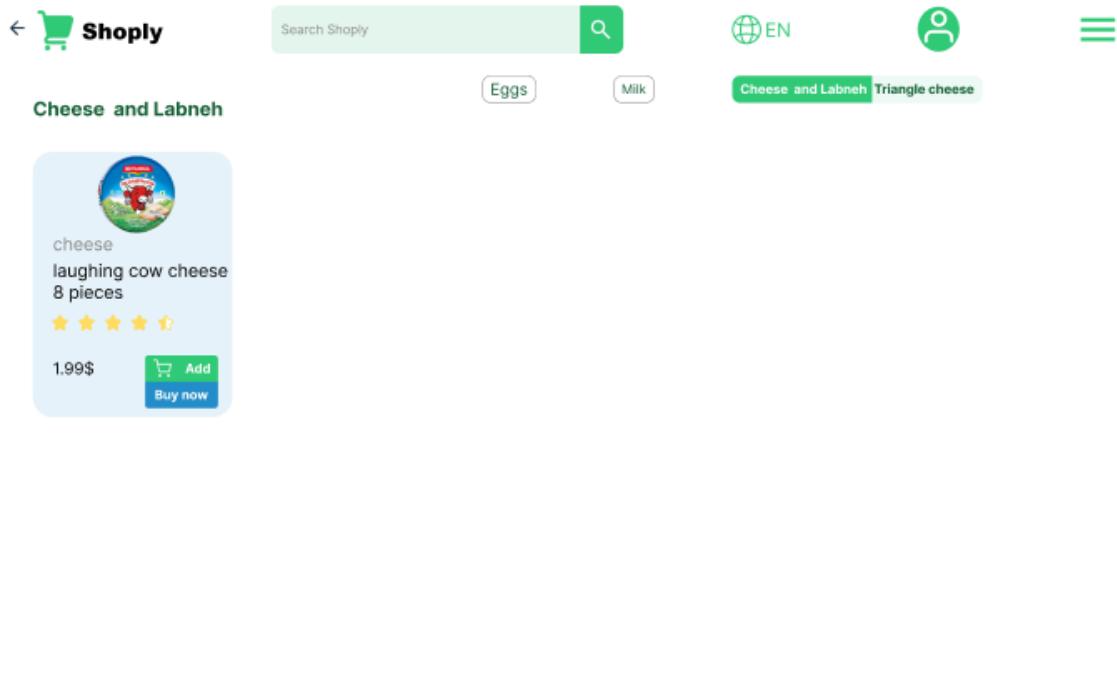


Figure 46 Rainbow Milk Popup



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Figure 47 Cheese and Labneh Triangle cheese

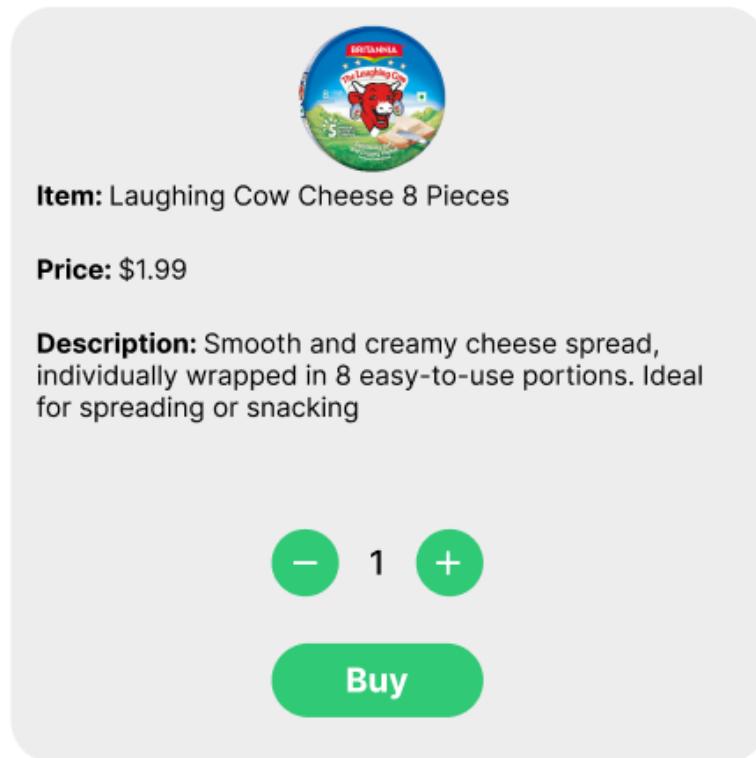
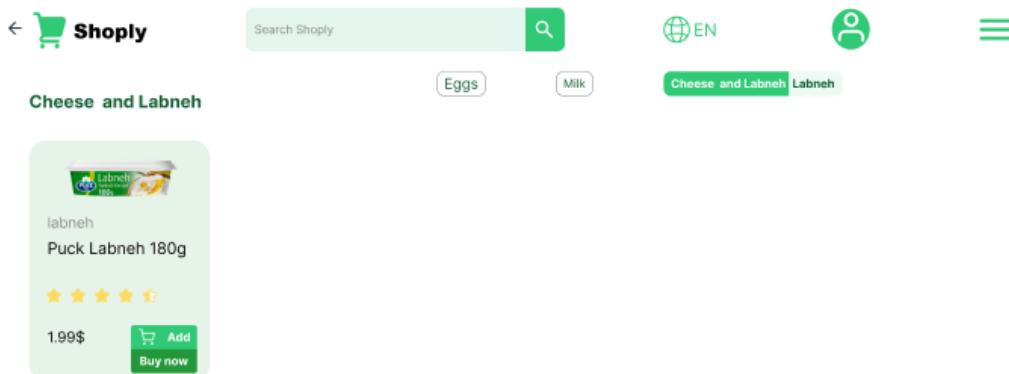


Figure 48 Laughing Cow Cheese Popup



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Figure 49 Cheese and Labneh

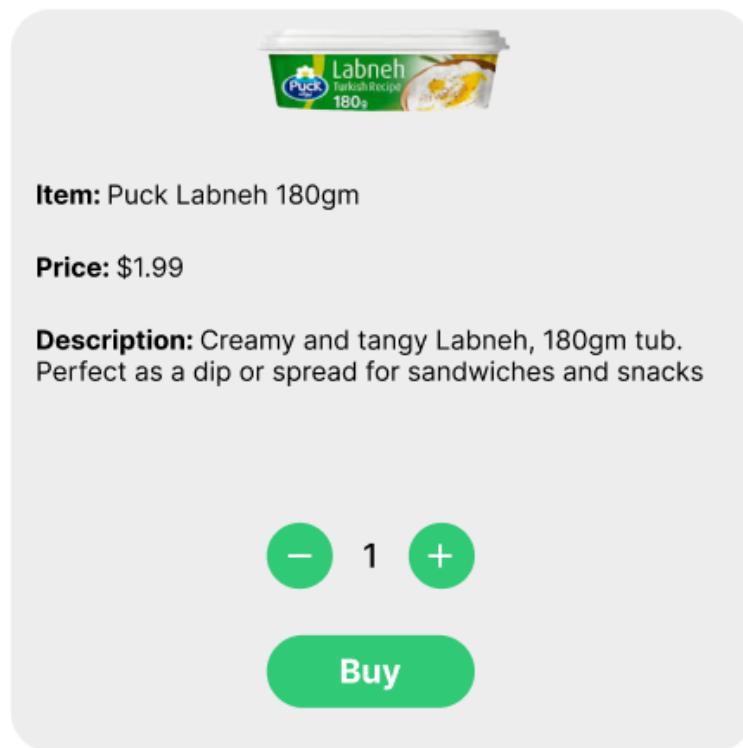


Figure 50 Puck Labneh Popup

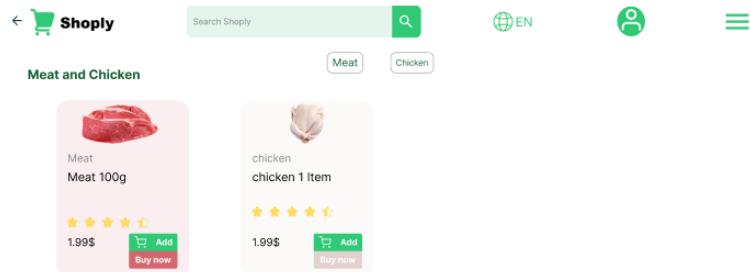


Figure 51 Meat and Chicken

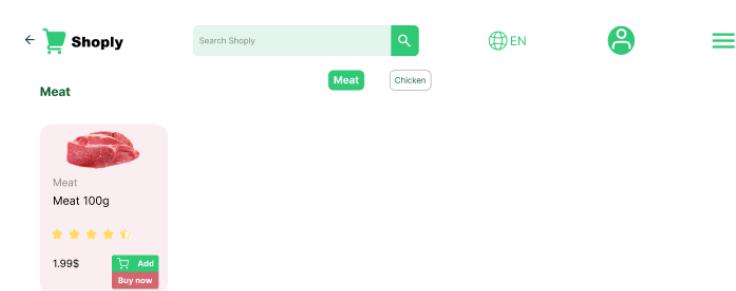


Figure 52 Meat

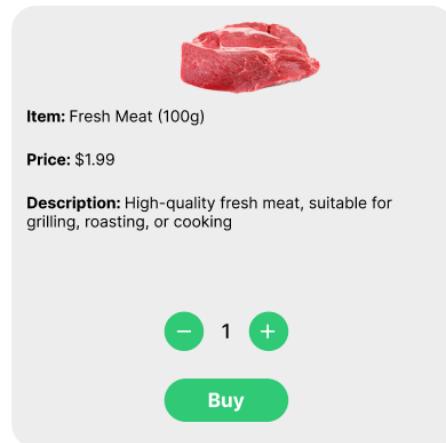
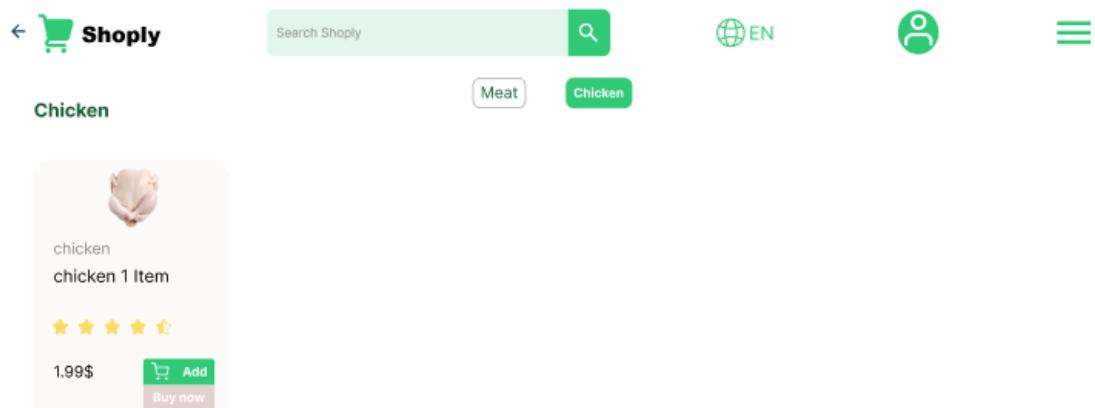


Figure 53 Meat Popup



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Figure 54 Chicken

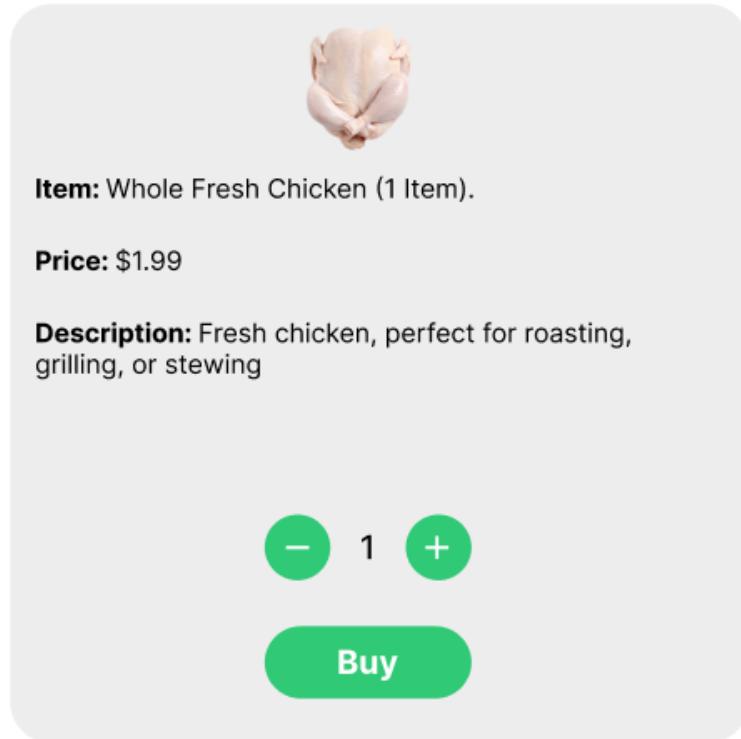
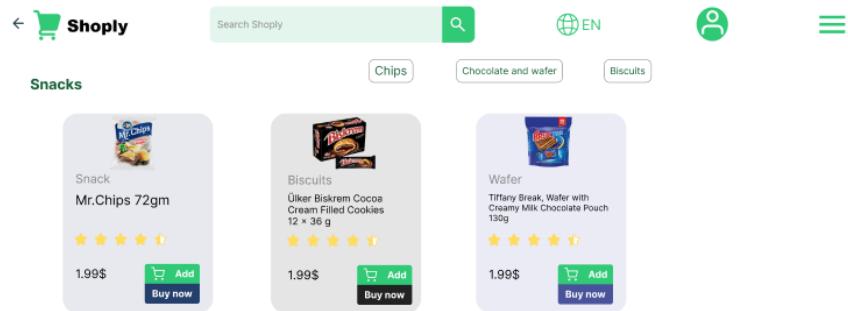
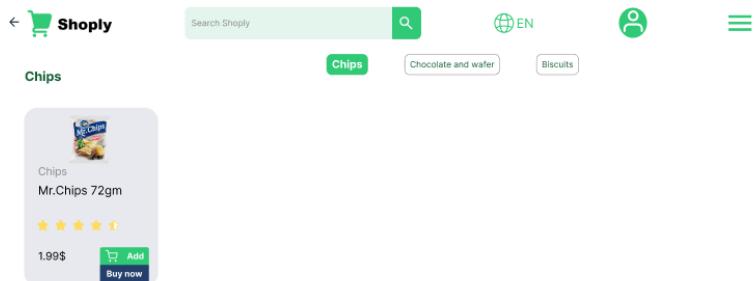


