Software Requirements Specification

for

Online Marketplace

Version 1.0 approved

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FAST NUCES Isb.

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Revision History

Name	Date	Reason For Changes	Version
M. Ahmed Mufti	3/23/2025	Initial draft of the SRS document.	1.0

1. Introduction

1.1 Purpose

*This Software Requirements Specification (SRS) document specifies the functional and non-functional requirements for the **Online Marketplace**. It defines the product's features, interfaces, and interactions, establishing the foundation for the design, development, and testing of the system. The marketplace is designed to facilitate secure, efficient transactions between buyers and sellers, supporting functionalities such as product browsing, shopping cart management, payment processing, and order tracking.*

1.2 Document Conventions

- **Standards Compliance**: This document adheres to IEEE SRS standards.

- **Formatting**: Consistent use of section headings, bold text, and bullet lists enhances clarity.

- **Requirement Identification**: Each requirement is uniquely identified (e.g., REQ-UM-1) to support traceability.

- **Inheritance of Priorities**: Detailed requirements inherit priorities from high-level objectives unless otherwise noted.

- **Placeholders**: "TBD" is used for details that are pending or require further clarification.

1.3 Intended Audience and Reading Suggestions

This document is intended for:

- **Developers**: To understand the functional requirements and constraints for building the system.

- **Project Managers**: For oversight on project scope, timelines, and resource allocation.

- **Testers**: To design test cases and validate system behavior.

- **Marketing and Business Analysts**: To grasp user requirements and market positioning.

- **Technical Writers**: To prepare user documentation and online help materials.

Reading Suggestions:
Readers should start with Section 1 for an overview, move to Section 2 for the overall system description, and refer to Sections 3 and 4 for detailed interface and functional requirements. Section 5 addresses nonfunctional requirements critical to system quality.

1.4 Product Scope

The **Online Marketplace** is a comprehensive web-based platform that connects buyers and sellers. Key features include:

- **User Management**: Registration, login, and profile management.

- **Product Management**: Sellers can list, update, and manage product details.

- **Search and Navigation**: Buyers can efficiently search and filter products.

- **Shopping and Checkout**: A secure shopping cart and checkout process with integrated payment gateways.

- **Order Processing**: Automated order confirmation, inventory updates, and tracking.

- **Feedback System**: Buyer reviews and ratings for products and sellers.

This product is designed to improve the online shopping experience by providing a secure, intuitive, and scalable platform that meets business and customer needs.

1.5 References

- IEEE Standard for Software Requirements Specifications.

- E-commerce System Design Guidelines – Authoritative online resource.

- Payment Card Industry Data Security Standard (PCI DSS) – For payment processing requirements.

- Accessibility Guidelines (WCAG) – For user interface design considerations.

2. Overall Description

2.1 Product Perspective

*The **Online Marketplace** is a self-contained system that operates as a standalone application. It may interact with external systems such as payment gateways, shipping carriers, and social media platforms for enhanced functionality. The system is built with a modular architecture, ensuring ease of integration and future scalability. A high-level architectural diagram (to be developed) in Section 6.1 illustrates the overall system context.*

2.2 Product Functions

- **User Management**: Secure registration, authentication, and profile management.

- **Product Management**: Tools for sellers to list products with images, descriptions, and pricing.

- **Search and Filter**: Advanced search options and filters for an enhanced user experience.

- **Shopping Cart & Checkout**: Management of shopping carts with secure checkout processes.

- **Order Processing**: Automated systems for order confirmation, inventory update, and tracking.

- **Payment Processing**: Integration with secure external payment gateways.

- **Feedback and Ratings**: Mechanisms for users to rate products and provide reviews.

- **Administrative Tools**: A backend interface for administrators to manage users, products, and transactions.

2.3 User Classes and Characteristics

- **Buyers**: End users who browse and purchase products. They require an intuitive interface and robust security features.

- **Sellers**: Users who list and manage products. They need comprehensive product management and order tracking tools.

- **Administrators**: System managers responsible for oversight, user management, and resolving disputes.

- **Guest Users**: Visitors who can browse the platform but must register for transactions.

- **Support Staff**: Personnel who provide customer and technical support.

2.4 Operating Environment

- **Web Platform**: Compatible with modern browsers such as Chrome, Firefox, Safari, and Edge.

- **Server Environment**: Deployed on cloud-based servers (e.g., AWS, Azure) that support auto-scaling and high availability.

- **Mobile Environment**: Responsive design ensures optimal performance on mobile devices.

- **Operating Systems**: Backend on Linux-based servers; client operations across any OS supporting modern browsers.

2.5 Design and Implementation Constraints

- **Regulatory Compliance**: The system must comply with PCI DSS for payment processing and GDPR for data privacy.

- **Hardware Limitations**: Designed for cloud environments with elastic scalability to support high concurrent user loads.

- **Technology Stack**: Utilizes RESTful APIs, microservices architecture, and modern JavaScript frameworks.

- **Security Considerations**: Encrypted data transmission, secure storage practices, and regular security audits.

- **Interoperability**: Supports integration with external APIs for payments, shipping, and social media authentication.

- **Performance Requirements**: Core functions are optimized to ensure response times under 2 seconds under normal conditions.

2.6 User Documentation

- **User Manuals**: Comprehensive guides for buyers, sellers, and administrators.

- **Online Help**: Context-sensitive help features integrated into the platform.

- **Tutorials and FAQs**: Step-by-step tutorials and frequently asked questions to assist users.

- **API Documentation**: Detailed guides for third-party integrations with the system's APIs.

2.7 Assumptions and Dependencies

- **Third-Party Services**: Reliable external services (payment gateways, shipping APIs, and identity verification) are available.

- **User Connectivity**: Assumes users have stable internet connections.

- **Regulatory Environment**: Anticipates no drastic changes in e-commerce regulations; any modifications will be tracked and accommodated.

- **Technology Availability**: The system depends on the availability of current cloud services and modern web technologies.

3. External Interface Requirements

3.1 User Interfaces

- **Web Interface**:
  The primary interface is a responsive web application supporting modern desktop and mobile browsers. It follows a consistent layout with a header, navigation menu, content area, and footer. Standard GUI components—such as buttons, form fields, tooltips, and error messages—adhere to established UI/UX guidelines and accessibility standards (e.g., WCAG). A separate User Interface Specification will provide sample screen images, detailed layout constraints, standard icons, and keyboard shortcuts.

- **Administrative Interface**:
  A secure, role-based portal that allows administrators to manage user accounts, orders, and product listings. The interface includes dashboards, data tables, and standard controls (e.g., search filters and sort options) consistent with the overall design language.

