# Functional Requirement

### 1.1 Customer Registration Function  
\*\*Function ID:\*\* FR-01   
\*\*Description:\*\* Allows new customers to create accounts by providing personal information. Validates input data and sends confirmation messages.   
\*\*Input:\*\* Customer name, email, password, address (registration form fields).   
\*\*Output:\*\* New customer record stored in the Customer entity (CustomerID, Name, Email, Password, RegistrationDate).  
  
### 1.2 Customer Login Function  
\*\*Function ID:\*\* FR-02   
\*\*Description:\*\* Authenticates registered customers using credentials to grant system access.   
\*\*Input:\*\* Registered email and password.   
\*\*Output:\*\* Authentication status (success/failure), and upon success, active user session with dashboard redirect.  
  
### 1.3 Customer Logout Function  
\*\*Function ID:\*\* FR-03   
\*\*Description:\*\* Terminates active customer sessions securely.   
\*\*Input:\*\* Active session token.   
\*\*Output:\*\* Session termination and redirection to login/homepage.  
  
### 1.4 Administrator Login Function  
\*\*Function ID:\*\* FR-04   
\*\*Description:\*\* Authenticates administrators using credentials to grant access to admin controls.   
\*\*Input:\*\* Administrator username and password.   
\*\*Output:\*\* Authentication status (success/failure), and upon success, active admin session with dashboard redirect.  
  
### 1.5 Administrator Logout Function  
\*\*Function ID:\*\* FR-05   
\*\*Description:\*\* Terminates active administrator sessions securely.   
\*\*Input:\*\* Active admin session token.   
\*\*Output:\*\* Session termination and redirection to login/homepage.  
  
### 1.6 Customer Profile Management Function  
\*\*Function ID:\*\* FR-06   
\*\*Description:\*\* Enables customers to view or update personal details (e.g., name, address).   
\*\*Input:\*\* Modified customer attributes (e.g., updated name/address).   
\*\*Output:\*\* Updated Customer entity record in the database.  
  
### 1.7 Customer Account Deletion Function  
\*\*Function ID:\*\* FR-07   
\*\*Description:\*\* Permanently removes customer accounts and associated data (e.g., orders, payment methods).   
\*\*Input:\*\* Account deletion confirmation.   
\*\*Output:\*\* Removal of Customer record and cascaded deletion of dependent entities (ShoppingCart, PaymentMethod, Order).  
  
### 1.8 Product Creation Function  
\*\*Function ID:\*\* FR-08   
\*\*Description:\*\* Allows administrators to add new products with details (name, price, description).   
\*\*Input:\*\* Product name, description, price, stock, image URL.   
\*\*Output:\*\* New Product record stored in the database.  
  
### 1.9 Product Update Function  
\*\*Function ID:\*\* FR-09   
\*\*Description:\*\* Enables administrators to modify existing product attributes.   
\*\*Input:\*\* Modified product fields (e.g., price, stock).   
\*\*Output:\*\* Updated Product record in the database.  
  
### 1.10 Product Deletion Function  
\*\*Function ID:\*\* FR-10   
\*\*Description:\*\* Removes products from the system if not associated with active orders.   
\*\*Input:\*\* Product deletion confirmation.   
\*\*Output:\*\* Removal of Product record from the database.  
  
### 1.11 Category Creation Function  
\*\*Function ID:\*\* FR-11   
\*\*Description:\*\* Allows administrators to define new product categories.   
\*\*Input:\*\* Category name and description.   
\*\*Output:\*\* New Category record stored in the database.  
  
### 1.12 Category Update Function  
\*\*Function ID:\*\* FR-12   
\*\*Description:\*\* Enables administrators to modify category details.   
\*\*Input:\*\* Modified category fields (e.g., name, description).   
\*\*Output:\*\* Updated Category record in the database.  
  
### 1.13 Category Deletion Function  
\*\*Function ID:\*\* FR-13   
\*\*Description:\*\* Removes unused categories not linked to products.   
\*\*Input:\*\* Category deletion confirmation.   
\*\*Output:\*\* Removal of Category record from the database.  
  