Figure 55 Chicken Popup



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Figure 56 Snacks



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Figure 57 Chips

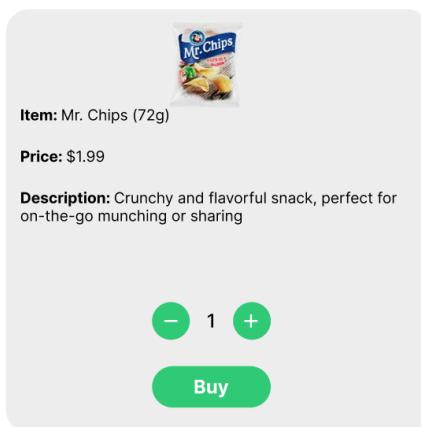
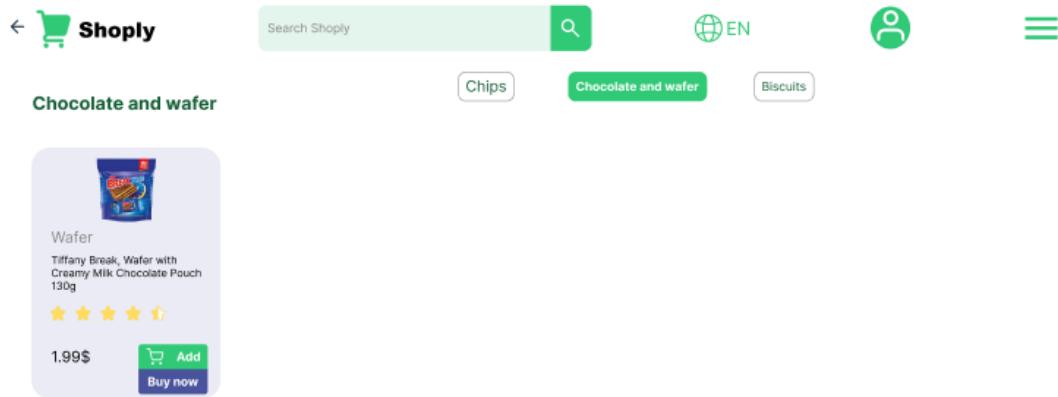


Figure 58 Mr. Chips Popup



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Figure 59 Chocolate and wafer

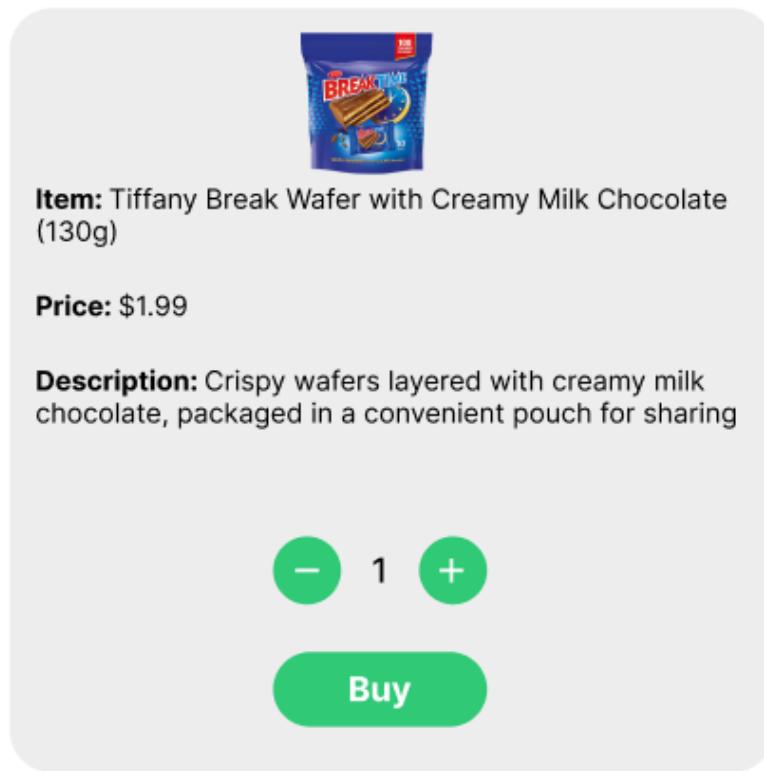
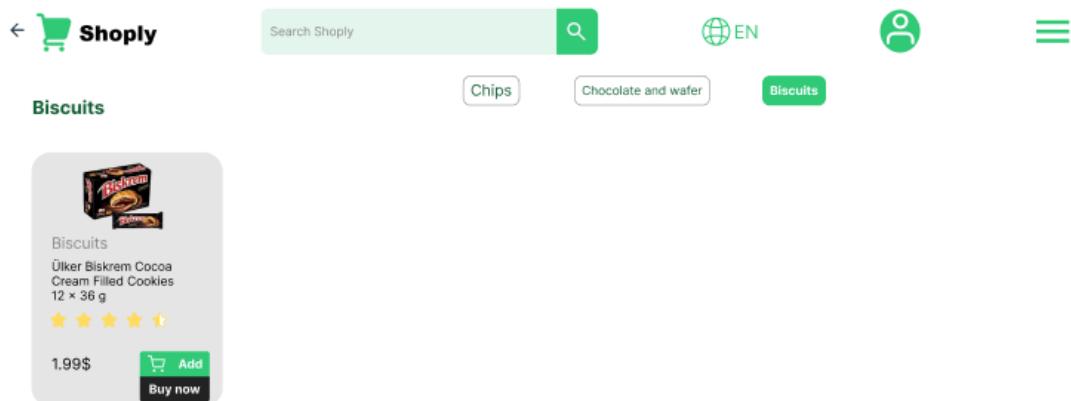


Figure 60 Break Popup



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Figure 61 Biscuits

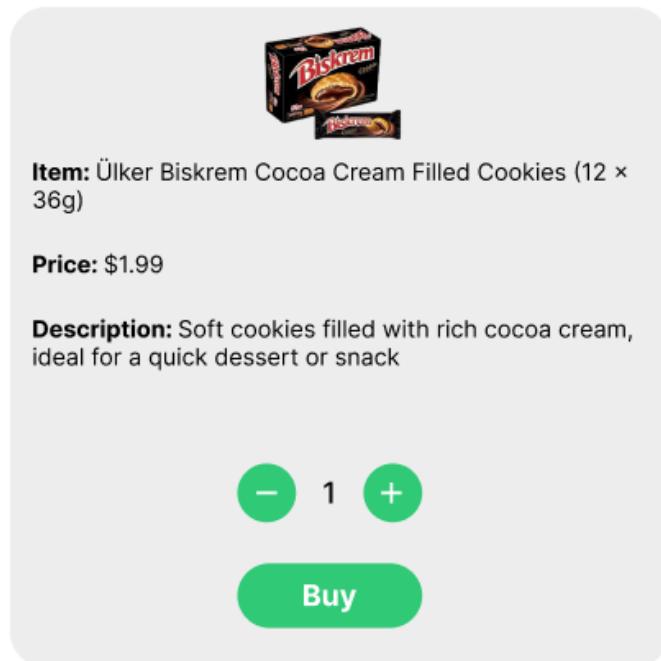
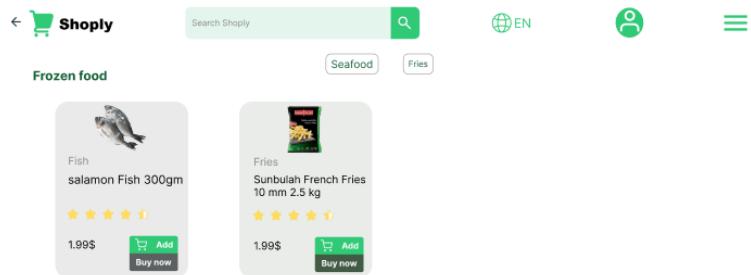
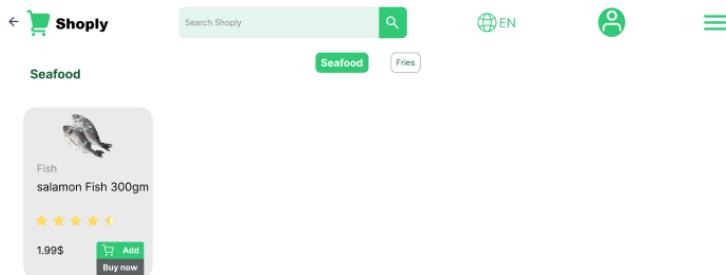


Figure 62 Biskrem Popup



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Figure 63 Frozen food



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Figure 64 Seafood

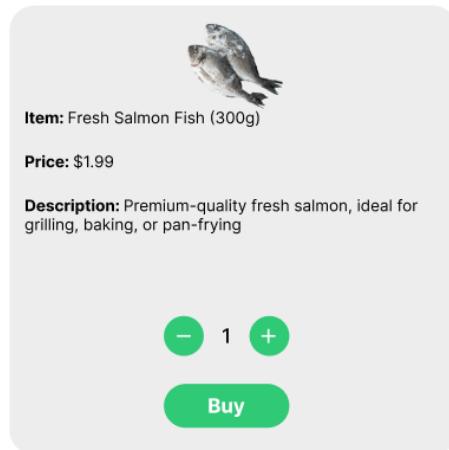
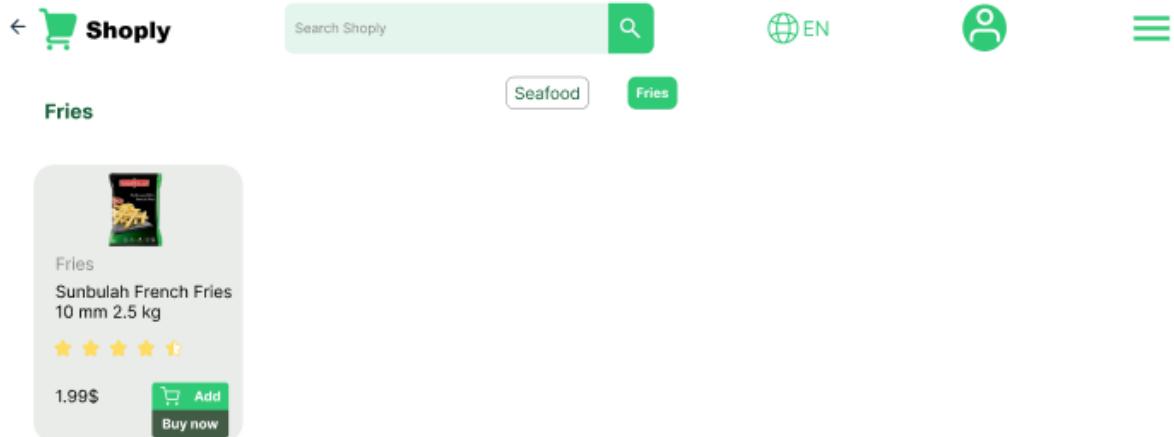


Figure 65 Fish Popup



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Figure 66 Fries

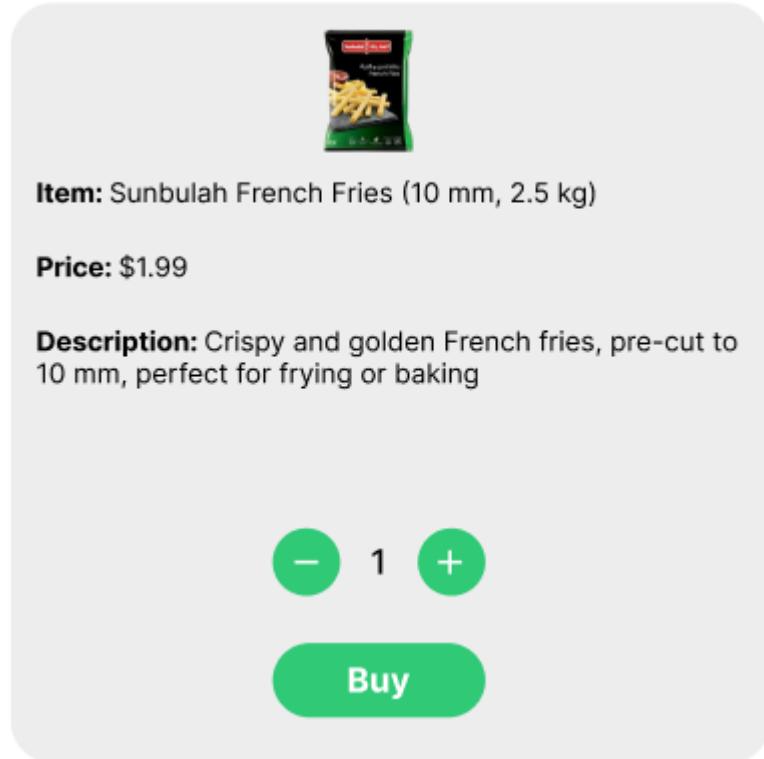
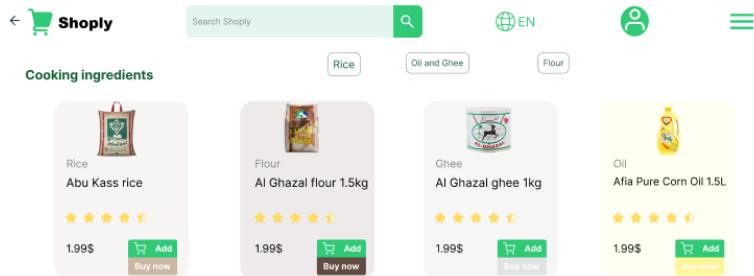
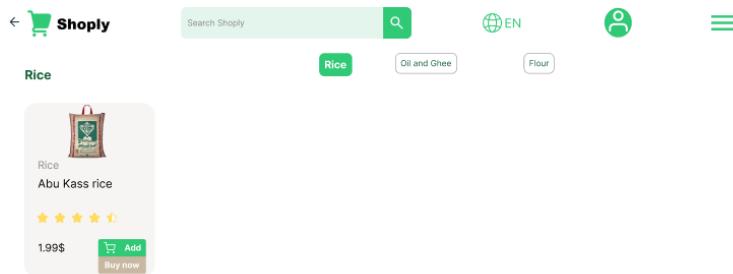


Figure 67 Sunbulah Popup



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Figure 68 Cooking ingredients