3.2 Hardware Interfaces

- **Server Hardware**:
  The system will operate on cloud-based servers that provide load balancing, high availability, and redundancy. The servers support necessary communication protocols and ensure high-speed data processing.

- **User Devices**:
  The application is designed to be compatible with a wide range of devices, including desktops, laptops, tablets, and smartphones. The interface dynamically adjusts to different screen sizes and input methods.

- **Peripheral Devices**:
  While integration with peripherals (e.g., barcode scanners) is not included in the initial scope, the architecture is designed to allow future support if needed.

3.3 Software Interfaces

- **Payment Gateway API**:
  Integration with external payment processing services (e.g., Stripe, PayPal) via RESTful APIs. These APIs will use JSON for data exchange, with detailed protocols documented in the API specification. The interface will handle secure transmission of payment data and transaction confirmations.

- **Shipping API**:
  The system will interface with logistics providers to obtain real-time shipping rates, tracking

updates, and delivery status. Data exchanges will be performed over secure RESTful endpoints.

- **Social Media APIs**:
  Optional integration for social logins and sharing functionalities. The interface will support OAuth-based authentication protocols and provide a consistent mechanism for data retrieval.

- **Internal APIs**:
  The architecture utilizes RESTful services for internal communication between micro services. Data is exchanged in JSON format, and versioning is maintained to ensure backward compatibility. Detailed API contracts will be specified separately.

3.4 Communications Interfaces

- **HTTP/HTTPS**:
  All data transmissions between the client and server, as well as between internal services, are required to use HTTPS with TLS encryption to ensure data integrity and security.

- **RESTful Services**:
  Communication between the client, server, and external systems is based on RESTful principles. All endpoints will support JSON payloads and adhere to standard HTTP methods (GET, POST, PUT, DELETE).

- **WebSocket/Push Notifications**:
  The system will support real-time communication for order updates and notifications using WebSocket protocols. This ensures low-latency updates for time-critical information.

- **Email Services**:
  SMTP will be used for sending transactional emails (e.g., order confirmations, password resets) and notifications. Message formatting will adhere to standard email templates ensuring consistency across communications.

4. System Features

This section organizes the functional requirements by major feature groups. Each feature group lists its functional requirements (FRs) with clear descriptions and identifiers.

4.1 User Management

Description & Priority:
Provides secure user account handling for both buyers and sellers. This feature is high priority as it underpins all platform interactions.

Stimulus/Response Sequences:

- **User Registration:** A customer or seller enters required personal information. The system validates the data and creates an account.

- **User Authentication:** A registered user logs in using email and password; the system verifies credentials and grants access.

- **Profile Management:** Users update personal details (address, contact info) with immediate effect.

- **Password Reset:** Upon user request, a password reset link is sent within 2 minutes.

Functional Requirements:

- **FR-01: User Registration**
  The system shall allow users (customers and sellers) to register by providing valid personal information (name, email, password).

- **FR-02: User Authentication**
  The system shall authenticate users during login using their registered email and password.

- **FR-03: Profile Management**
  The system shall enable users to edit personal details (address, contact information) and save changes immediately.

- **FR-04: Password Reset**
  The system shall send a password reset link to the user's registered email within 2 minutes of the request.

- **FR-22: Seller Verification**
  The system shall require document verification (e.g., business license) for new seller registrations.

4.2 Product Management

Description & Priority:
Enables sellers to manage product listings. High priority as it directly affects the marketplace's content and revenue potential.

Stimulus/Response Sequences:

- **Product Addition:** Seller inputs product details (name, description, price, images, stock quantity); system validates and publishes the product.

- **Product Editing/Deletion:** Sellers modify or remove product listings, subject to order status checks.

- **Stock Management:** Inventory levels are monitored, automatically marking products "Out of Stock" when necessary.

Functional Requirements:

- **FR-05: Product Addition**
  The system shall allow sellers to add new products with details (name, description, price, images, stock quantity).

- **FR-06: Product Editing**
  The system shall enable sellers to modify product details (e.g., price, description) for listed items.

- **FR-07: Product Deletion**
  The system shall allow sellers to delete products only if no pending orders are associated with them.

- **FR-08: Stock Management**
  The system shall automatically mark products as "Out of Stock" when inventory reaches zero.

4.3 Search & Navigation

Description & Priority:
Facilitates efficient product discovery for users. Critical for user engagement and sales conversion.

Stimulus/Response Sequences:

- **Product Search:** User enters a search query; the system retrieves matching products.

- **Filtering and Sorting:** The system refines results based on user-selected filters and sort options.

Functional Requirements:

- **FR-09: Product Search**
  The system shall return search results matching product names, categories, or sellers within 3 seconds.

- **FR-10: Search Filters**
  The system shall allow users to filter search results by price range, category, availability, and ratings.

- **FR-11: Sorting Options**
  The system shall enable users to sort products by price (low to high), date added, and popularity.

4.4 Shopping Cart & Checkout

Description & Priority:
Enables users to review and finalize purchases. This is high priority as it directly drives revenue.

Stimulus/Response Sequences:

- **Cart Management:** Users add or remove products and adjust quantities in the cart.

- **Order Summary:** Before checkout, a detailed summary is presented with itemized costs.

Functional Requirements:

- **FR-12: Cart Management**
  The system shall allow users to add/remove products to/from the cart and adjust quantities.

- **FR-13: Order Summary**
  The system shall display a pre-checkout summary showing itemized costs and total price.

4.5 Payment Integration

Description & Priority:
Ensures secure and flexible payment processing. High priority due to its impact on user trust and financial transactions.

Stimulus/Response Sequences:

- **Payment Methods:** The system offers multiple payment options during checkout.

- **Transaction Processing:** Payment details are encrypted and processed securely.

Functional Requirements:

- **FR-14: Payment Methods**
  The system shall support Cash on Delivery (COD) and online payments (credit/debit cards, mobile wallets).

- **FR-15: Secure Transactions**
  The system shall encrypt payment details during transactions using industry-standard protocols.

4.6 Order Management

Description & Priority:
Handles order lifecycle from placement to fulfillment. Critical for maintaining customer satisfaction.

Stimulus/Response Sequences:

- **Order Tracking:** Real-time updates on order status are provided to buyers.

- **Order Cancellation:** Buyers may cancel orders before dispatch, with a defined refund process.

Functional Requirements:

- **FR-16: Order Tracking**
  The system shall provide real-time order status updates (Pending, Shipped, Delivered) to buyers.