### 1.14 Product-Category Assignment Function  
\*\*Function ID:\*\* FR-14   
\*\*Description:\*\* Associates products with categories via the ProductCategory mapping entity.   
\*\*Input:\*\* ProductID and CategoryID.   
\*\*Output:\*\* New ProductCategory relationship record in the database.  
  
### 1.15 Cart Item Addition Function  
\*\*Function ID:\*\* FR-15   
\*\*Description:\*\* Adds products to a customer’s shopping cart with specified quantities.   
\*\*Input:\*\* ProductID and quantity.   
\*\*Output:\*\* New CartItem record linked to ShoppingCart in the database.  
  
### 1.16 Cart Item Modification Function  
\*\*Function ID:\*\* FR-16   
\*\*Description:\*\* Updates quantities or removes items from a shopping cart.   
\*\*Input:\*\* CartItemID and new quantity (or removal flag).   
\*\*Output:\*\* Updated CartItem record or removal from the database.  
  
### 1.17 Order Placement Function  
\*\*Function ID:\*\* FR-17   
\*\*Description:\*\* Converts shopping cart items into a confirmed order, deducts inventory, and clears cart.   
\*\*Input:\*\* Shipping address, selected PaymentMethodID, cart contents.   
\*\*Output:\*\* New Order and OrderItem records; updated Product stock; cleared ShoppingCart.  
  
### 1.18 Order Retrieval Function  
\*\*Function ID:\*\* FR-18   
\*\*Description:\*\* Returns order lists filtered by user role (customer sees own orders; admin sees all).   
\*\*Input:\*\* User role (customer/admin) and optional filters (status/date).   
\*\*Output:\*\* List of Order records with summaries (OrderID, date, total, status).  
  
### 1.19 Order Detail View Function  
\*\*Function ID:\*\* FR-19   
\*\*Description:\*\* Fetches detailed information for a specific order.   
\*\*Input:\*\* Valid OrderID.   
\*\*Output:\*\* Complete Order entity data with linked OrderItems, shipping, and payment details.  
  
### 1.20 Order Cancellation Function  
\*\*Function ID:\*\* FR-20   
\*\*Description:\*\* Marks cancellable orders as "Cancelled" and restocks inventory.   
\*\*Input:\*\* OrderID and cancellation confirmation.   
\*\*Output:\*\* Updated Order status ("Cancelled"); restored Product stock quantities.  
  
### 1.21 Order Status Update Function  
\*\*Function ID:\*\* FR-21   
\*\*Description:\*\* Allows administrators to modify order statuses (e.g., "Shipped" to "Delivered").   
\*\*Input:\*\* OrderID and new status.   
\*\*Output:\*\* Updated Order status in the database; optional customer notifications.  
  
### 1.22 Payment Method Addition Function  
\*\*Function ID:\*\* FR-22   
\*\*Description:\*\* Securely stores new payment credentials for a customer.   
\*\*Input:\*\* Payment details (card number, expiry, CVV, type).   
\*\*Output:\*\* New PaymentMethod record linked to Customer.  
  
### 1.23 Payment Method Update Function  
\*\*Function ID:\*\* FR-23   
\*\*Description:\*\* Modifies existing payment credentials (e.g., expiration date).   
\*\*Input:\*\* PaymentMethodID and updated fields.   
\*\*Output:\*\* Updated PaymentMethod record in the database.  
  
### 1.24 Payment Method Removal Function  
\*\*Function ID:\*\* FR-24   
\*\*Description:\*\* Deletes stored payment methods not tied to active orders.   
\*\*Input:\*\* PaymentMethodID and deletion confirmation.   
\*\*Output:\*\* Removal of PaymentMethod record from the database.  
  
### 1.25 Product Browsing Function  
\*\*Function ID:\*\* FR-25   
\*\*Description:\*\* Returns products filtered by categories or keywords.   
\*\*Input:\*\* CategoryID or search keyword (optional).   
\*\*Output:\*\* List of Product records with details (name, price, description, stock).  
  