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Figure 69 Rice

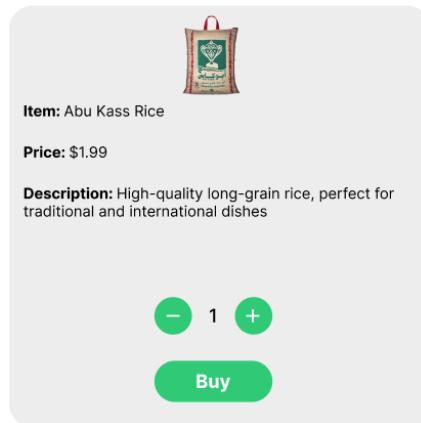


Figure 70 Abu Kass Popup

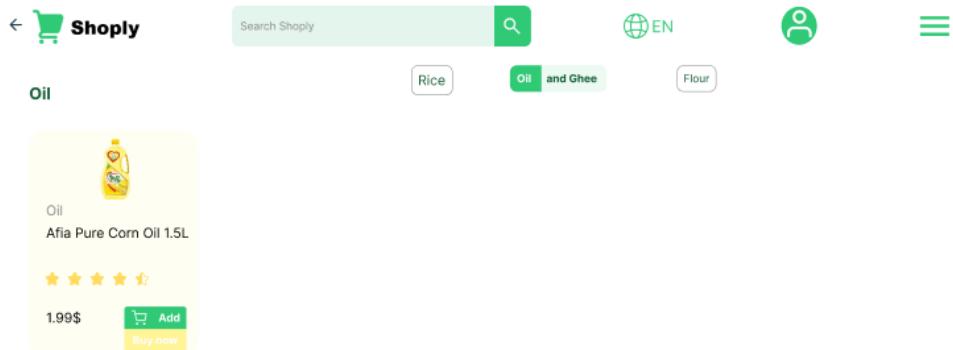


Figure 71 Oil

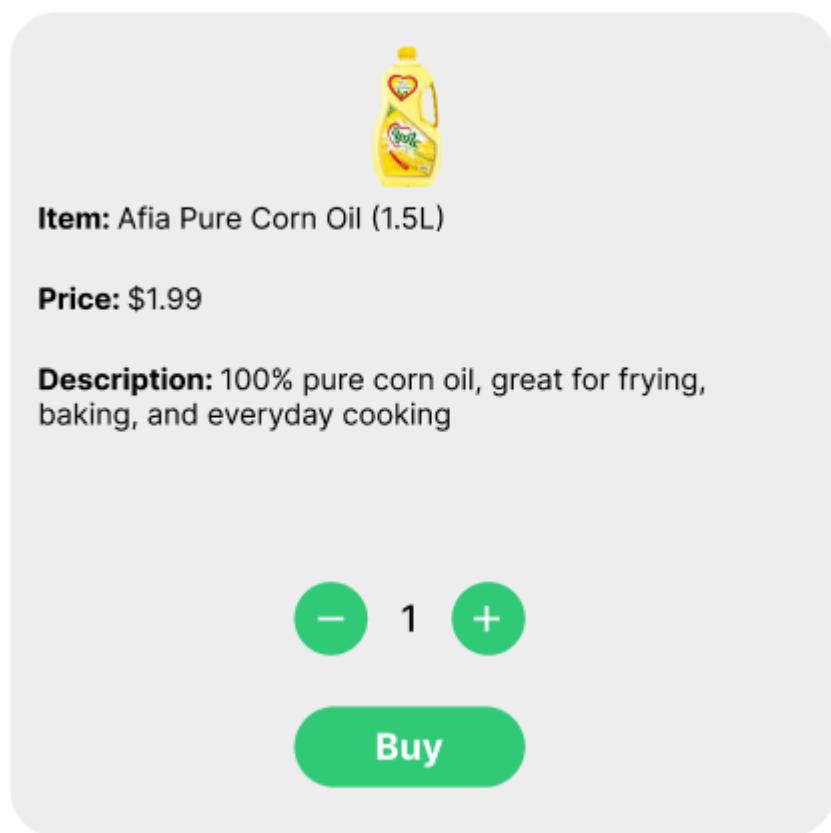
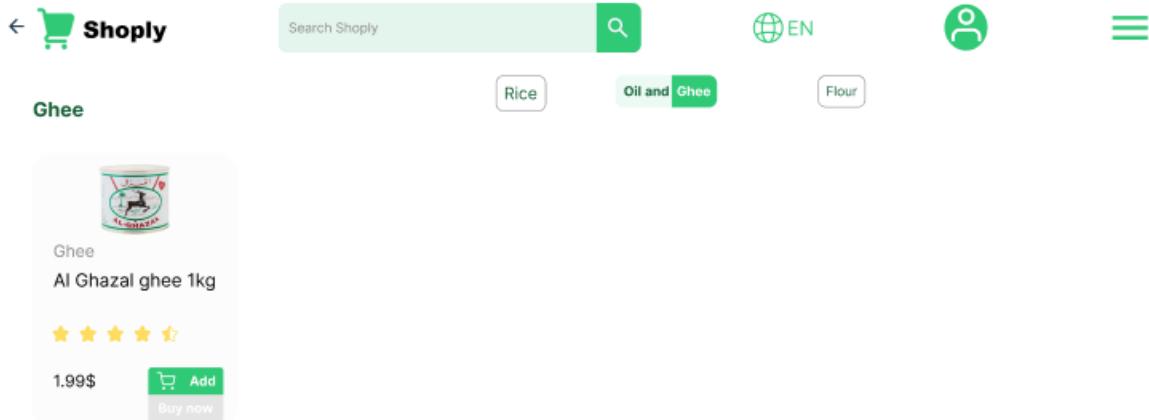


Figure 72 Afia Popup



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Figure 73 Ghee

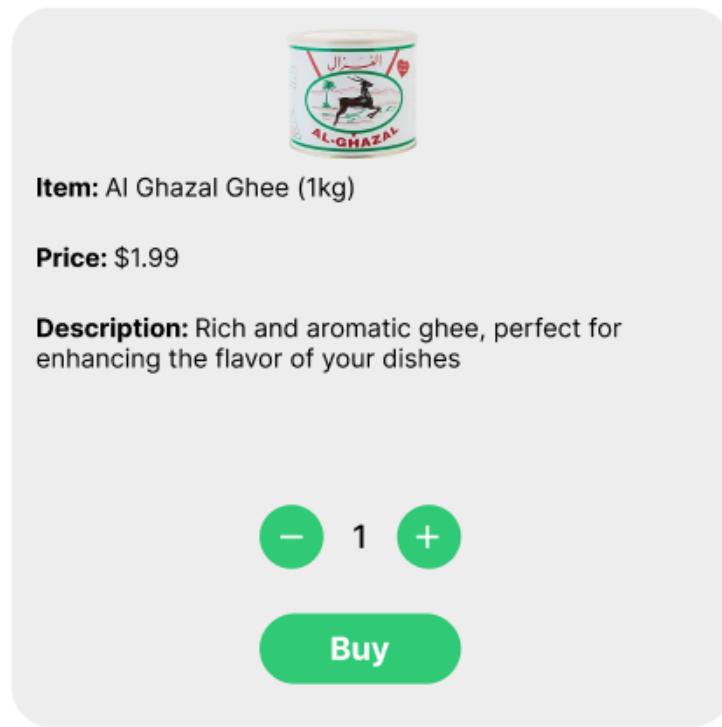
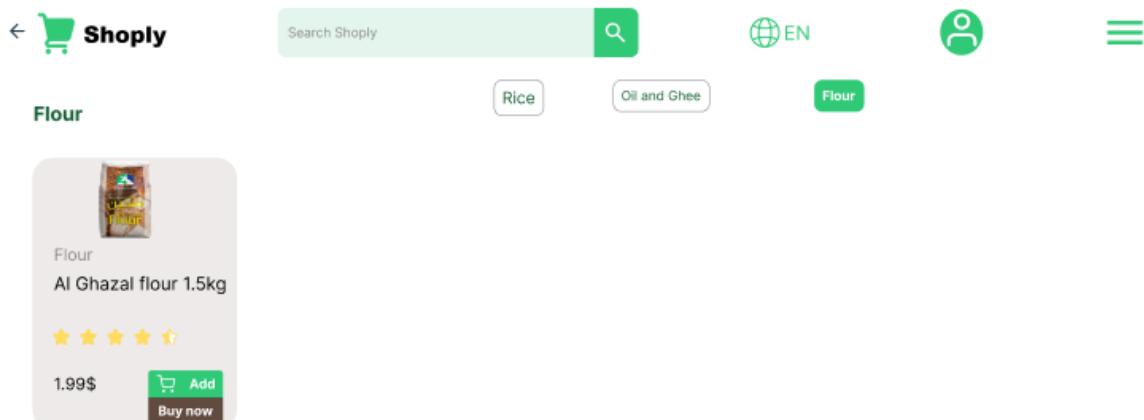


Figure 74 Al Ghazal Ghee Popup



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Figure 75 Flour

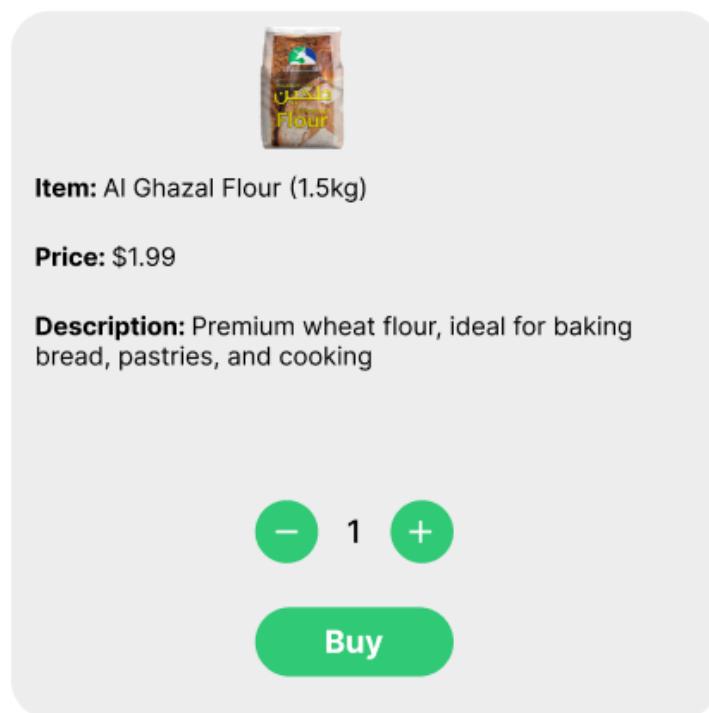


Figure 76 Al Ghazal Flour Popup

←  **Shoply** Search Shoply  EN  

Canned goods

Canned Meat Canned Vegetables Canned Fruits



Luncheon meat  
UNIUM chicken luncheon meat 900g  
  
1.99\$  



Tuna  
Durra Tuna Hot 50g  
  
1.99\$  



Sardin  
Durra Sardin Hot 50gm  
  
1.99\$  



mushroom  
maxim mushrooms 425g  
  
1.99\$  



Sweet Corn  
Maxim'S Sweet Corn 340 g  
  
1.99\$  



Pineapple  
Maxim's Pineapple Slices In Syrup 565 g  
  
1.99\$  

---

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Figure 77 Canned goods

The screenshot shows the Shoply app interface. At the top, there is a navigation bar with a back arrow, the Shoply logo, a search bar containing 'Search Shoply' with a magnifying glass icon, a language switcher showing 'EN', a user profile icon, and a menu icon represented by three horizontal lines. Below the navigation bar, the search results for 'Tuna and sardiens' are displayed. A green button labeled 'Canned Meat' is highlighted. Other categories shown are 'Tuna and sardiens', 'Canned Vegetables', and 'Canned Fruits'. Two product cards are visible: 'Tuna Durra Tuna Hot 50g' and 'Sardin Durra Sardin Hot 50g'. Each card includes an image of the can, the product name, a star rating, the price '\$1.99', and two buttons: 'Add' and 'Buy now'.