- **FR-17: Order Cancellation**
  The system shall allow buyers to cancel orders before dispatch, with refunds processed within 24 hours.

4.7 Seller Dashboard

Description & Priority:
Offers sellers a comprehensive view of their operations, including inventory and sales analytics.

Stimulus/Response Sequences:

- **Inventory Updates:** Seller dashboard reflects real-time changes in product stock.

- **Sales Analytics:** Sellers view key performance metrics such as total orders and revenue.

Functional Requirements:

- **FR-18: Inventory Updates**
  The system shall reflect inventory changes (e.g., stock adjustments) in real time on the seller dashboard.

- **FR-19: Sales Analytics**
  The system shall display key metrics (total orders, revenue) to sellers on their dashboard.

4.8 Customer Support & Feedback

Description & Priority:
Facilitates customer service and builds trust through feedback mechanisms.

Stimulus/Response Sequences:

- **Live Chat:** Immediate support is available during business hours.

- **Product Reviews:** Verified buyers submit product ratings and reviews.

Functional Requirements:

- **FR-20: Live Chat**
  The system shall provide live chat support for immediate customer assistance during business hours.

- **FR-21: Product Reviews**
  The system shall allow verified buyers to submit ratings and reviews for purchased products.

4.9 Fraud Prevention & Dispute Handling

Description & Priority:
Ensures platform integrity by managing fraud risks and mediating disputes. High priority for maintaining user trust.

Stimulus/Response Sequences:

- **Dispute Mediation:** Escalates unresolved disputes for admin resolution within a specified time frame.

Functional Requirements:

- **FR-23: Dispute Mediation**
  The system shall escalate unresolved buyer-seller disputes to admins for resolution within 48 hours.

4.10 Sales & Promotions

Description & Priority:
Supports marketing efforts through discount campaigns and promo codes.

Stimulus/Response Sequences:

- **Discount Campaigns:** Sellers create time-bound discount offers.

- **Promo Code Validation:** System validates and applies promo codes during checkout.

Functional Requirements:

- **FR-24: Discount Campaigns**
  The system shall allow sellers to create time-bound discounts (e.g., 20% off) for specific products.

- **FR-25: Promo Code Validation**
  The system shall automatically validate promo codes at checkout and apply discounts if eligible.

4.11 Notifications & Alerts

Description & Priority:
Provides timely updates to both buyers and sellers to keep them informed about order statuses and other key events.

Stimulus/Response Sequences:

- **Order Notifications:** Alerts are sent via email/SMS when order status changes.

- **Seller Alerts:** Notifications for new orders and disputes are delivered via email and on-dashboard alerts.

Functional Requirements:

- **FR-26: Order Notifications**
  The system shall send email/SMS alerts to buyers for order status changes (e.g., "Shipped").

- **FR-27: Seller Alerts**
  The system shall notify sellers of new orders and disputes via email and dashboard alerts.

4.12 Admin Panel

Description & Priority:
Provides administrative control over critical operations such as seller approvals and fraud monitoring.

Stimulus/Response Sequences:

- **Seller Approval:** New seller registrations are reviewed and approved by an admin within a defined timeframe.

- **Fraud Monitoring:** Transactions above a certain threshold trigger manual review.

Functional Requirements:

- **FR-28: Seller Approval**
  The system shall require admin approval for new seller accounts within 24 hours of submission.

- **FR-29: Fraud Monitoring**
  The system shall flag transactions exceeding $1,000 for manual review by admins.

- **FR-30: Financial Reports**
  The system shall generate downloadable financial reports (weekly/monthly) for platform earnings and commissions.

5. Other Nonfunctional Requirements

This section details the performance, scalability, security, usability, and regulatory standards that ensure the system's robustness and quality.

5.1 Performance Requirements

- **NFR-01: User Authentication Speed**
  The system shall process user authentication within 2 seconds after submitting login credentials.

- **NFR-02: Search Performance**
  The system shall return product search results within 3 seconds after a user submits a query.

- **NFR-03: Checkout Performance**
  The system shall complete the checkout and payment process within 5 seconds after submission.

- **NFR-04: Concurrent User Handling**
  The system shall support at least 1,000 concurrent users without significant performance degradation.

- **NFR-05: Order Processing Speed**
  The system shall update order statuses (Pending, Shipped, Delivered) in real time and notify users within 2 seconds.

5.2 Scalability Requirements

- **NFR-06: User Load Capacity**
  The platform shall be able to support 10,000 active sellers and 100,000 concurrent buyers.

- **NFR-07: Modular Architecture**
  The system shall be designed in a way that allows new features to be added without impacting performance.

5.3 Security Requirements

- **NFR-08: User Data Encryption**
  All sensitive user data (passwords, payment details) shall be encrypted using AES-256.

- **NFR-09: Secure Transactions**
  All payment transactions shall be secured using TLS 1.2 or higher to prevent data breaches.

- **NFR-10: Automatic Logout**
  Users shall be automatically logged out after 30 minutes of inactivity for security purposes.

5.4 Availability & Reliability Requirements

- **NFR-11: System Uptime**
  The platform shall maintain an uptime of at least 99%, except during scheduled maintenance.

- **NFR-12: Server Failover**
  Failover mechanisms shall be implemented to recover from server failures within 10 seconds.

- **NFR-13: Data Backup & Recovery**
  The system shall perform daily backups, and data recovery shall be possible within 1 hour of data loss.

5.5 Usability Requirements

- **NFR-14: User-Friendly Checkout**
  A new user shall be able to register, search for a product, and place an order within 3 minutes.

- **NFR-15: Cross-Platform Compatibility**
  The system shall be responsive and fully functional on mobile, tablet, and desktop devices.

5.6 Maintainability & Extensibility

- **NFR-16: Code Modularity**
  The system shall be developed using a modular architecture to allow easy future enhancements.

- **NFR-17: Bug Fix Deployment**
  The system shall deploy bug fixes within 48 hours of issue identification.

5.7 Regulatory & Compliance Requirements

- **NFR-18: Payment Security Standards**
  The platform shall adhere to PCI DSS (Payment Card Industry Data Security Standard) for financial transactions.