### 1.26 Cart View Function  
\*\*Function ID:\*\* FR-26   
\*\*Description:\*\* Displays current shopping cart contents with item quantities and prices.   
\*\*Input:\*\* Active ShoppingCartID.   
\*\*Output:\*\* List of CartItem records with linked Product data and total cost.

# External Description

### Chapter 2: External Interfaces   
Based on functional requirements analysis, the system interacts with the following external interfaces:   
  
#### 2.1 User Interfaces   
- \*\*Web Application Interface\*\*   
 - \*Description\*: Browser-based UI for user interactions.   
 - \*Roles\*:   
 - \*Customer Portal\*: Handles registration/login (FR-01, FR-02), profile management (FR-06), product browsing (FR-25), cart operations (FR-15, FR-16, FR-26), order placement/viewing (FR-17, FR-18, FR-19), and payment method management (FR-22, FR-23, FR-24).   
 - \*Admin Portal\*: Manages product/category CRUD (FR-08–FR-13), order status updates (FR-21), and administrator login/logout (FR-04, FR-05).   
 - \*Interactions\*: HTML/CSS/JavaScript frontend. Inputs mirror functional requirements (e.g., registration forms, cart modification inputs). Outputs include dashboards, confirmation prompts, and data display.   
  
#### 2.2 Hardware Interfaces   
\*Not applicable.\*   
- No hardware-specific interactions identified in functional requirements.   
  
#### 2.3 Software Interfaces   
- \*\*Relational Database System\*\*   
 - \*Description\*: Central datastore for all entities (Customer, Product, Category, Order, etc.).   
 - \*Roles\*:   
 - \*Data Persistence\*: Stores/retrieves records for all CRUD operations (e.g., FR-01 output to `Customer` entity; FR-17 updates `Order`, `OrderItem`, and `Product` tables).   
 - \*Constraints Enforcement\*: Cascades deletions (FR-07, FR-10, FR-13) and validates relationships (e.g., FR-14’s `ProductCategory` mapping).   
 - \*Interactions\*: SQL queries via ORM/DAO layer. Inputs: Structured data per FR specifications. Outputs: Stored records or transaction status.   
  
- \*\*Third-Party Payment Gateway API\*\*   
 - \*Description\*: External service for payment processing (implied by FR-17, FR-22–FR-24).   
 - \*Roles\*: Securely processes payments during order placement (FR-17) and validates payment credentials (FR-22, FR-23).   
 - \*Interactions\*: REST API calls. Inputs: Encrypted payment details. Outputs: Authorization status (success/failure).   
  
#### 2.4 Communication Interfaces   
- \*\*Email/SMS Notification Service\*\*   
 - \*Description\*: External messaging platform for user notifications.   
 - \*Roles\*:   
 - Sends registration confirmations (FR-01 output).   
 - Delivers order status updates (FR-21 output).   
 - \*Interactions\*: API integration (e.g., SMTP/Twilio). Inputs: User contact info, message templates. Outputs: Delivery receipts.   
  
- \*\*Session Management Protocol\*\*   
 - \*Description\*: HTTP-based session handling via tokens.   
 - \*Roles\*: Manages user authentication states (FR-02/FR-04 login outputs; FR-03/FR-05 logout inputs).   
 - \*Interactions\*: Cookie/token exchanges. Inputs: Credentials; Outputs: Session IDs with redirects.   
  
---  
  
### Cross-Check Validation   
- \*\*Database References\*\*: All FR outputs (e.g., `Customer`, `Product`, `Order` entities) map to §2.3’s database interface.   
- \*\*External Services\*\*:   
 - Payment processing (FR-17/FR-22) → §2.3 Payment Gateway API.   
 - Notifications (FR-01/FR-21) → §2.4 Email/SMS Service.   
- \*\*UI Consistency\*\*: All input forms and output displays align with §2.1’s Web Application Interface.   
  
\*Terminology note\*: Entity names (e.g., `ShoppingCart`, `PaymentMethod`) and IDs (e.g., `OrderID`) maintain consistency with functional requirements.