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Figure 78 Tuna and sardiens

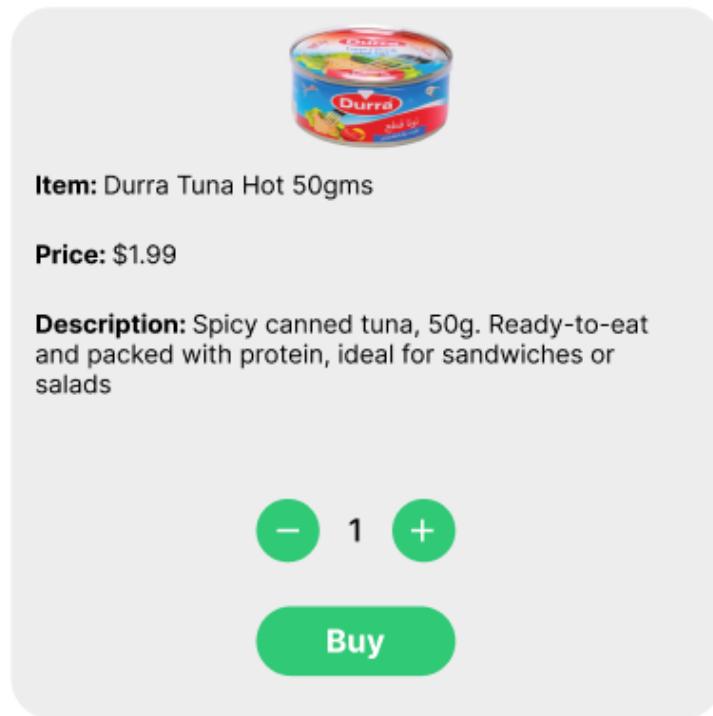


Figure 79 Tuna Popup

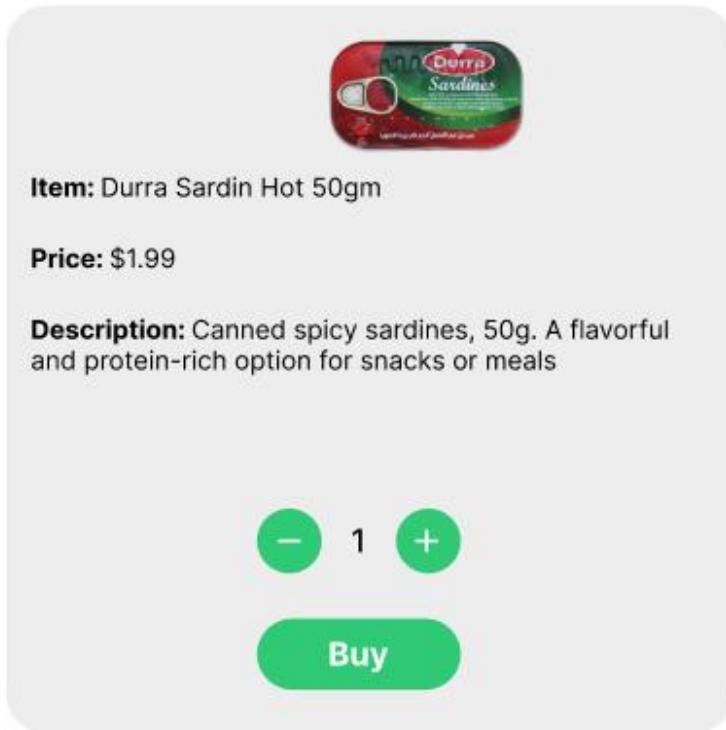


Figure 80 Sardin Popup

Luncheon

Search Shoply

EN

Canned Meat Luncheon Canned Vegetables Canned Fruits

luncheon meat  
UNIUM chicken luncheon meat 900g  
1.99\$ Add Buy now

Figure 81 Luncheon

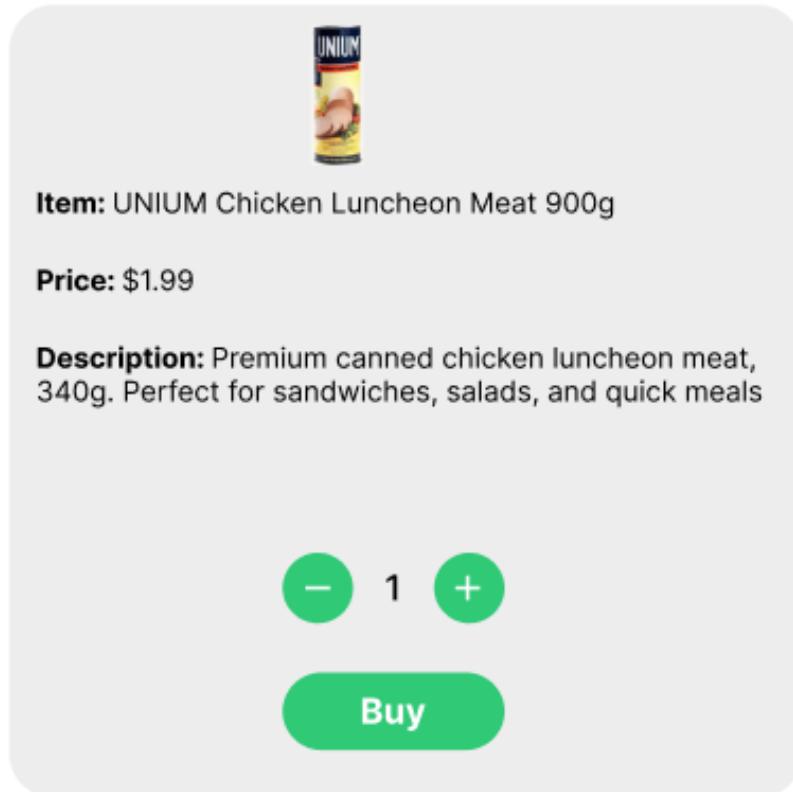


Figure 82 UNIUM Popup

Figure 83 Mushroom

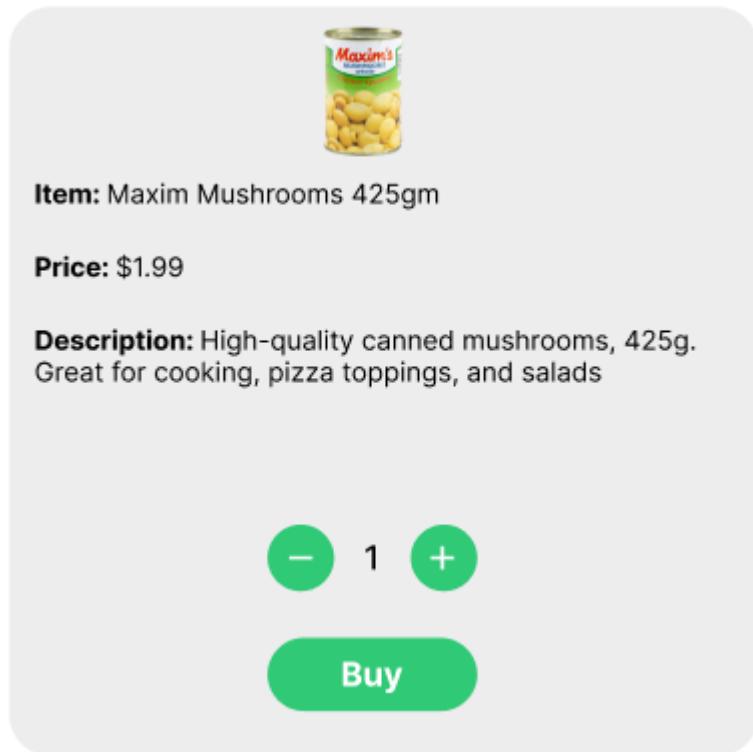
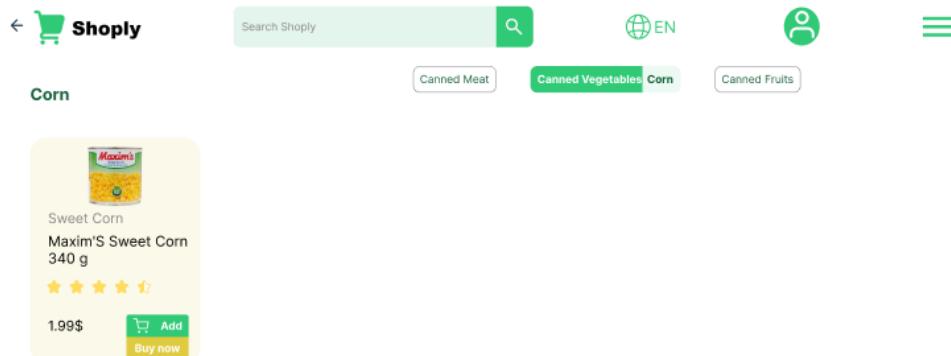


Figure 84 Mushrooms Popup



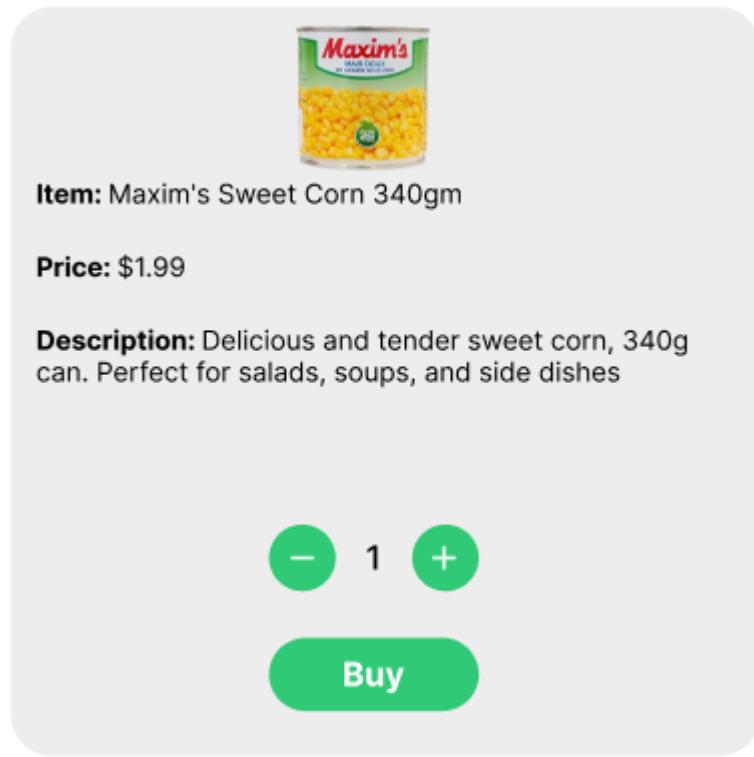


Figure 86 Corn Popup



Canned Fruits

Pineapple  
Maxim's Pineapple Slices  
In Syrup 565 g

1.99\$

Add

Buy now

Figure 87 Canned Fruits

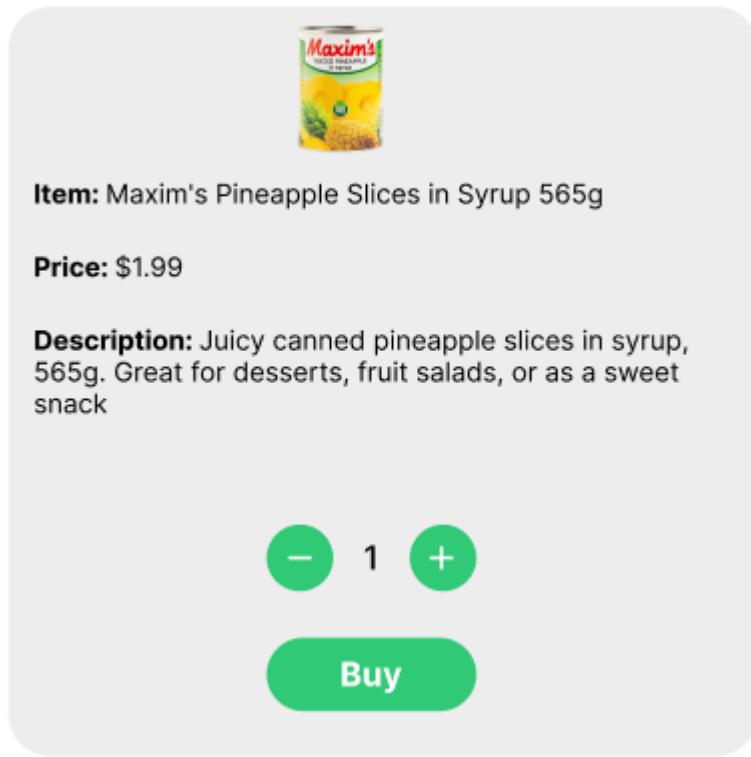
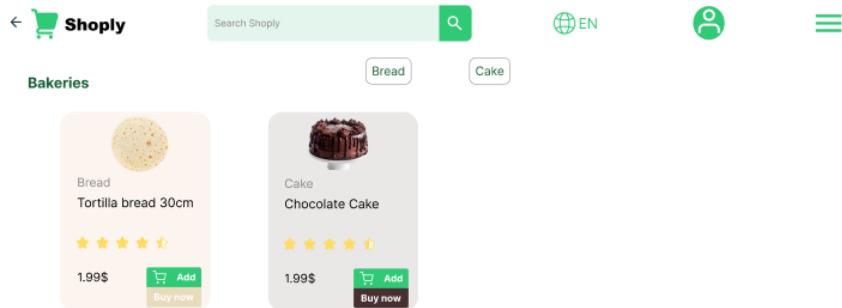
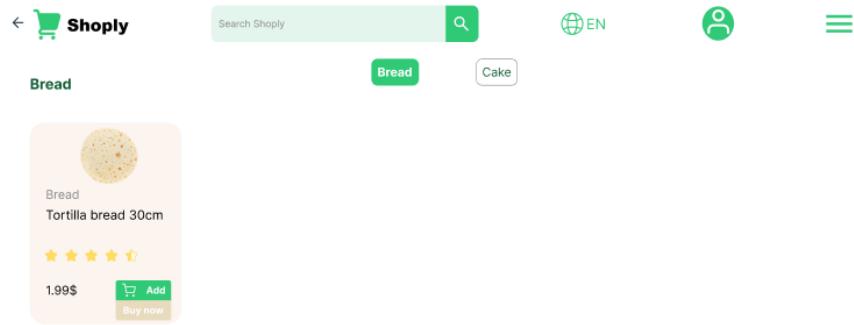


Figure 88 Pineapple Popup



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Figure 89 Bakeries



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Figure 90 Bread

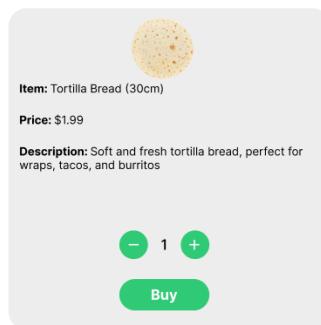


Figure 91 Tortilla Popup

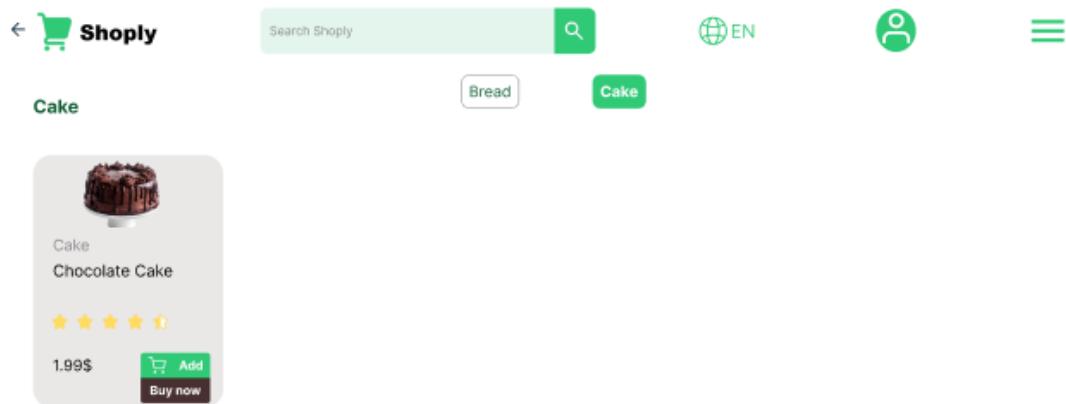


Figure 92 Cake

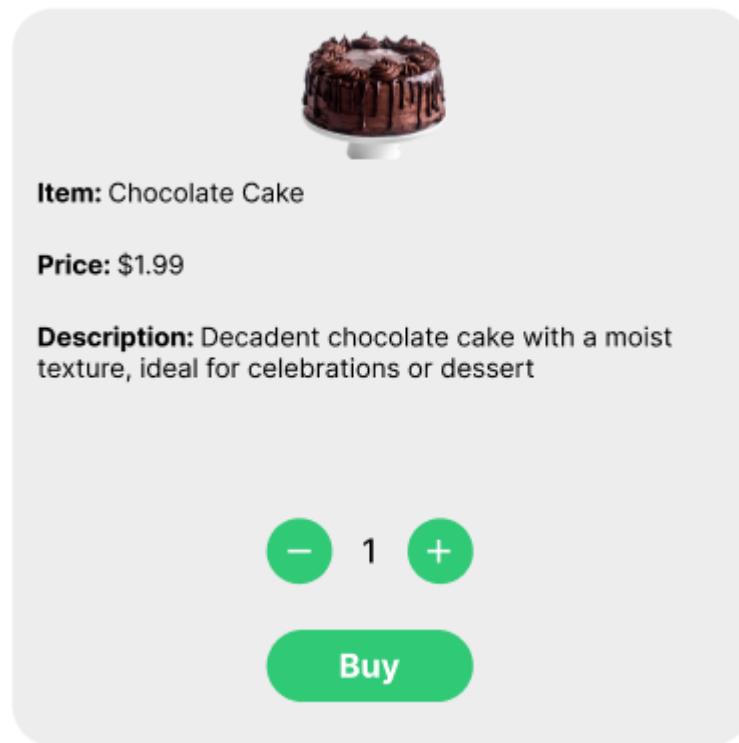
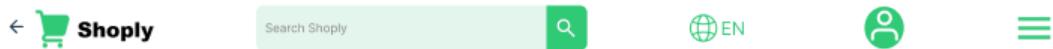
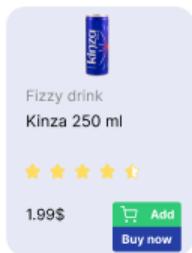


Figure 93 Chocolate Cake Popup



## Fizzy drinks

A product card for a Kinza Fizzy drink. It features a small image of a blue can with the Kinza logo. Below the image, the text reads "Fizzy drink" and "Kinza 250 ml". A rating of 4 stars is shown. The price is listed as "1.99\$". At the bottom right is a green "Buy now" button with a shopping cart icon.