- **NFR-19: Consumer Protection Laws**
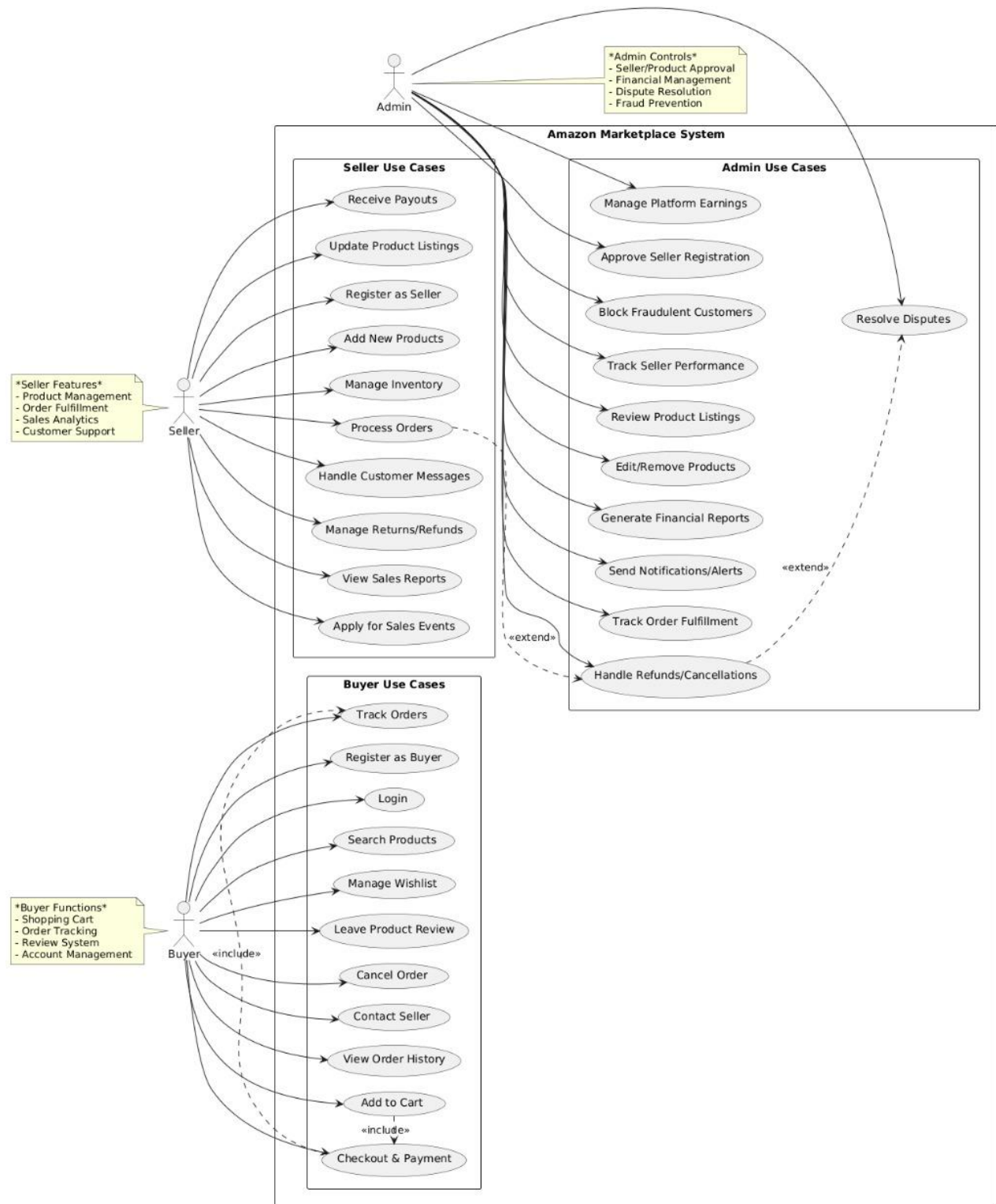 The system shall ensure that return policies comply with local consumer protection laws.

5.8 External Integration Requirements

- **NFR-20: Payment Gateway Integration**
  The system shall integrate with third-party payment providers such as Stripe, PayPal, and local banks.

