# Functional Requirement

### Chapter 1: Functional Requirements  
  
\*\*1.1 Customer Registration Function\*\*   
Function ID: FR-01   
Description: Creates new customer accounts with secure credential storage and auto-generated shopping carts.   
Input: Registration form data (Username, Password, Email, PhoneNumber, FirstName, LastName, Address, City, State, Country, PostalCode)   
Output: New Customer entity, linked Personal Information entity, and Shopping Cart entity   
  
\*\*1.2 Customer Login Function\*\*   
Function ID: FR-02   
Description: Authenticates customers and initiates secure sessions using stored credentials.   
Input: Login credentials (Email, Password)   
Output: Active session token and Shopping Cart linkage   
  
\*\*1.3 Customer Logout Function\*\*   
Function ID: FR-03   
Description: Terminates authenticated sessions while preserving cart contents.   
Input: Active session token   
Output: Session termination confirmation and cart state preservation   
  
\*\*1.4 Personal Information View Function\*\*   
Function ID: FR-04   
Description: Retrieves and displays stored personal details in read-only format.   
Input: CustomerID   
Output: Formatted Personal Information entity data   
  
\*\*1.5 Personal Information Update Function\*\*   
Function ID: FR-05   
Description: Modifies stored personal details with real-time validation.   
Input: Updated Personal Information fields (Email, Address, etc.)   
Output: Updated Personal Information entity   
  
\*\*1.6 Purchase History View Function\*\*   
Function ID: FR-06   
Description: Compiles and displays chronological order records.   
Input: CustomerID   
Output: List of Order entities with itemized details   
  
\*\*1.7 Payment Information View Function\*\*   
Function ID: FR-07   
Description: Retrieves and displays payment methods with sensitive data masking.   
Input: CustomerID   
Output: Masked Payment Information entities (e.g., ●●●●1234)   
  
\*\*1.8 Payment Information Update Function\*\*   
Function ID: FR-08   
Description: Modifies stored payment methods via gateway verification.   
Input: Updated Payment Information fields (CardNumber, ExpirationDate, CVV)   
Output: Verified and encrypted Payment Information entity   
  
\*\*1.9 Category Creation Function\*\*   
Function ID: FR-09   
Description: Adds new product categories with uniqueness validation.   
Input: CategoryName, CategoryDescription   
Output: New Category entity   
  
\*\*1.10 Category Modification Function\*\*   
Function ID: FR-10   
Description: Edits existing category attributes and propagates changes.   
Input: CategoryID, Updated fields (CategoryName/Description)   
Output: Updated Category entity   
  
\*\*1.11 Category Deletion Function\*\*   
Function ID: FR-11   
Description: Removes unused categories after integrity verification.   
Input: CategoryID   
Output: Deletion confirmation and inventory relationship updates   
  
\*\*1.12 Product Creation Function\*\*   
Function ID: FR-12   
Description: Adds new products with linked inventory initialization.   
Input: ProductName, Description, Price, CategoryID, InitialStock   
Output: New Product entity and Inventory entity   
  
\*\*1.13 Product Modification Function\*\*   
Function ID: FR-13   
Description: Updates product details and synchronizes inventory data.   
Input: ProductID, Updated fields (Price/Description/Stock)   
Output: Updated Product and Inventory entities   
  
\*\*1.14 Product Deletion Function\*\*   
Function ID: FR-14   
Description: Removes products after verifying no active transactions.   
Input: ProductID   
Output: Deletion confirmation and inventory association removal   
  
\*\*1.15 Product Categorization Function\*\*   
Function ID: FR-15   
Description: Assigns products to active categories with concurrency checks.   
Input: ProductID, CategoryID   
Output: Updated Product-Category relationship   
  
\*\*1.16 Stock Update Function\*\*   
Function ID: FR-16   
Description: Modifies inventory quantities with cart reservation checks.   
Input: ProductID, NewStockQuantity   
Output: Updated Inventory entity and cart synchronization   
  
\*\*1.17 Inventory Restock Function\*\*   
Function ID: FR-17   
Description: Increases stock levels with safety buffer handling.   
Input: ProductID, RestockQuantity   
Output: Updated Inventory entity with new\_stock calculation   
  
\*\*1.18 Cart Addition Function\*\*   
Function ID: FR-18   
Description: Adds products to cart with real-time inventory validation.   
Input: ProductID, Quantity   
Output: New or updated Cart Item entity   
  