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Figure 94 Fizzy drinks

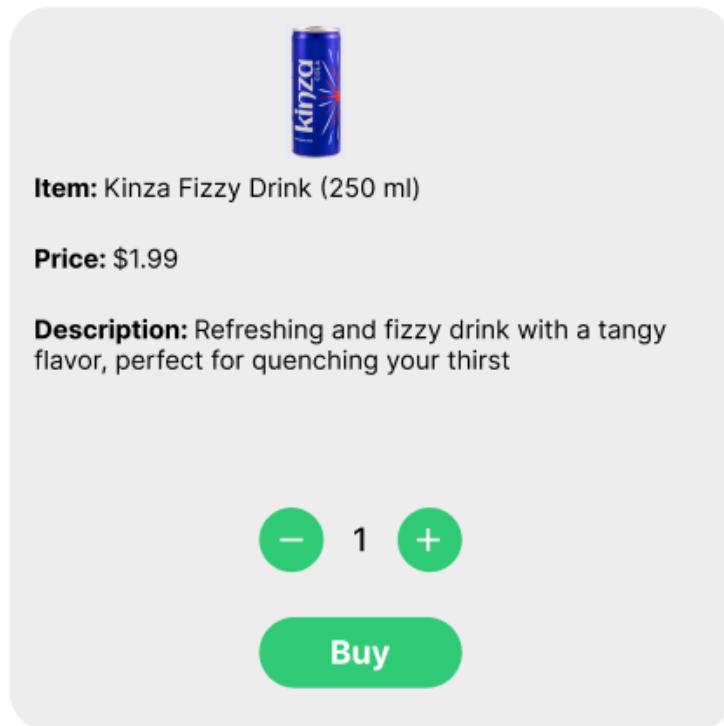
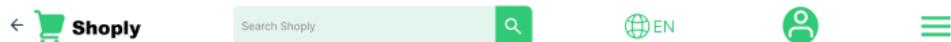
A detailed product view for the Kinza Fizzy Drink. It shows a larger image of the blue can. Below it, the text "Item: Kinza Fizzy Drink (250 ml)" and "Price: \$1.99" are displayed. A description follows: "Description: Refreshing and fizzy drink with a tangy flavor, perfect for quenching your thirst". At the bottom, there are quantity controls with a minus sign, a "1" in a circle, and a plus sign, followed by a large green "Buy" button.

Figure 95 Kinza Popup



### Fresh Juices

Fresh juice  
Orange juice 250 ml

★★★★★

1.99\$

Add Buy now

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Figure 96 Fresh Juices

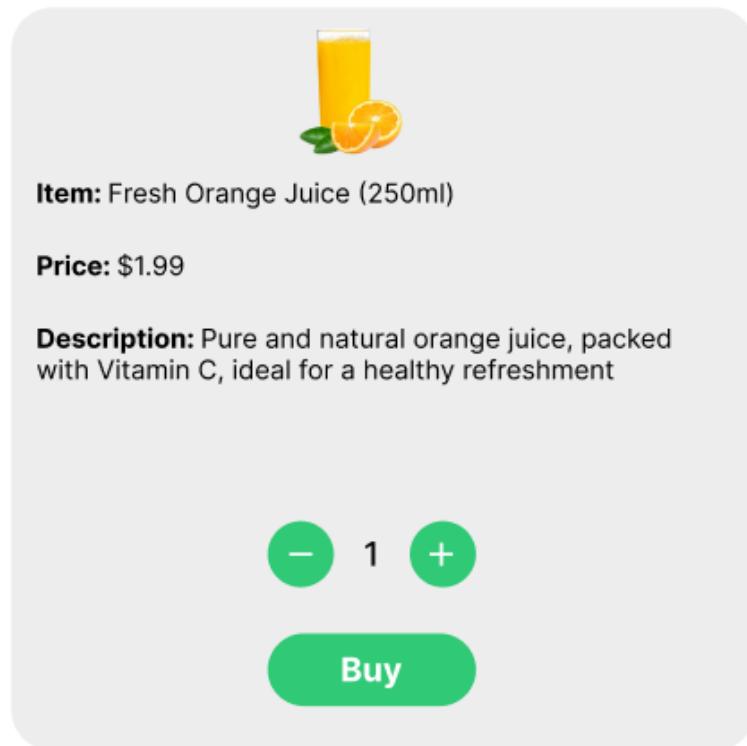
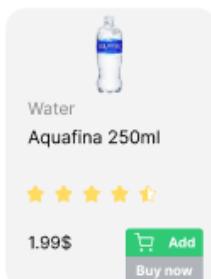


Figure 97 Orange Juice overlay



## Water



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Figure 98 Water

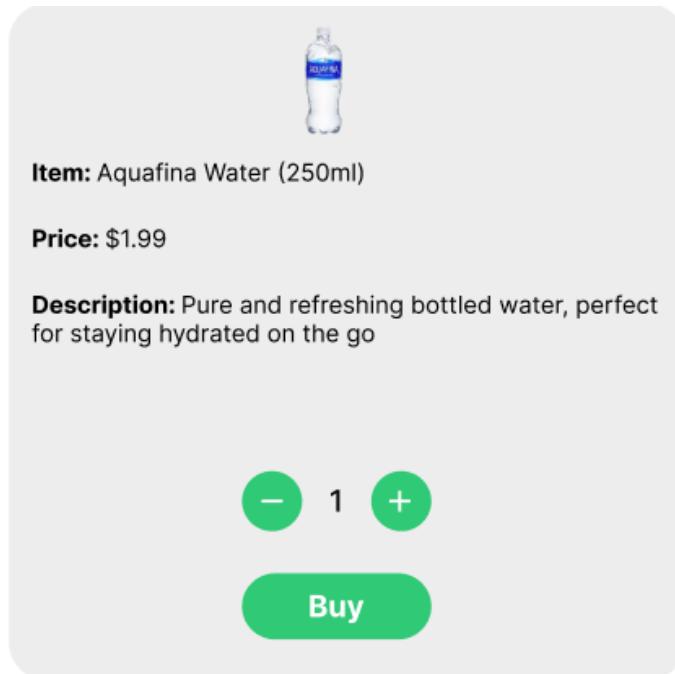
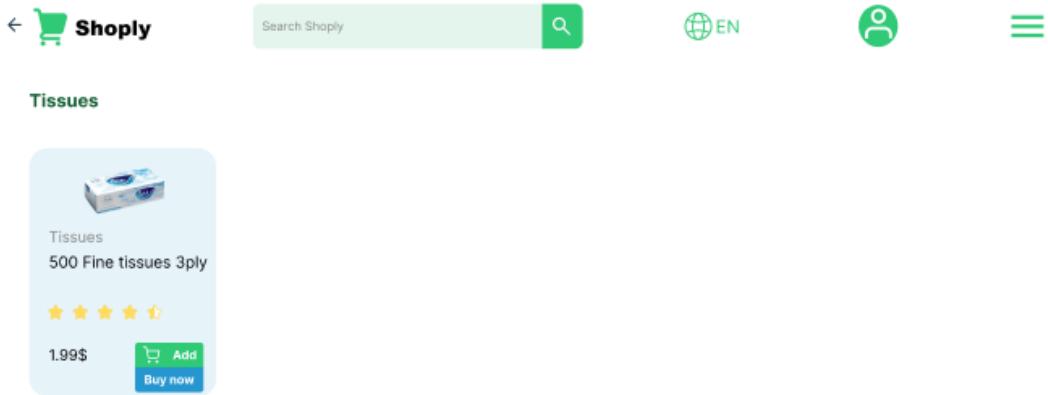


Figure 99 Aquafina Water Popup



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Figure 100 Tissues

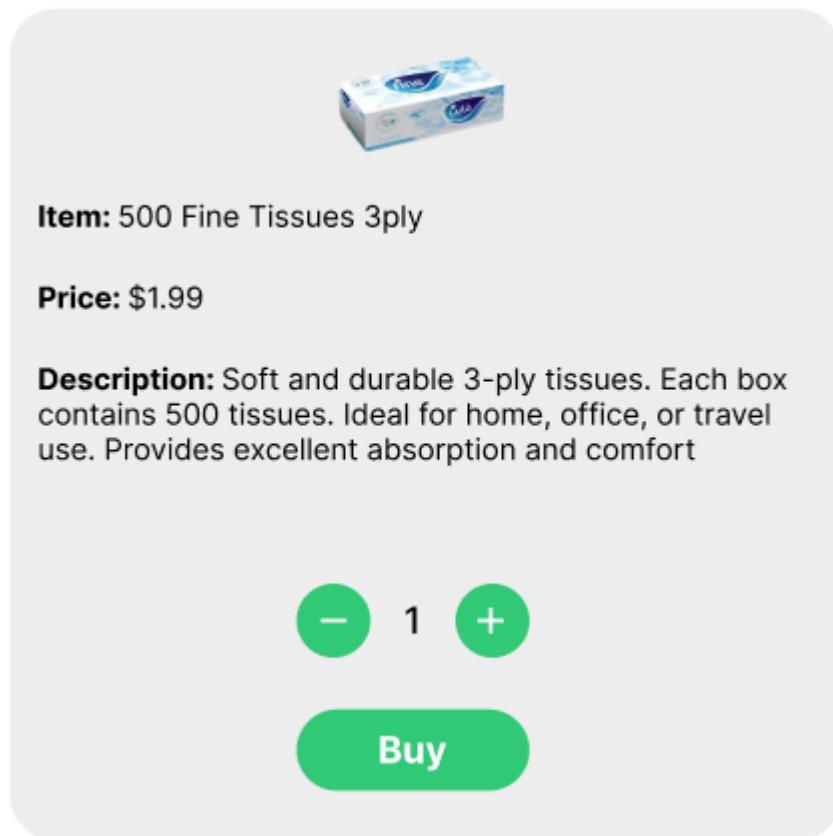


Figure 101 Fine Tissues Popup

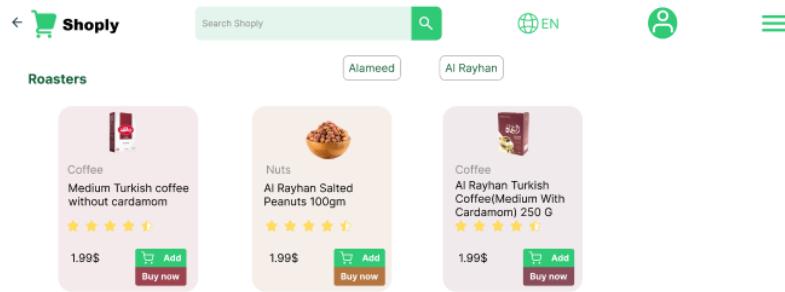


Figure 102 Roasters

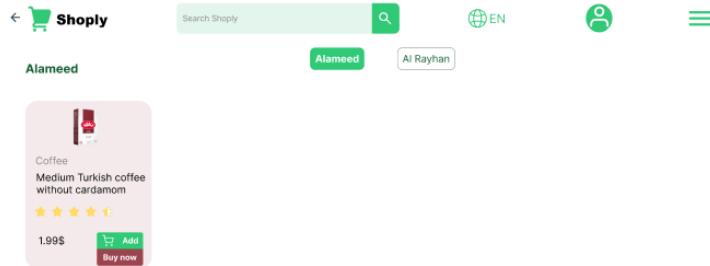


Figure 103 Alameed

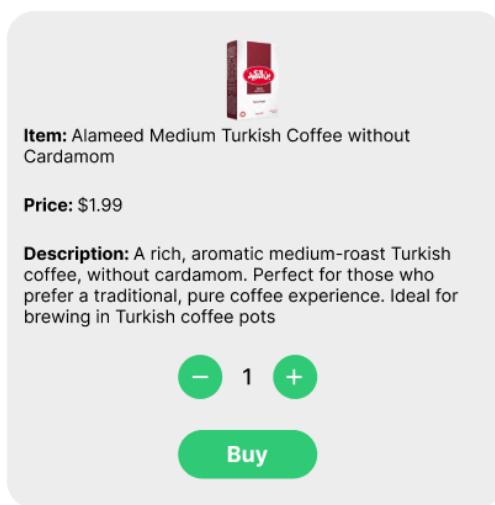
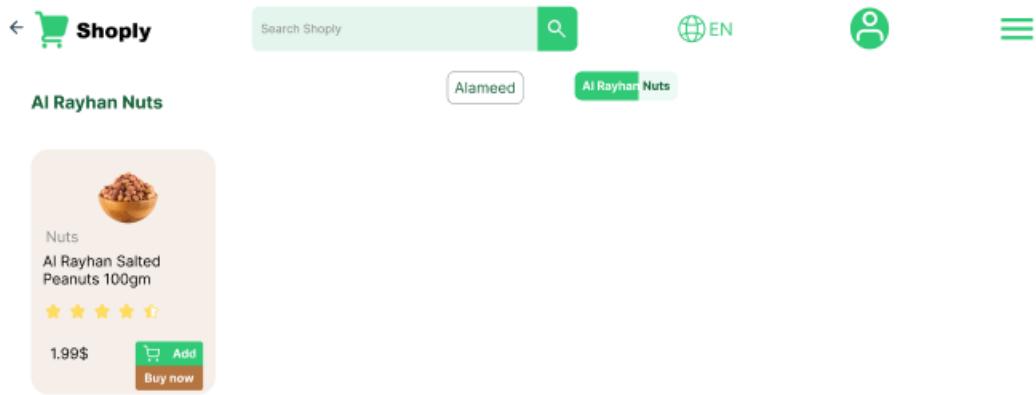