- **NFR-21: Tax Compliance**
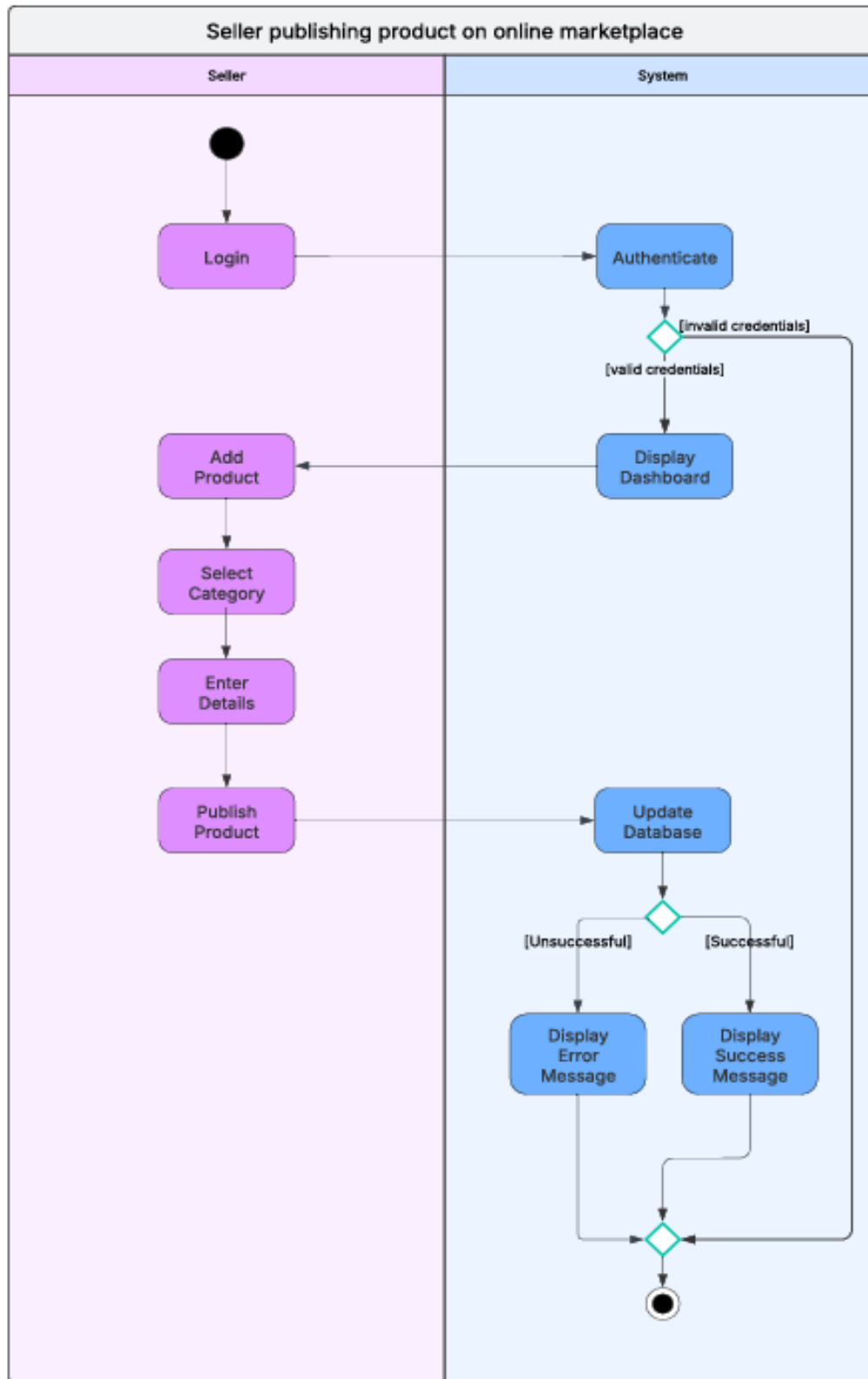 The system shall correctly calculate and apply regional tax regulations during checkout.
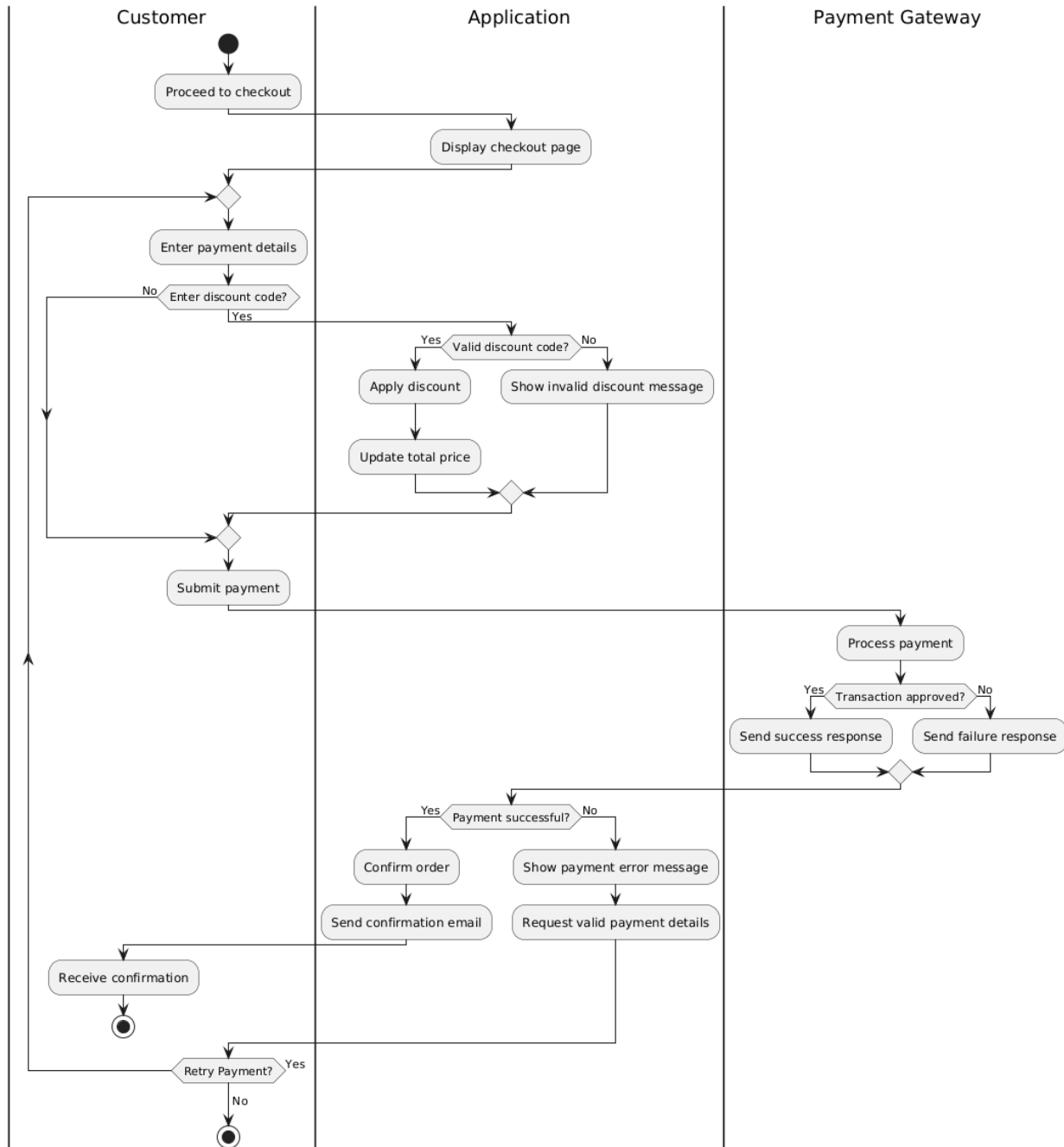
6. Diagrams

