

E-Commerce Part I

Project Scope

1. System Requirements and User Roles

Key Users and Their Interactions:

User Type	Main Interactions
Vendor	Register/login, create/manage stores, add/edit/remove products, view orders
Buyer	Register/login, browse/search products, add to cart, checkout, leave reviews
Admin	(Optional) Oversee users, products, orders, and system health

Core Functional Requirements:

- User registration and authentication (vendor/buyer)
- Store and product management (vendor)
- Product browsing, cart, and checkout (buyer)
- Order management and history
- Product reviews (verified/unverified)
- Password recovery via email
- Session-based cart management
- Secure payment and order confirmation
- Data validation and error handling.

2. User Interface (UI) Layout Planning:

Navigation Structure:

- **Top Navbar:** Home, All Products, Cart, Orders, Login/Register (or Logout), Vendor/Store options (if applicable)
- **Homepage:** Featured products, categories, search bar
- **Product Listing:** Grid of products, filter/sort options
- **Product Detail:** Product info, images, add to cart, reviews
- **Cart:** List of selected products, quantity update, remove, checkout
- **Vendor Dashboard:** Manage stores, manage products, view orders
- **Order History:** List of past orders, order details
- **Admin Panel:** (If implemented) User/product/order management

UX Principles

- Simple, consistent navigation
- Responsive design (usable on desktop/mobile)
- Clear feedback on actions (e.g., item added to cart, order confirmation)
- Accessible forms with validation and error messages.

3. Access Control and Data Security

Access Control

- **Authentication:** Only registered users can access buyer/vendor features
- **Authorization:** Vendors can only manage their own stores/products; buyers cannot access vendor/admin features
- **Admin Controls:** Only admins can access sensitive user/product/order management

Data Security Measures

- Password hashing and secure authentication
- CSRF protection on forms
- Input validation and sanitization
- HTTPS for data transmission (enforce SSL in production)
- Restrict access to sensitive data (e.g., user info, payment details)
- Compliance with privacy and payment standards (PCI-DSS for payments)
- Regular security updates and monitoring.

4. Failure and Recovery Planning

- **Form Validation Errors:** Display user-friendly error messages, preserve user input
- **Authentication Failures:** Inform users of incorrect credentials, lock accounts after repeated failures
- **Database/Server Errors:** Show generic error pages, log errors for admin review
- **Payment Failures:** Clearly inform users, allow retry, do not process order until payment confirmed
- **Session Expiry:** Prompt user to log in again, preserve cart if possible
- **Email Delivery Issues:** Retry sending, notify user if critical (e.g., password reset)
- **Unexpected Exceptions:** Log all exceptions, alert admin, ensure system stability.

5. Example Diagrams

5.1 Use Case Diagram

- **Actors:** Vendor, Buyer, Admin (optional)
- **Use Cases:** Register/Login, Manage Store, Manage Products, Browse Products, Add to Cart, Checkout, Leave Review, View Orders, Admin Management.

5.2 Activity Diagram (Flow)

- **Buyer Flow:** Login → Browse Products → View Product → Add to Cart → Checkout → Payment → Order Confirmation
- **Vendor Flow:** Login → Manage Store → Add/Edit Products → View Orders
- **Error Flows:** Login failure, payment failure, form validation errors.

5.3 Class Diagram (Data Model)

- **Entities:** User, Store, Product, Order, OrderItem, Review, Cart
- **Relationships:**
 - User (Vendor) 1..* Store
 - Store 1..* Product
 - User (Buyer) 1..* Order
 - Order 1..* OrderItem
 - Product 1..* Review.

5.4 ER Diagram (Database)

- **Entities:** Customer, Product, Order, OrderItem, Payment, Store, Review
- **Relationships:** Customer places Order, Order contains OrderItems, OrderItem references Product, Payment linked to Order, Review linked to Product and Customer.

5.5 Sequence Diagram

- **Example:** Customer → Search Product → View Product → Add to Cart → Checkout → Payment → Order Confirmation.

5.6 Data Flow Diagram

- **Level 0:** User interacts with system, system interacts with database
- **Level 1:** Show flows for registration, product browsing, cart management, order processing, review submission.

6. Security and Access Control Plan

- Enforce strong password policies for users
- Limit access to admin/vendor features based on user roles
- Use secure session management and token-based authentication for sensitive operations
- Regularly audit and update dependencies and server software
- Backup data and have a disaster recovery plan
- Monitor logs for suspicious activity and set up alerts.

7. Planning Folder Structure

Planning/

- |—— requirements.md
- |—— ui-layout.md
- |—— access-and-security.md
- |—— failure-recovery.md
- |—— use-case-diagram.png
- |—— activity-diagram.png
- |—— class-diagram.png
- |—— er-diagram.png
- |—— sequence-diagram.png
- |—— data-flow-diagram.png
- |—— notes.txt

