# Functional Requirement

### Chapter 1: Functional Requirements   
  
\*\*1.1 Customer Registration Function\*\*   
Function ID: FR-01   
Description: Enables unregistered users to create new accounts with mandatory personal information and email verification.   
Input: Customer details (Name, Email, Password, PhoneNumber, Address).   
Output: New customer record stored in the database with unique CustomerID and encrypted credentials.   
  
\*\*1.2 Customer Authentication Function\*\*   
Function ID: FR-02   
Description: Validates registered customer credentials to grant system access.   
Input: Email and Password.   
Output: Authenticated session with permission tokens; login timestamp recorded in audit log.   
  
\*\*1.3 Customer Profile Management Function\*\*   
Function ID: FR-03   
Description: Allows authenticated customers to modify personal details (contact, address).   
Input: Updated customer attributes (PhoneNumber, Address).   
Output: Persisted database changes; audit log entry with modification timestamp.   
  
\*\*1.4 Admin Customer Management Function\*\*   
Function ID: FR-04   
Description: Enables administrators to create, update, or deactivate customer accounts.   
Input: Administrator actions (add/edit/deactivate), customer attributes.   
Output: Modified customer records; audit log with admin ID and action details.   
  
\*\*1.5 Product Catalog Management Function\*\*   
Function ID: FR-05   
Description: Allows administrators to add, edit, or delete products with category assignments.   
Input: Product attributes (Name, Description, Price, StockQuantity, CategoryID).   
Output: Updated product records; inventory synchronization; audit log entries.   
  
\*\*1.6 Inventory Adjustment Function\*\*   
Function ID: FR-06   
Description: Modifies stock quantities and triggers reorder alerts.   
Input: ProductID, new StockQuantity, adjustment reason.   
Output: Updated inventory data; low-stock notifications if applicable.   
  
\*\*1.7 Shopping Cart Modification Function\*\*   
Function ID: FR-07   
Description: Handles item additions, quantity updates, and removals in the cart.   
Input: ProductID, new Quantity (or removal flag).   
Output: Updated cart metadata (subtotal, item count); real-time inventory validation.   
  
\*\*1.8 Order Placement Function\*\*   
Function ID: FR-08   
Description: Converts cart contents into orders with payment processing.   
Input: Confirmed shipping address, payment method details.   
Output: New Order record; reduced inventory; order confirmation email; cleared cart.   
  
\*\*1.9 Order Tracking Function\*\*   
Function ID: FR-09   
Description: Retrieves real-time shipment status from carrier APIs.   
Input: OrderID.   
Output: Dynamic tracking data (carrier, location, estimated delivery); cached status timeline.   
  
\*\*1.10 Payment Processing Function\*\*   
Function ID: FR-10   
Description: Authorizes transactions and records payment details.   
Input: PaymentMethod (card details), Amount, OrderID.   
Output: Payment record (TransactionID, Status); order status synchronization.   
  
\*\*1.11 Category Hierarchy Management Function\*\*   
Function ID: FR-11   
Description: Manages product category creation, editing, and deletion.   
Input: Category attributes (Name, Description, ParentCategoryID).   
Output: Updated category tree; synchronized product-category associations.   
  
\*\*1.12 Admin Order Management Function\*\*   
Function ID: FR-12   
Description: Updates order statuses, processes cancellations/refunds.   
Input: OrderID, new OrderStatus, refund amounts.   
Output: Modified Order and Payment records; inventory restocks on cancellations.   
  
\*\*1.13 System Configuration Function\*\*   
Function ID: FR-13   
Description: Adjusts global settings (security, notifications, UI).   
Input: Configuration parameters (session timeout, email templates).   
Output: Persisted system-wide changes; audit log entries.   
  
\*\*1.14 Audit Logging Function\*\*   
Function ID: FR-14   
Description: Automatically records critical actions (logins, data modifications).   
Input: Actor type (Customer/Admin), action type, timestamp.   
Output: Immutable audit log entries stored in the database.   
  
\*\*1.15 Plugin API Integration Function\*\*   
Function ID: FR-15   
Description: Provides interfaces for third-party functionality extensions.   
Input: API requests compliant with documented specifications.   
Output: Executed plugin operations; system state modifications.   
  
\*\*1.16 Data Validation Function\*\*   
Function ID: FR-16   
Description: Enforces input constraints (email format, password strength).   
Input: User-provided data fields.   
Output: Validation errors or sanitized inputs for database operations.   
  
\*\*1.17 Email Notification Function\*\*   
Function ID: FR-17   
Description: Sends transactional emails (order confirmations, password resets).   
Input: Recipient email, template type, dynamic content.   
Output: Delivered emails; delivery status logs.   
  
\*\*1.18 Session Management Function\*\*   
Function ID: FR-18   
Description: Handles session creation/timeout for authenticated users.   
Input: Login credentials or session tokens.   
Output: Active session establishment/termination; timeout redirects.   
  
\*\*1.19 Dependency Validation Function\*\*   
Function ID: FR-19   
Description: Prevents operations violating data integrity (e.g., deleting products in active orders).   
Input: Entity ID (ProductID/CategoryID), action type.   
Output: Blocked action alert or dependency resolution prompts.   
  
\*\*1.20 Conflict Resolution Function\*\*   
Function ID: FR-20   
Description: Manages concurrent data editing conflicts.   
Input: Conflicting data versions from multiple users.   
Output: Merged valid changes; conflict notifications with latest data.   
  
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\*\*Compliance Verification\*\*   
- All inputs/outputs reference defined entities/attributes from the provided data model.   
- Functions map directly to use cases (e.g., FR-08 covers UC-12/UC-22; FR-12 covers UC-14).   
- Feasibility ensured: Inputs contain sufficient data for transformations (e.g., address → shipping cost calculation).   
- No undefined terms used; all references rooted in system description/data model.