<Include visual representations that help convey the structure, behavior, and interactions within the software system.
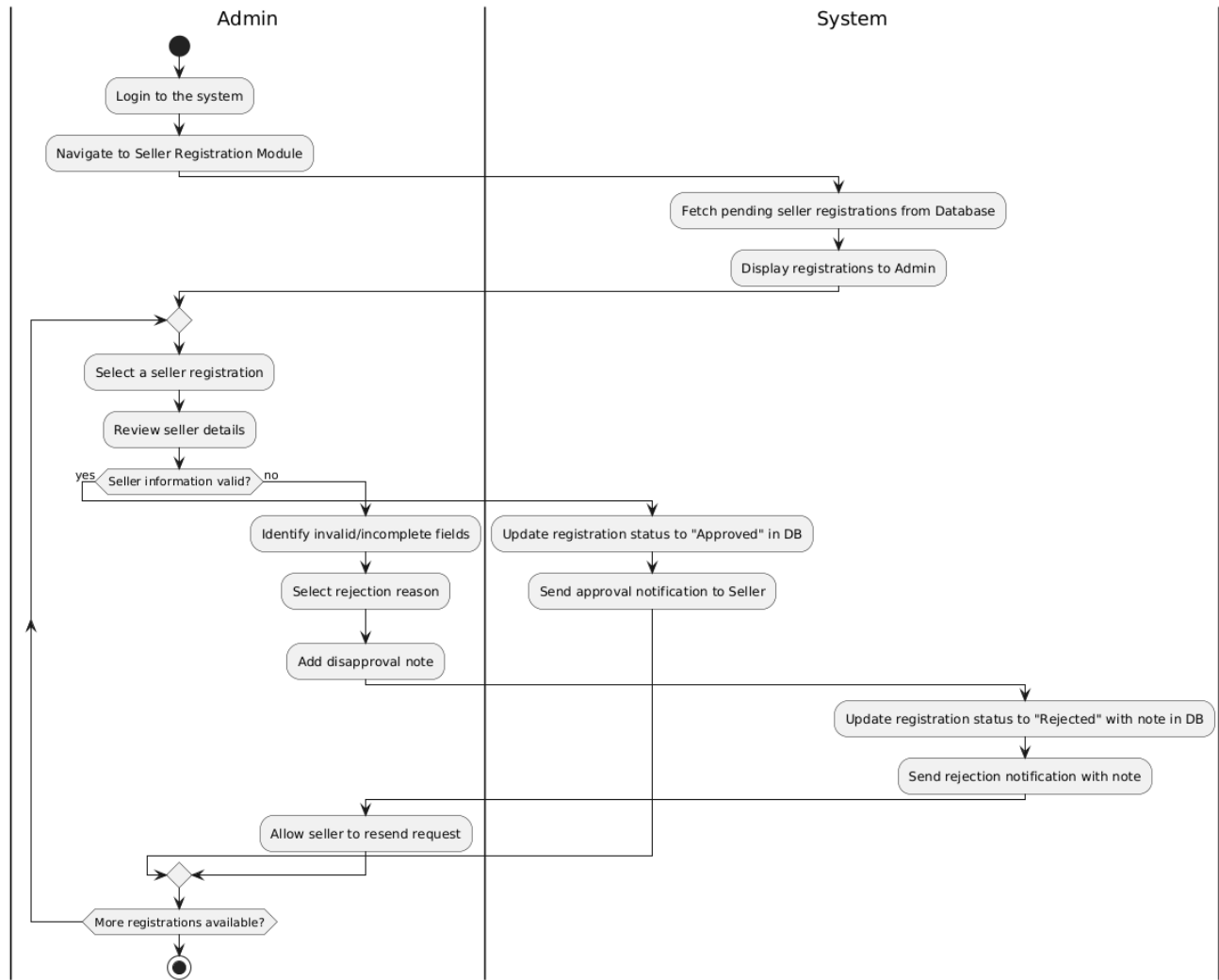
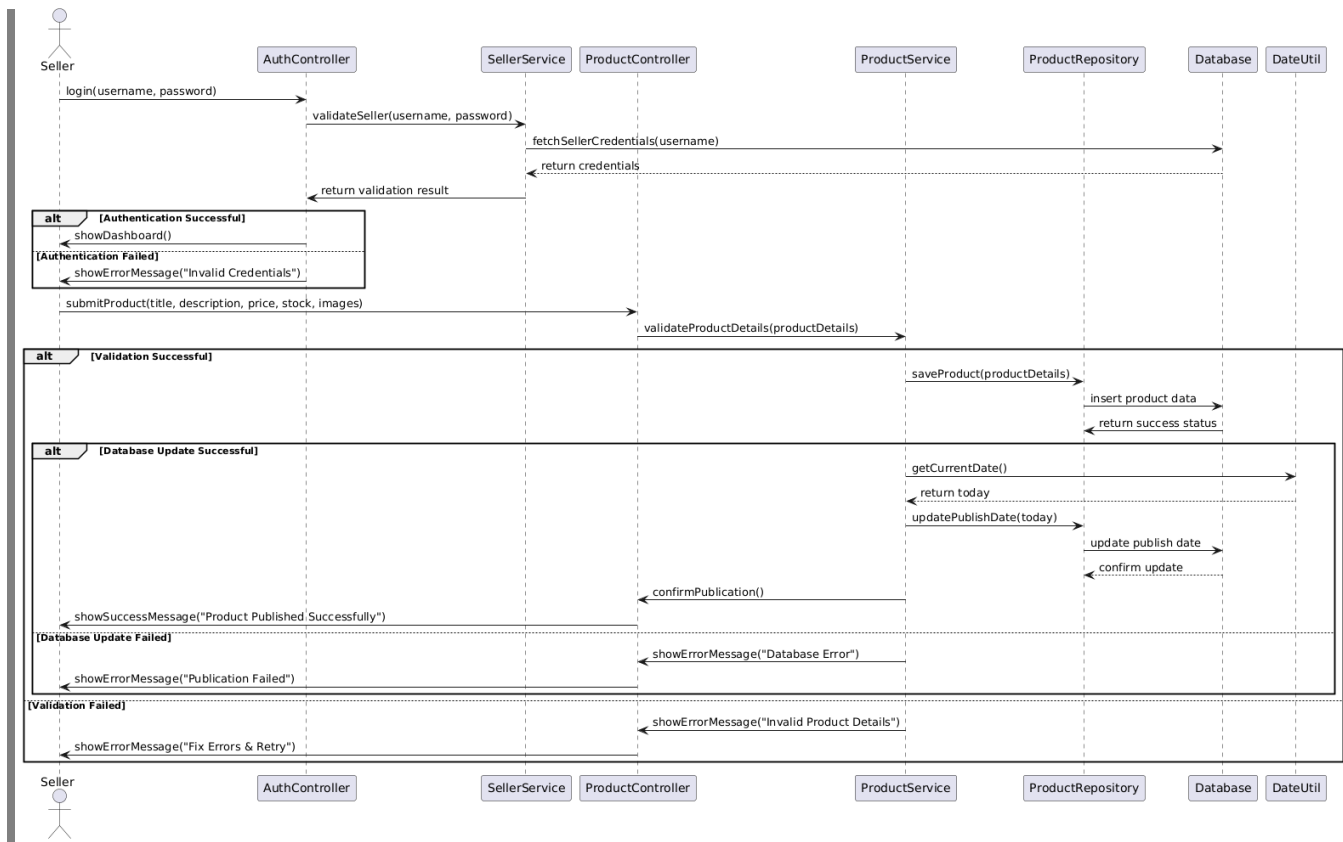## 6.1 Use Case Diagram