\*\*1.19 Cart View Function\*\*   
Function ID: FR-19   
Description: Displays cart contents with pricing and availability status.   
Input: CartID   
Output: Formatted Shopping Cart entity with linked Cart Items and Products   
  
\*\*1.20 Cart Item Update Function\*\*   
Function ID: FR-20   
Description: Modifies item quantities within inventory constraints.   
Input: CartItemID, NewQuantity   
Output: Updated Cart Item entity   
  
\*\*1.21 Cart Item Removal Function\*\*   
Function ID: FR-21   
Description: Deletes items from cart and releases inventory reservations.   
Input: CartItemID   
Output: Removal confirmation and stock release   
  
\*\*1.22 Cart Clearance Function\*\*   
Function ID: FR-22   
Description: Removes all cart items and resets totals.   
Input: CartID   
Output: Empty Shopping Cart entity and inventory release   
  
\*\*1.23 Checkout Initiation Function\*\*   
Function ID: FR-23   
Description: Validates cart items and prepares payment processing.   
Input: CartID, PaymentMethod   
Output: Checkout entity with transaction summary   
  
\*\*1.24 Checkout Cancellation Function\*\*   
Function ID: FR-24   
Description: Terminates checkout while preserving cart state.   
Input: CheckoutID   
Output: Cancellation confirmation and cart preservation   
  
\*\*1.25 Order Finalization Function\*\*   
Function ID: FR-25   
Description: Creates confirmed orders after payment verification.   
Input: CheckoutID   
Output: Order entity, Order Confirmation entity, inventory deduction   
  
\*\*1.26 Order View Function\*\*   
Function ID: FR-26   
Description: Retrieves and displays order details with linked entities.   
Input: OrderID   
Output: Formatted Order Confirmation data with itemized products   
  
\*\*1.27 Order Cancellation Function\*\*   
Function ID: FR-27   
Description: Cancels eligible orders and initiates refunds.   
Input: OrderID   
Output: "Canceled" Order status, inventory restoration, refund record   
  
\*\*1.28 Confirmation Email Function\*\*   
Function ID: FR-28   
Description: Generates and dispatches order confirmation emails.   
Input: OrderID   
Output: Email dispatch record in Order Confirmation entity   
  
\*\*1.29 Plugin Installation Function\*\*   
Function ID: FR-29   
Description: Integrates new plugins with compatibility validation.   
Input: PluginFile   
Output: Activated Plugin entity and API Specifications linkage   
  
\*\*1.30 Plugin Removal Function\*\*   
Function ID: FR-30   
Description: Uninstalls plugins with dependency checks.   
Input: PluginID   
Output: Removal confirmation and configuration rollback   
  
\*\*1.31 API Specification View Function\*\*   
Function ID: FR-31   
Description: Retrieves and displays documented plugin interfaces.   
Input: PluginID   
Output: Structured API Specifications data   
  
\*\*1.32 Customer Management Function\*\*   
Function ID: FR-32   
Description: Creates/updates/deactivates customer accounts by administrators.   
Input: Customer data fields, Action type (Add/Edit/Deactivate)   
Output: Modified Customer entity and linked resource updates   
  
\*\*1.33 Administrator Management Function\*\*   
Function ID: FR-33   
Description: Manages admin accounts with privilege controls.   
Input: Administrator data fields, Action type (Add/Edit/Deactivate)   
Output: Modified Administrator entity and session synchronization

# External Description

### Chapter 2: External Interfaces  
  
This chapter describes the external interfaces that the system interacts with, categorized into user interfaces, hardware interfaces, software interfaces, and communication interfaces.  
  
#### 2.1 User Interfaces  
  
The system provides several user interfaces to facilitate interaction with customers and administrators.  
  
1. \*\*Customer Registration Interface\*\*  
 - \*\*Description\*\*: A web-based interface where customers can input their personal details, including username, password, email, phone number, and address.  
 - \*\*Interaction\*\*: The interface collects user input and validates it before storing the data in the system's database.  
  
2. \*\*Customer Login Interface\*\*  
 - \*\*Description\*\*: A web-based interface where customers can enter their email and password to access their account.  
 - \*\*Interaction\*\*: The interface authenticates the user and initiates a secure session upon successful login.  
  