Figure 104 Alameed Medium Turkish Coffee Popup



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Figure 105 Al Rayhan Nuts

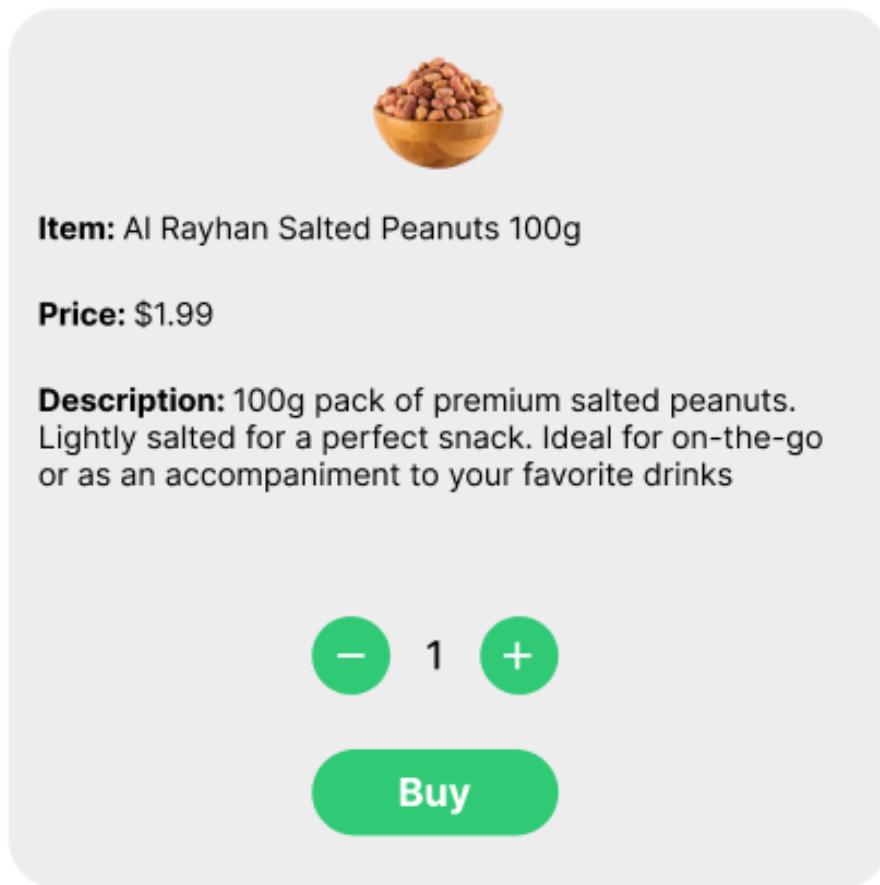


Figure 106 Al Rayhan Salted Peanuts Popup

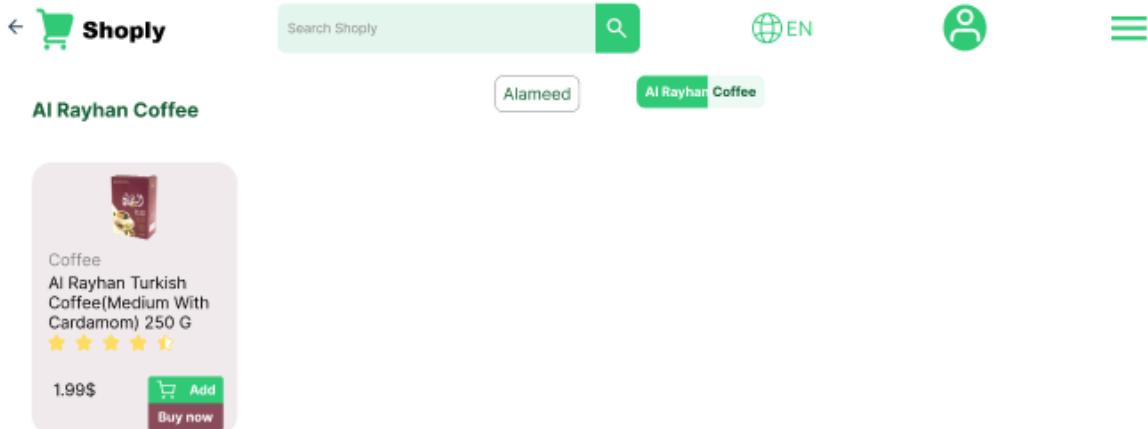


Figure 107 Al Rayhan Coffee

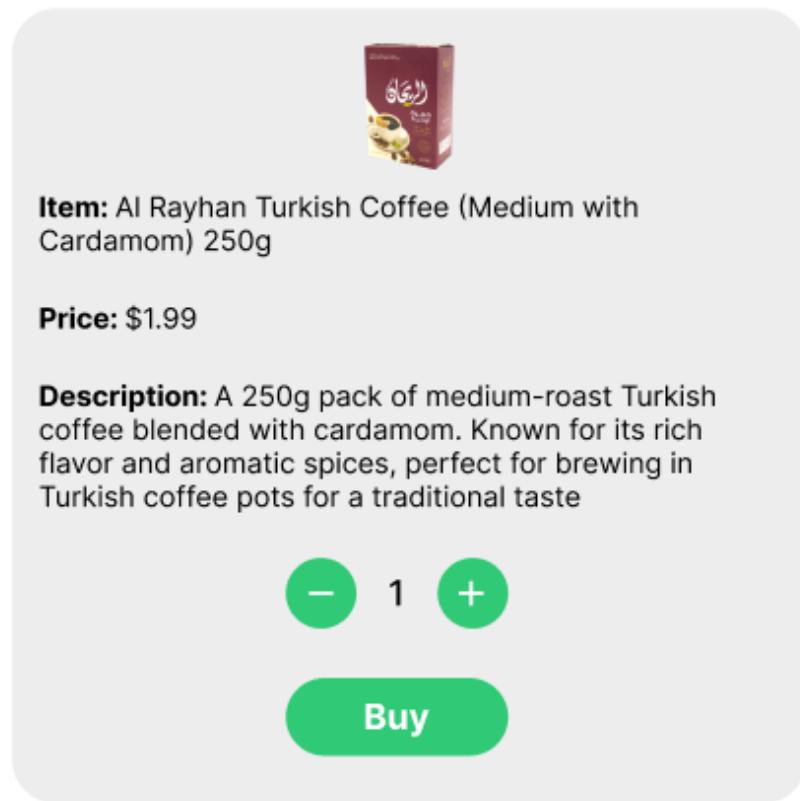


Figure 108 Al Rayhan Turkish Coffee Popup

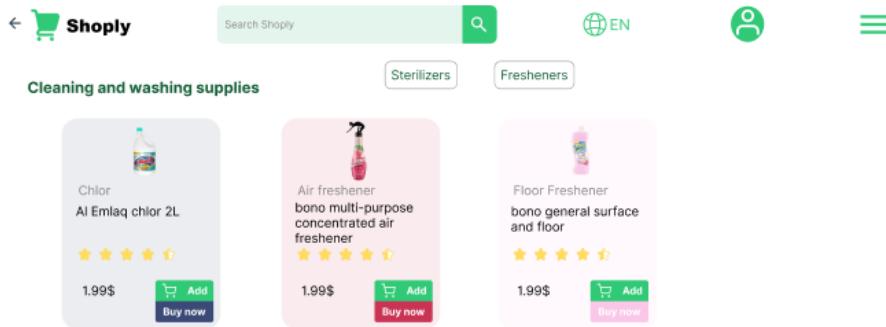


Figure 109 Cleaning and washing supplies

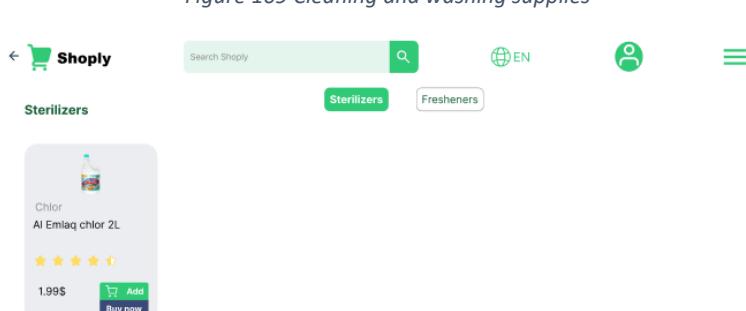


Figure 110 Sterilizers

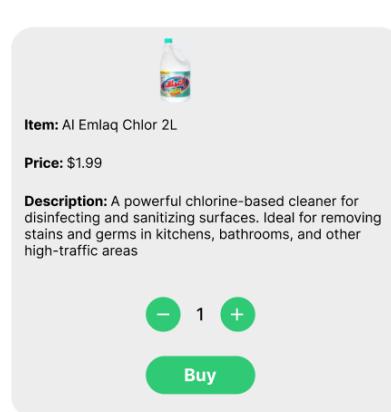


Figure 111 AI Emlaq Chlor Popup

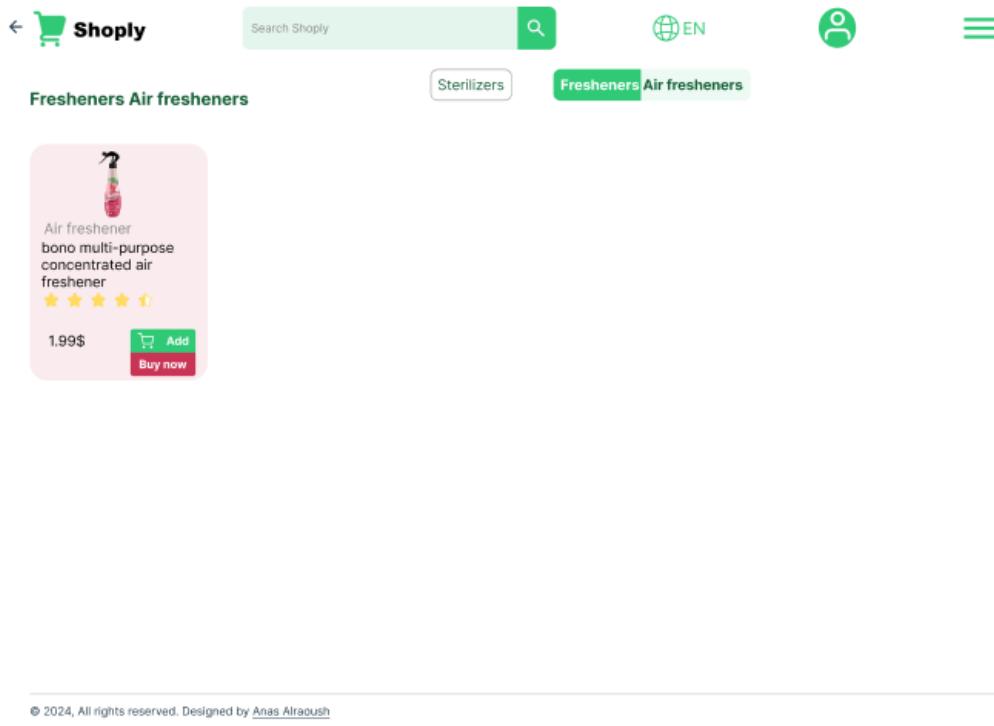


Figure 112 Fresheners Air fresheners

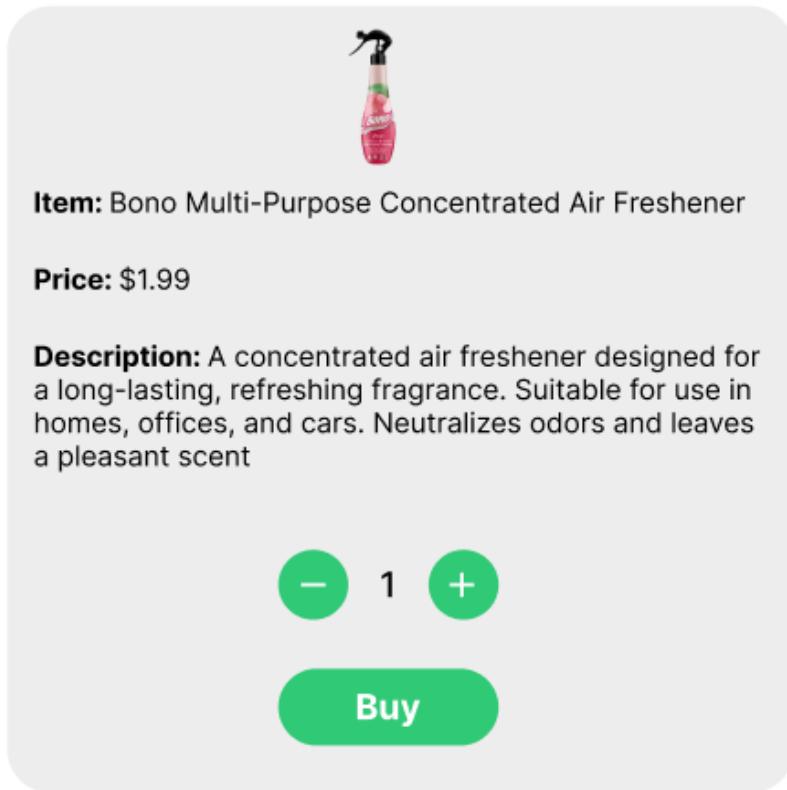
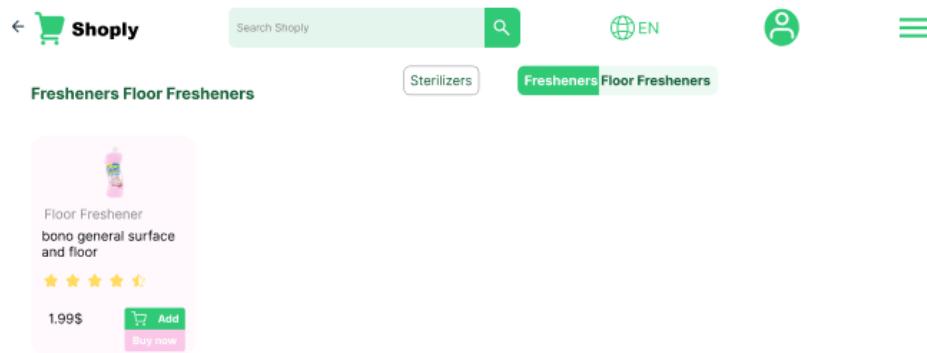


Figure 113 Air Freshener Popup



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Figure 114 Fresheners Floor Fresheners