6.2 Activity Diagram

Customer	Application	Payment Gateway

Proceed to checkout

Display checkout page

Enter payment details

Enter discount code? — No / Yes

Valid discount code? — Yes / No

Apply discount

Show invalid discount message

Update total price

Submit payment

Process payment

Transaction approved? — Yes / No

Send success response

Send failure response

Payment successful? — Yes / No

Confirm order

Show payment error message

Send confirmation email

Request valid payment details

Receive confirmation

Retry Payment? — Yes / No

Admin	System

Login to the system

Navigate to Seller Registration Module

Fetch pending seller registrations from Database

Display registrations to Admin

Select a seller registration

Review seller details

Seller information valid?

yes   no

Identify invalid/incomplete fields

Update registration status to "Approved" in DB

Select rejection reason

Send approval notification to Seller

Add disapproval note

Update registration status to "Rejected" with note in DB

Send rejection notification with note

Allow seller to resend request
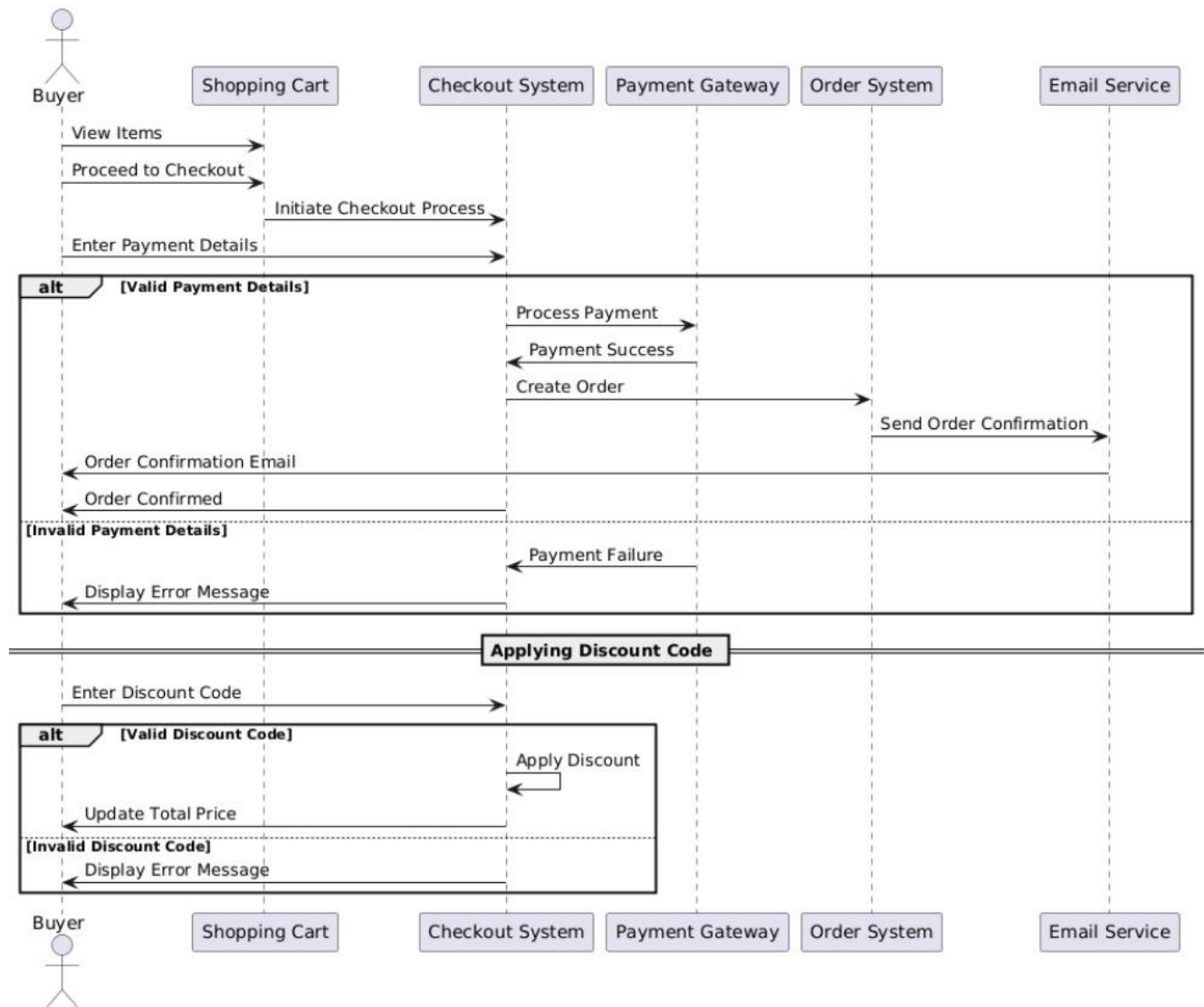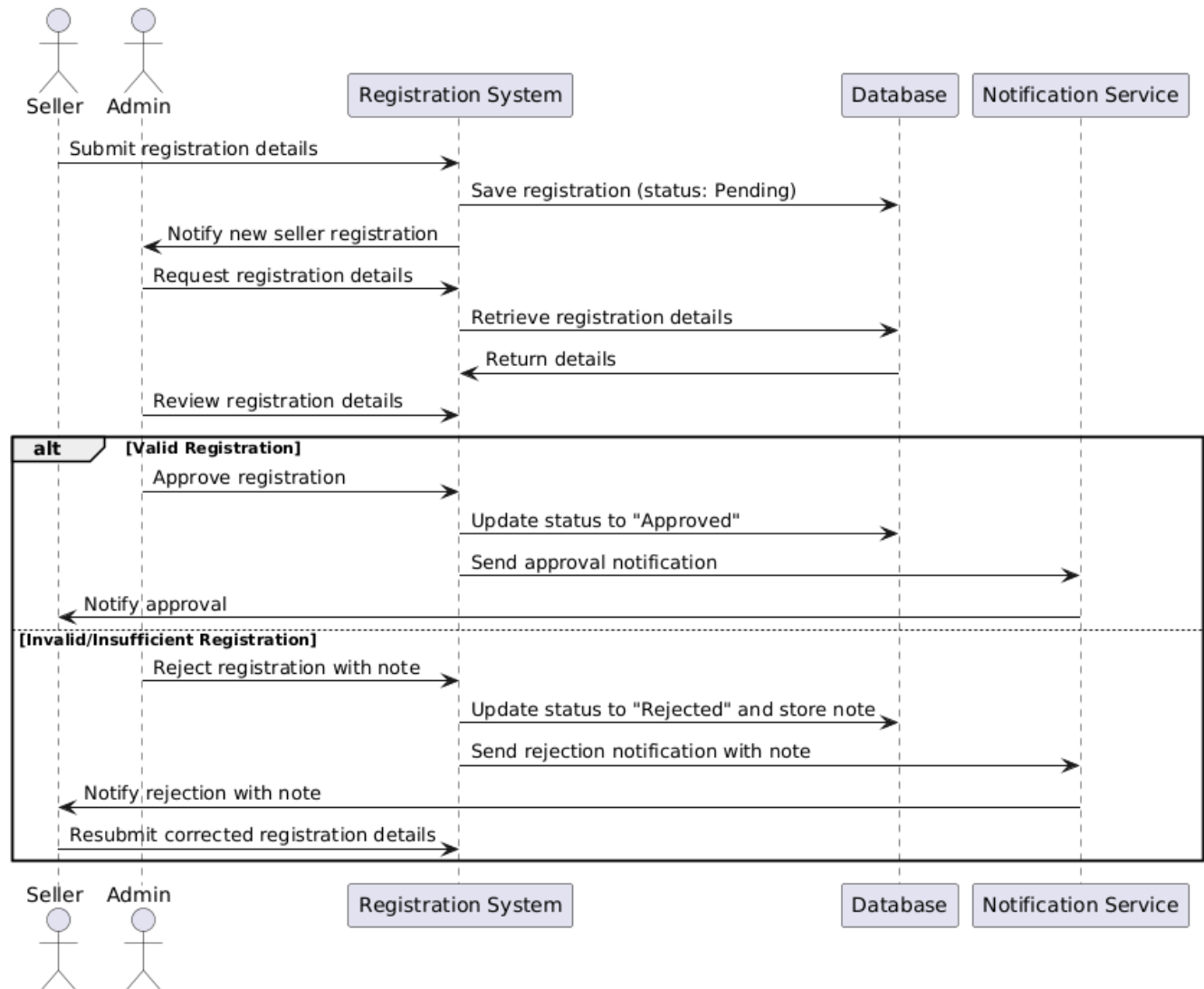
More registrations available?