3. \*\*Personal Information Management Interface\*\*  
 - \*\*Description\*\*: A web-based interface where customers can view and update their personal information, such as email and address.  
 - \*\*Interaction\*\*: The interface allows customers to input updated information, which is validated and stored in the database.  
  
4. \*\*Product Management Interface\*\*  
 - \*\*Description\*\*: A web-based interface used by administrators to add, modify, or delete products, including product name, description, price, and category.  
 - \*\*Interaction\*\*: The interface collects product details and updates the database, ensuring inventory data is synchronized.  
  
5. \*\*Order Management Interface\*\*  
 - \*\*Description\*\*: A web-based interface where customers can view their order history and details, including order status and itemized products.  
 - \*\*Interaction\*\*: The interface retrieves order data from the database and displays it in a formatted manner.  
  
6. \*\*Plugin Management Interface\*\*  
 - \*\*Description\*\*: A web-based interface used by administrators to install, configure, and remove plugins, including compatibility validation.  
 - \*\*Interaction\*\*: The interface handles plugin file uploads, validates compatibility, and updates plugin configurations.  
  
7. \*\*Administrator Management Interface\*\*  
 - \*\*Description\*\*: A web-based interface for managing administrator accounts, including adding, editing, and deactivating accounts.  
 - \*\*Interaction\*\*: The interface collects administrator data, validates it, and updates the database, ensuring session synchronization.  
  
#### 2.2 Hardware Interfaces  
  
The system interacts with the following hardware interfaces:  
  
1. \*\*Payment Terminal Interface\*\*  
 - \*\*Description\*\*: An interface that connects the system with payment terminals for processing payment transactions.  
 - \*\*Interaction\*\*: The interface communicates with payment terminals to receive payment information and send transaction confirmations.  
  
2. \*\*Inventory Management Interface\*\*  
 - \*\*Description\*\*: An interface that connects the system with inventory management hardware, such as barcode scanners.  
 - \*\*Interaction\*\*: The interface collects inventory data from hardware devices and updates the inventory database.  
  
#### 2.3 Software Interfaces  
  
The system interfaces with several software components and external systems:  
  
1. \*\*Payment Gateway API\*\*  
 - \*\*Description\*\*: An API that enables secure payment processing, including credit card transactions and payment verification.  
 - \*\*Interaction\*\*: The system sends payment details to the API, which processes the payment and returns a confirmation or error message.  
  
2. \*\*Email Service API\*\*  
 - \*\*Description\*\*: An API used to send confirmation emails, such as order confirmations and password reset emails.  
 - \*\*Interaction\*\*: The system sends email content and recipient details to the API, which handles the delivery of emails.  
  
3. \*\*Plugin API\*\*  
 - \*\*Description\*\*: An API that allows third-party plugins to integrate with the system, providing additional functionalities.  
 - \*\*Interaction\*\*: The system communicates with the plugin API to install, configure, and execute plugin functionalities.  
  
4. \*\*Inventory Management System\*\*  
 - \*\*Description\*\*: A software system that tracks and manages product inventory levels.  
 - \*\*Interaction\*\*: The system sends inventory updates and retrieves inventory data from the inventory management system.  
  
#### 2.4 Communication Interfaces  
  
The system uses the following communication interfaces to interact with external systems and users:  
  
1. \*\*Email Communication\*\*  
 - \*\*Description\*\*: The system sends confirmation emails to customers, such as order confirmations and password reset instructions.  
 - \*\*Interaction\*\*: The system uses an email service API to send emails, ensuring timely delivery to the recipient.  
  
2. \*\*Push Notifications\*\*  
 - \*\*Description\*\*: The system sends push notifications to users for order updates, payment confirmations, and other important alerts.  
 - \*\*Interaction\*\*: The system uses a push notification service to send real-time notifications to users' devices.  
  
3. \*\*API Communication\*\*  
 - \*\*Description\*\*: The system communicates with external APIs, such as payment gateways and email services, to perform specific tasks.  
 - \*\*Interaction\*\*: The system sends HTTP requests to the APIs, receives responses, and processes the data accordingly.  
  
### Summary  
  
This chapter has outlined the external interfaces that the system interacts with, ensuring that all external data sources mentioned in the functional requirements are clearly defined. The interfaces are categorized into user interfaces, hardware interfaces, software interfaces, and communication interfaces, each with a clear description of their role and interaction method. This provides a comprehensive understanding of how the system interfaces with external entities, facilitating accurate implementation and integration.