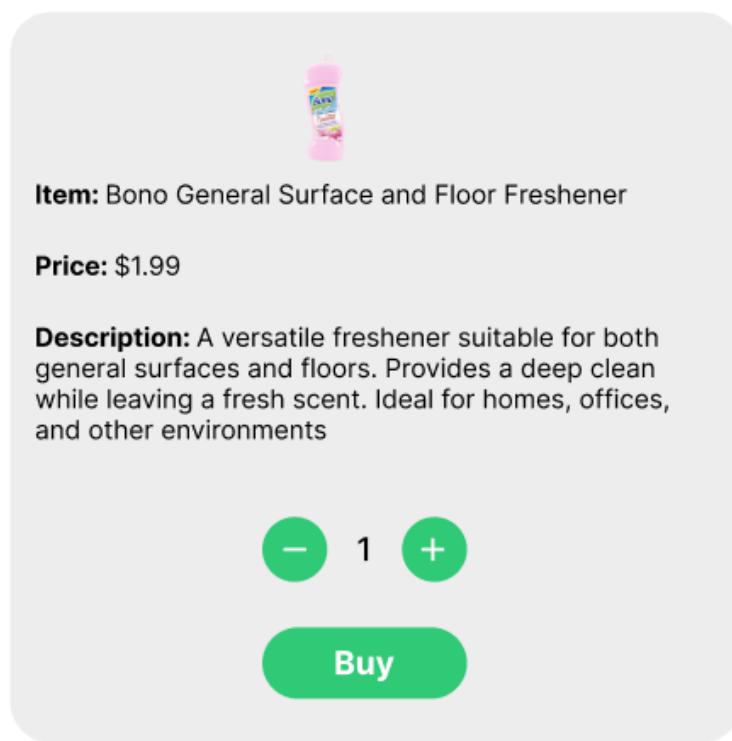


Figure 115 Floor Freshener Popup

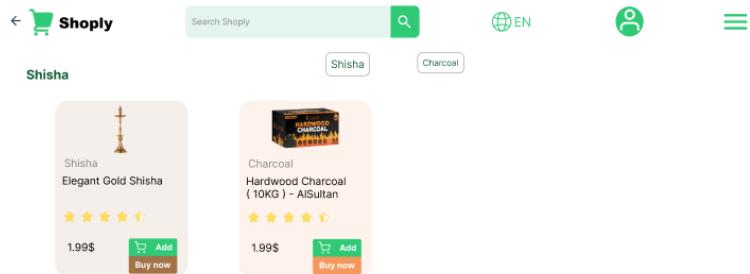


Figure 116 Shisha

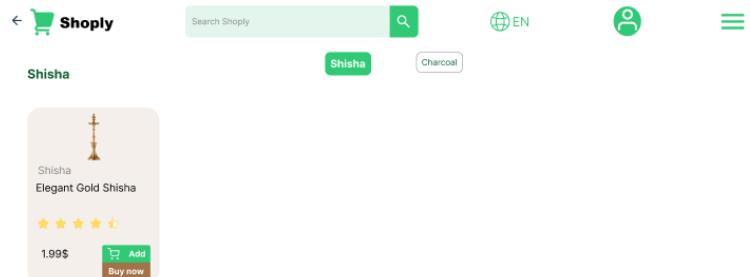


Figure 117 Shisha

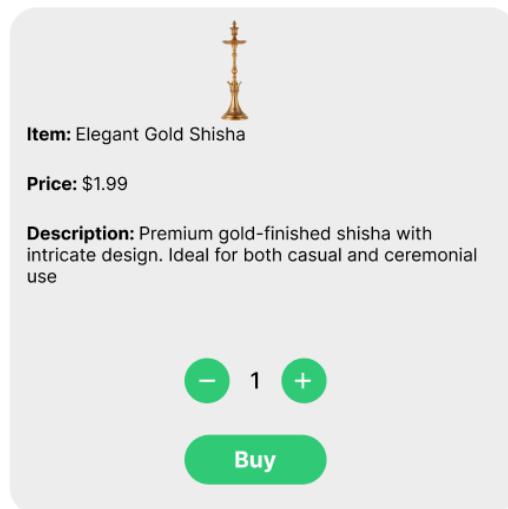
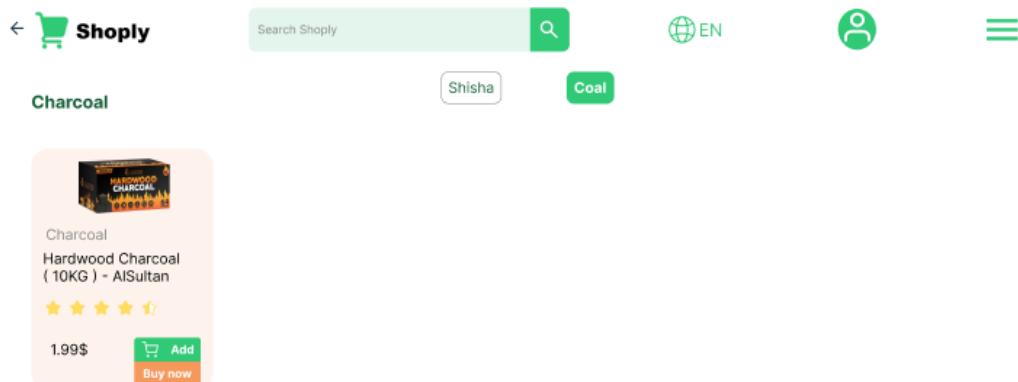


Figure 118 Gold Shisha Popup



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Figure 119 Charcoal



**Item:** Hardwood Charcoal (10KG) - AlSultan

**Price:** \$1.99

**Description:** High-quality hardwood charcoal, 10kg box. Perfect for grilling, barbecues, and shisha setups

− 1 +

Buy

Figure 120 Charcoal Popup

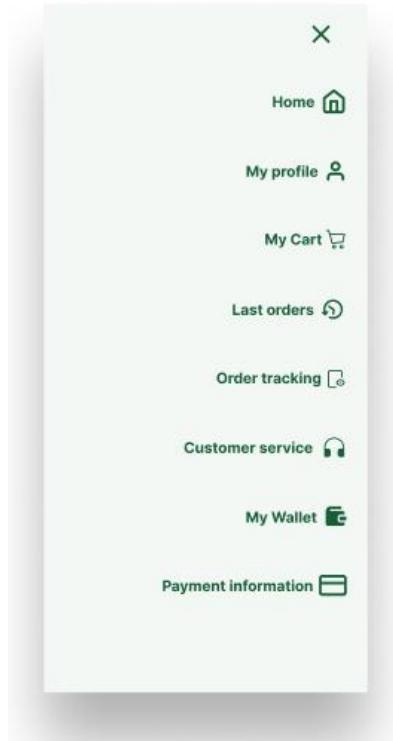


Figure 121 menu

My profile

Manage your profile with ease!

First Name  
Anas

Last name  
Alraoush

Phone number  
+00962795864502

Email  
someone@gmail.com

Password

Edit Information

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Figure 122 My profile



My Cart

Your cart is currently empty.  
Start shopping now to fill it!



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Figure 123 119 My Cart



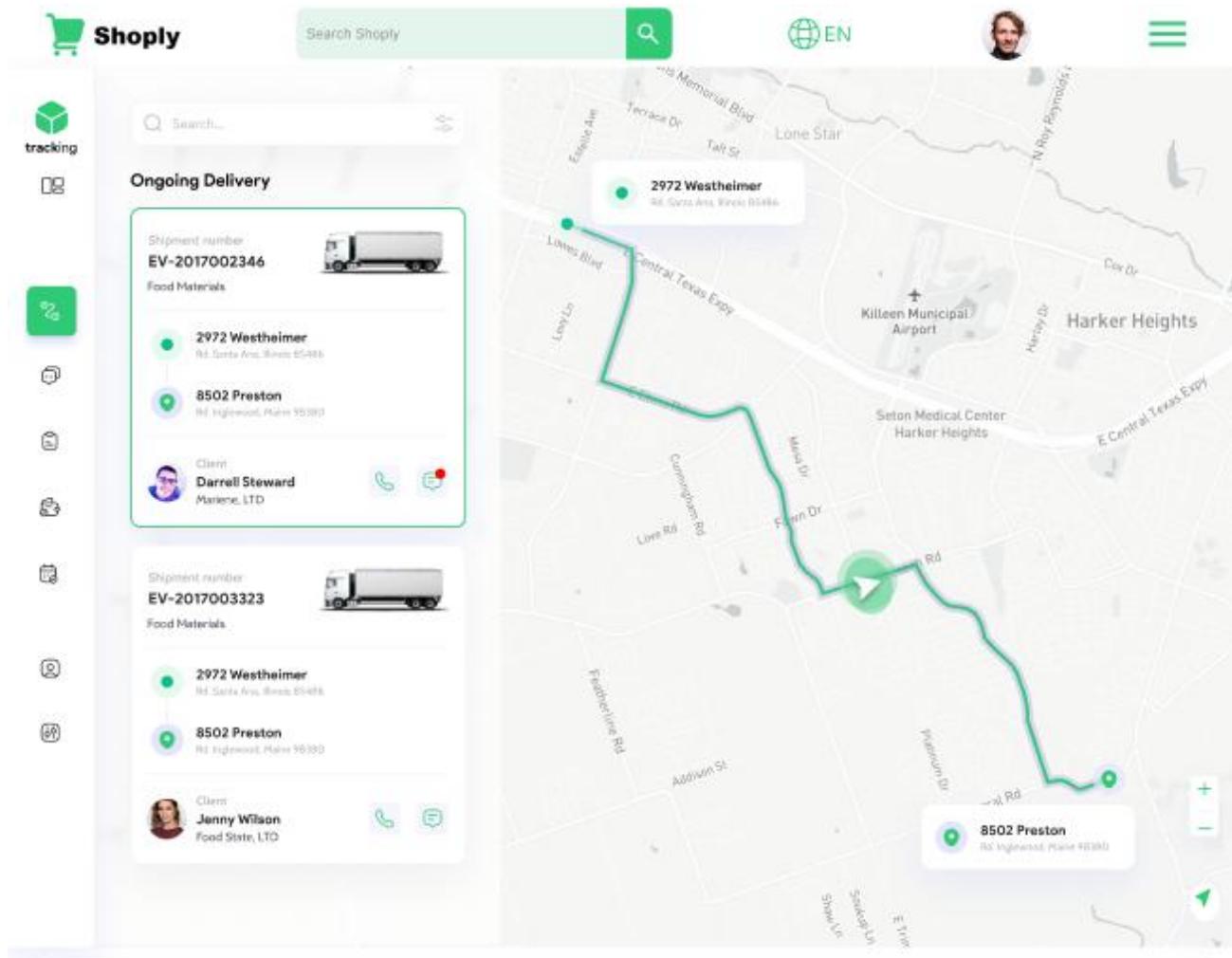
Last orders

You have no order history yet



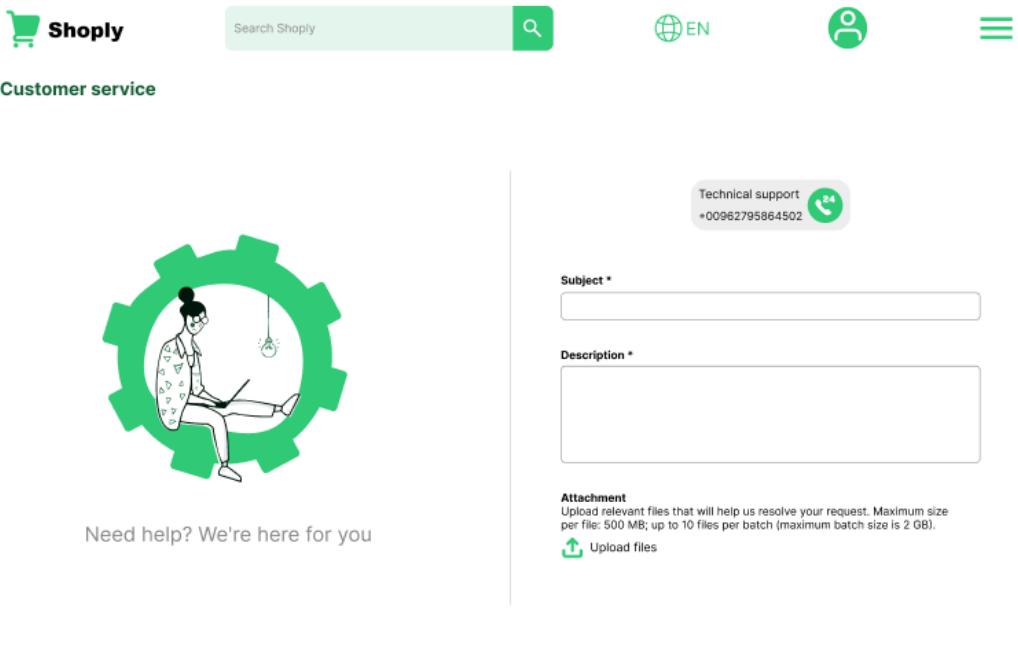
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Figure 124 120 Last orders



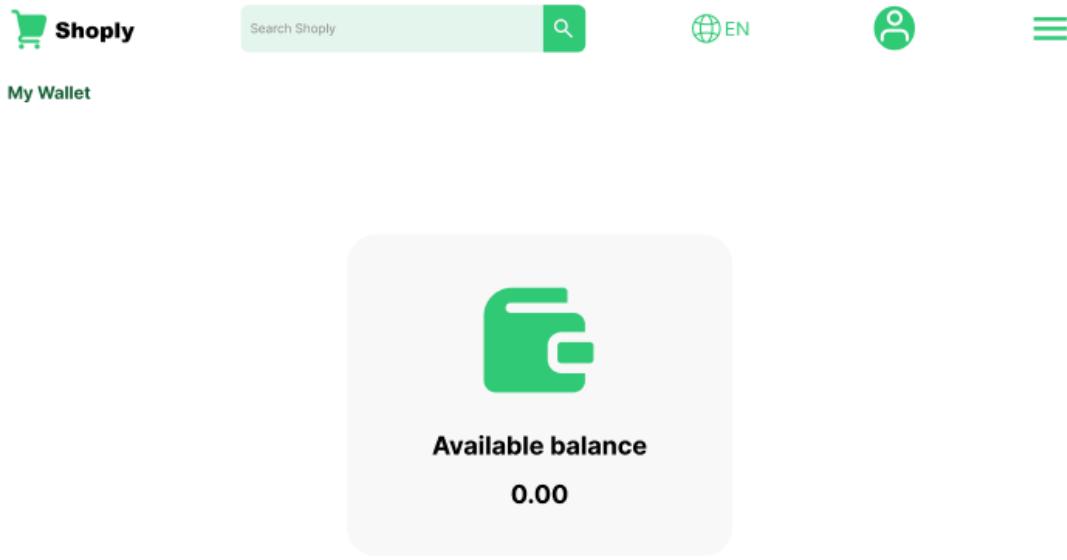
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Figure 125 Order tracking



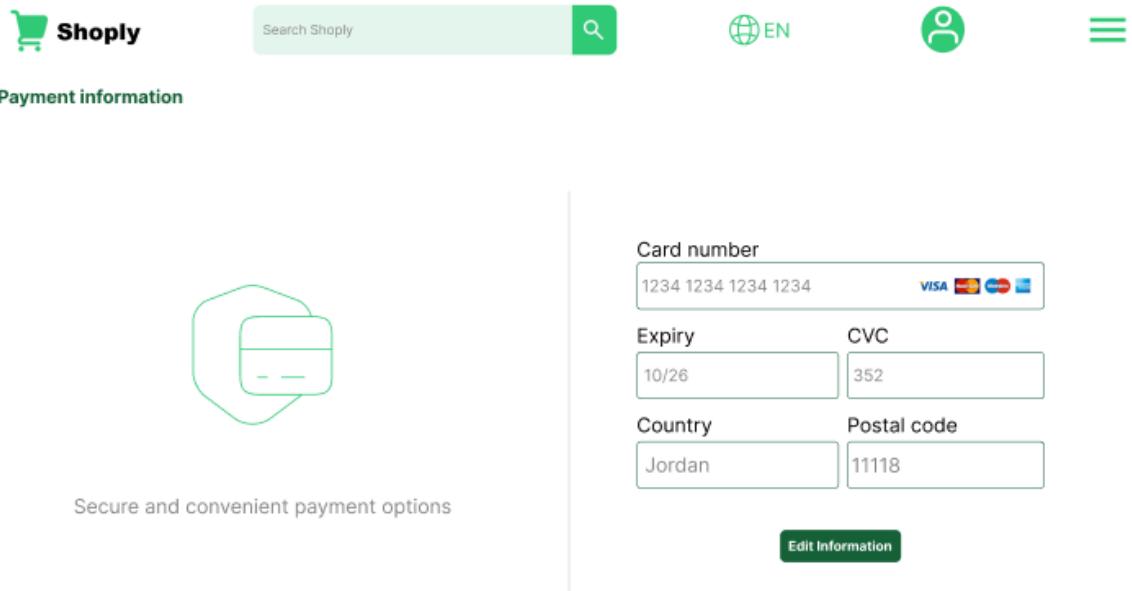
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Figure 126 Customer service



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Figure 127 My Wallet

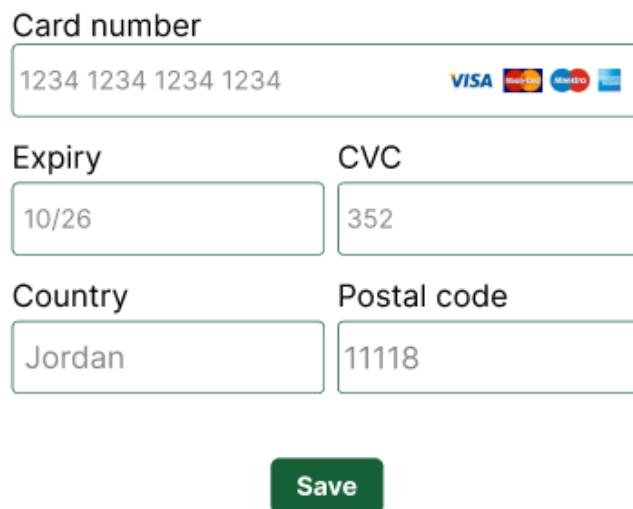


The screenshot shows the 'Payment information' section of the Shoply app. At the top, there's a green header bar with the Shoply logo, a search bar, and language and user icons. Below the header, the title 'Payment information' is displayed. On the left, there's a large green icon of a credit card inside a hexagon. Below the icon, the text 'Secure and convenient payment options' is shown. To the right, there are four input fields: 'Card number' (containing '1234 1234 1234 1234' with VISA, MasterCard, American Express, and Discover logos), 'Expiry' (containing '10/26'), 'CVC' (containing '352'), 'Country' (containing 'Jordan'), and 'Postal code' (containing '11118'). A green 'Edit Information' button is located at the bottom right of these fields.