6.3 Sequence Diagram

### Seller publishing product on online marketplace

Appendix A: Glossary

- **Marketplace**: An online platform for buying and selling products.

- **User**: Any person interacting with the system (buyer, seller, administrator).

- **Product Listing**: The information and media provided by a seller to describe a product.

- **Transaction**: The process of purchasing a product, including payment and order confirmation.

- **MFA (Multi-Factor Authentication)**: A security system that requires more than one method of authentication.

Appendix B: Analysis Models

Class Diagram:
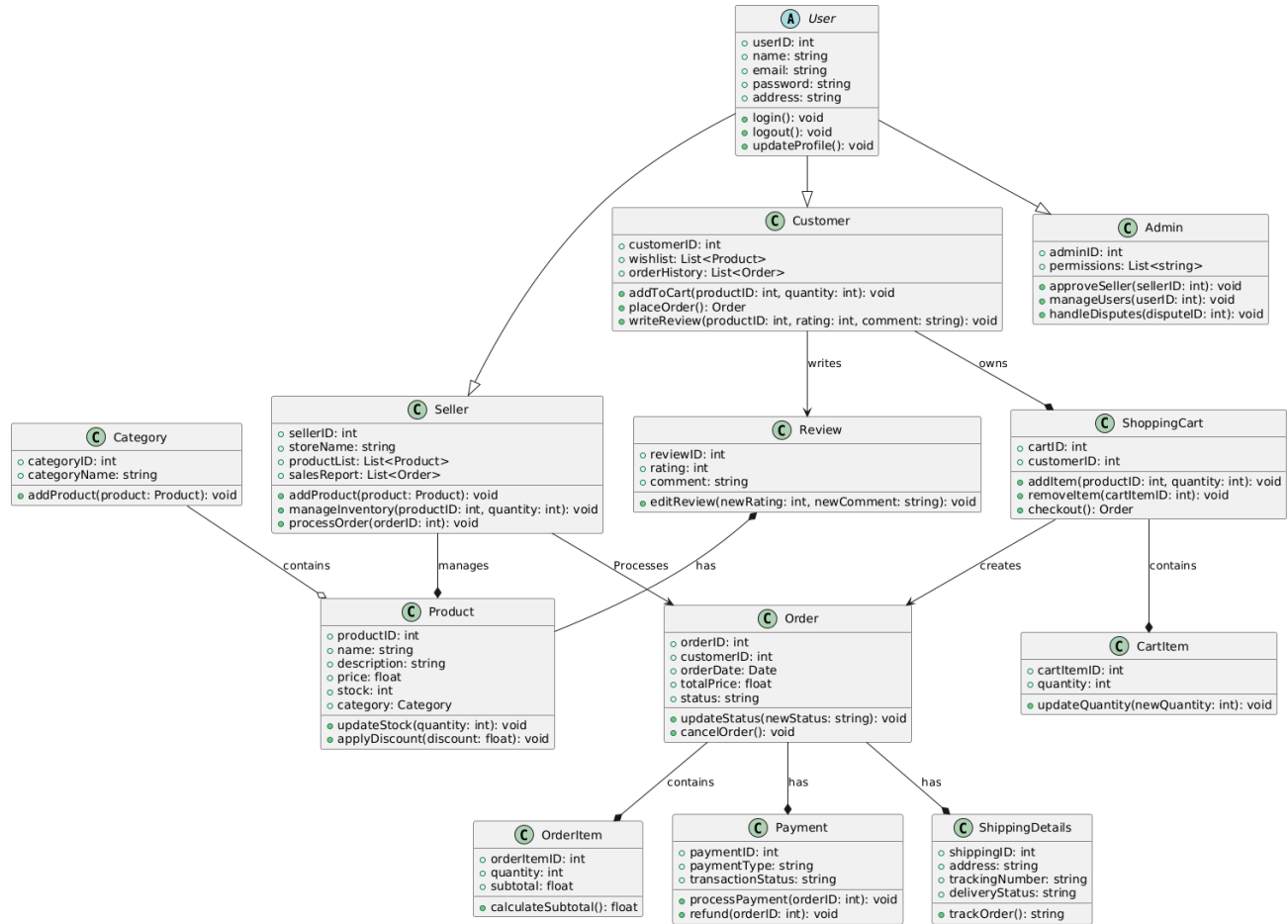
Appendix C: To Be Determined List

- Detailed API specifications for third-party integrations (payment, shipping, etc.) – **TBD**.

- Detailed wireframes for the user interface – **TBD**.

- Extended security protocols and audit schedule – **TBD**.

- Additional performance benchmarks and load testing scenarios – **TBD**.