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Figure 128 Payment information

### New Payment information



This screenshot shows a new payment information form. It includes fields for 'Card number' (with placeholder '1234 1234 1234 1234' and logos for VISA, MasterCard, American Express, and Discover), 'Expiry' (with placeholder '10/26'), 'CVC' (with placeholder '352'), 'Country' (with placeholder 'Jordan'), and 'Postal code' (with placeholder '11118'). A green 'Save' button is located at the bottom center of the form.

Figure 129 New Payment information



Total Price: 1.99

Card number



Expiry                    CVC

Country                    Postal code

**Confirm Buying**

---

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Figure 130 Buying process



**Purchase completed**

Reload to return to the home page

---

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Figure 131 Purchase completing



Effortlessly update and manage your product listings



Add Products



Edit or Delete Products



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Figure 132 Admin Home page

## Add Products

Enter item's name

Enter item's Description

Enter item's price

Specify the available quantity

- 1 +

Upload Items photo

Submit

Figure 133 Add item popup

	<b>Item:</b> Fresh Orange (100g)	<b>Price:</b> \$1.99	<b>Description:</b> Juicy and fresh oranges, rich in Vitamin C, ideal for snacks, juice, or desserts. Weight: 100g per unit	<a class="Edit" href="#">Edit</a>	<a class="Delete" href="#">Delete</a>
	<b>Item:</b> Potato (100gm)	<b>Price:</b> \$1.99	<b>Description:</b> Fresh and high-quality potatoes, ideal for cooking or baking	<a class="Edit" href="#">Edit</a>	<a class="Delete" href="#">Delete</a>
	<b>Item:</b> Fresh Strawberries (100g)	<b>Price:</b> \$1.99	<b>Description:</b> Sweet and juicy strawberries, perfect for desserts, smoothies, or snacking. Weight: 100g per unit	<a class="Edit" href="#">Edit</a>	<a class="Delete" href="#">Delete</a>

Figure 134 Edit or delete popup

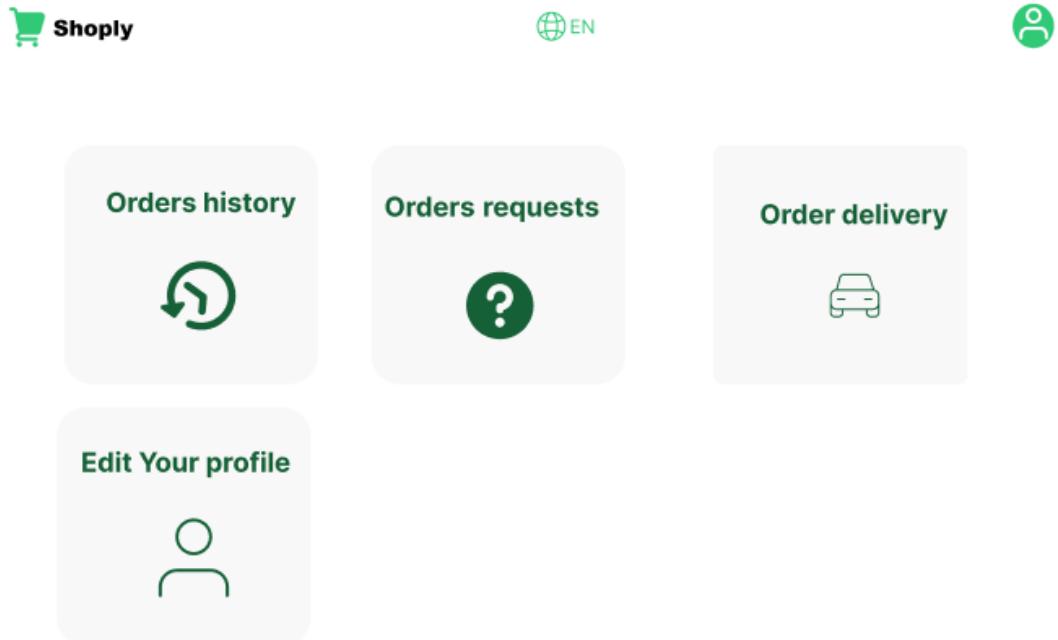


Figure 135 Delivery personal homepage

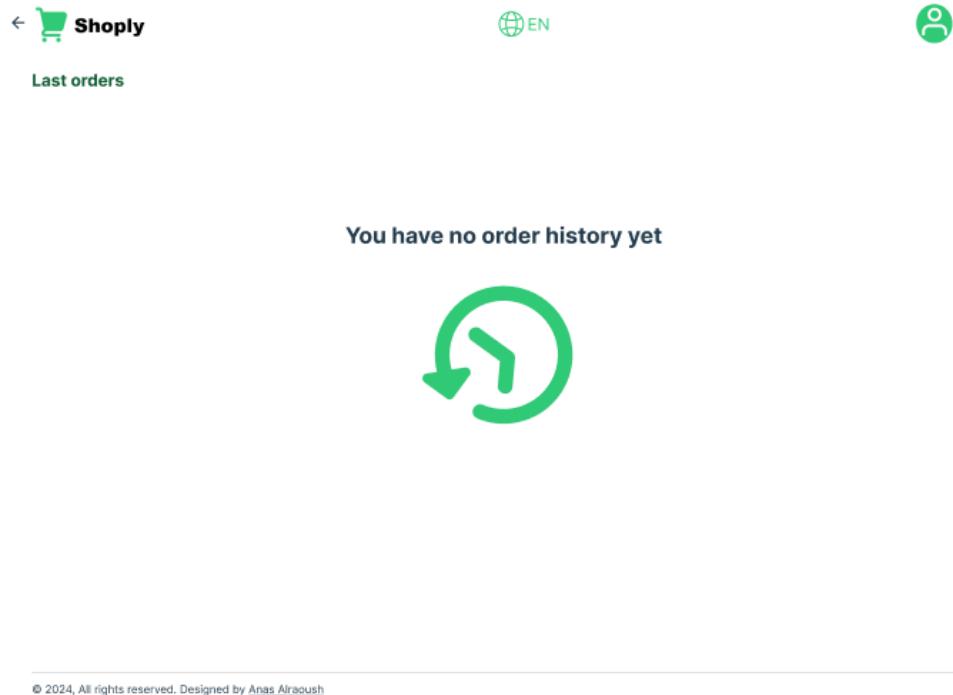


Figure 136 Delivery personal order history



Last orders

No orders requests



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Figure 137 Delivery personal order requests



Edit profile



Manage your profile with ease!

First Name <input type="text" value="Anas"/>	Last name <input type="text" value="Alraoush"/>
Phone number <input type="text" value="+00962795864502"/>	
Email <input type="text" value="someone@gmail.com"/>	Password <input type="password" value="*****"/>

Edit information

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Figure 138Delivery personal Profile information

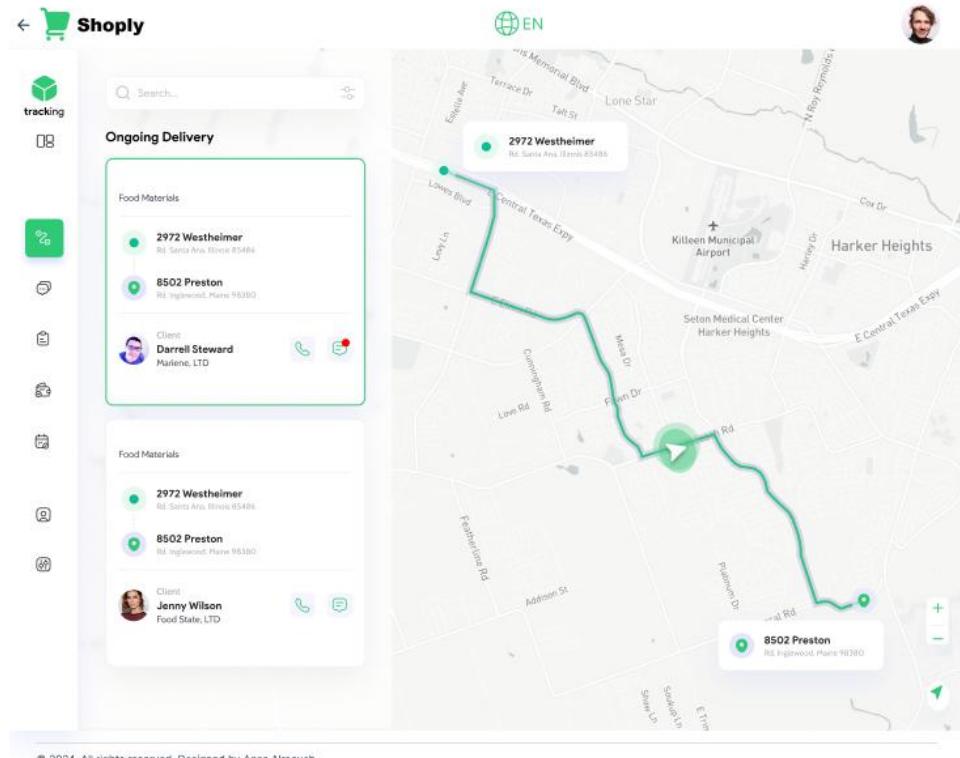
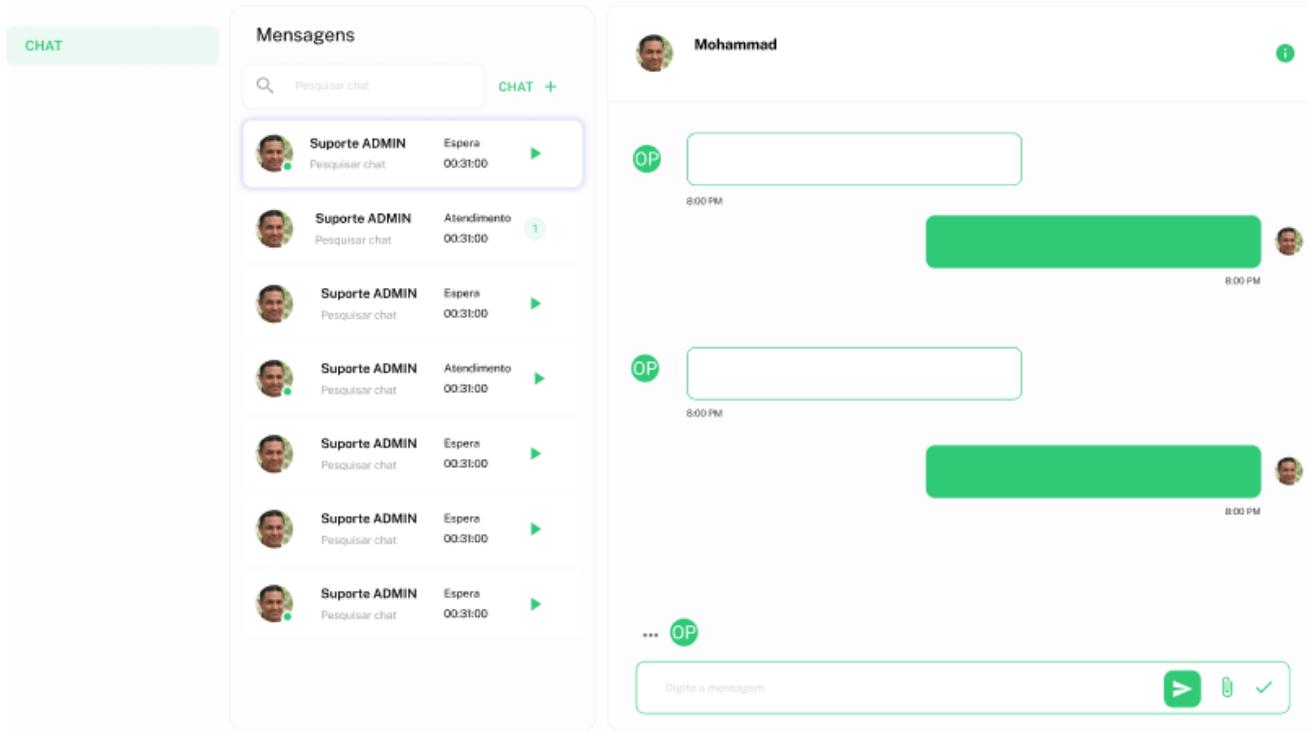


Figure 139 Delivery personal Delivery map

**Mensagens**

Pesquisar chat CHAT +

- Suporte ADMIN** Espera 00:31:00 ➔
- Suporte ADMIN** Atendimento 00:31:00 1 ➔
- Suporte ADMIN** Espera 00:31:00 ➔
- Suporte ADMIN** Atendimento 00:31:00 ➔
- Suporte ADMIN** Espera 00:31:00 ➔
- Suporte ADMIN** Espera 00:31:00 ➔
- Suporte ADMIN** Espera 00:31:00 ➔

**Mohammad**

OP [green message bubble] 8:00 PM

OP [green message bubble] 8:00 PM

OP [green message bubble] 8:00 PM

... OP [green message bubble]

Digite a mensagem   

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Figure 140 Delivery personal Customer communication

## 6.0 User Manual

User Manual video link

## 7.0 References: books and tools

[Software Engineering - Ian Sommerville](#)

[Figma](#)

[Lucid chart](#)

[Plant UML](#)