# Functional Requirement

1. Functional Requirements   
  
1.1 Customer Account Registration Function   
 Function ID: FR-01   
 Description: Customers can create a new account by providing personal information such as name, email, password, and contact details. The system must validate the input data, ensure the email is unique, and send a confirmation message or email.   
 Input: Name, email address, password, and contact details.   
 Output: A new customer account stored in the system, and a confirmation message or email sent to the customer.   
  
1.2 Customer Login Function   
 Function ID: FR-02   
 Description: Registered customers can log in using their email and password. The system must validate the credentials, initiate a session, and redirect the customer to the homepage or shopping cart.   
 Input: Email address and password.   
 Output: An authenticated session initiated for the customer, and redirection to the homepage or shopping cart.   
  
1.3 Customer Logout Function   
 Function ID: FR-03   
 Description: Customers can terminate their session by logging out. The system must clear session data and redirect the customer to the homepage or login page.   
 Input: Customer session or logout request.   
 Output: Session terminated, and customer redirected to the homepage or login page.   
  
1.4 Product Detail View Function   
 Function ID: FR-04   
 Description: Customers can view detailed information of a selected product, including name, description, price, images, and availability.   
 Input: Product ID or search term.   
 Output: Displayed product details in a user-friendly format.   
  
1.5 Product Search Function   
 Function ID: FR-05   
 Description: Customers can search for products using terms such as product name, category, or keywords. The system must display matching products and allow selection.   
 Input: Search term (e.g., product name, keyword).   
 Output: List of products matching the search criteria displayed to the customer.   
  
1.6 Add Product to Shopping Cart Function   
 Function ID: FR-06   
 Description: Customers can add a product to their shopping cart by specifying the desired quantity. The system must verify product availability in the inventory, update the cart, and reflect the updated stock.   
 Input: Product ID and quantity.   
 Output: Updated Shopping Cart and Inventory stock levels, and a confirmation message.   
  
1.7 Update Shopping Cart Function   
 Function ID: FR-07   
 Description: Customers can modify the quantity of items in their shopping cart or remove items. The system must update the cart and inventory accordingly, and recalculate the total cost.   
 Input: Cart item ID, new quantity, or removal request.   
 Output: Updated Shopping Cart and Inventory stock levels, and a confirmation message.   
  
1.8 Remove Product from Shopping Cart Function   
 Function ID: FR-08   
 Description: Customers can remove a product from their shopping cart. The system must update the cart and inventory to restore the product's stock level.   
 Input: Cart item ID and removal request.   
 Output: Updated Shopping Cart and Inventory stock levels, and a confirmation message.   
  
1.9 View Shopping Cart Summary Function   
 Function ID: FR-09   
 Description: Customers can view a summary of their shopping cart, including product names, quantities, prices, and total cost. The system must also display stock availability and warnings for low or out-of-stock items.   
 Input: Shopping Cart ID or session identifier.   
 Output: Cart summary displayed, including product details, total cost, and availability status.   
  
1.10 Checkout Function   
 Function ID: FR-10   
 Description: Customers can proceed to checkout by entering or confirming their shipping and billing information and selecting a payment method. The system must validate the data, process the payment, create an order, and clear the cart.   
 Input: Shopping Cart ID, shipping and billing information, selected payment method.   
 Output: Confirmed order stored in the system, updated Inventory, cleared Shopping Cart, and a confirmation message or email sent to the customer.   
  
1.11 Order Confirmation Function   
 Function ID: FR-11   
 Description: After completing the checkout, the system must confirm the order and update the payment and inventory accordingly.   
 Input: Checkout data and validated payment information.   
 Output: Confirmed order status, updated Payment and Inventory entities, and a confirmation message or email sent to the customer.   
  
1.12 Order Confirmation Email Function   
 Function ID: FR-12   
 Description: The system must generate and send an email to the customer confirming the order details, such as order number, items purchased, total cost, and estimated delivery time.   
 Input: Order details and customer email address.   
 Output: Order confirmation email sent to the customer and a log entry indicating the email was sent.   
  
1.13 Administrator Login Function   
 Function ID: FR-13   
 Description: Administrators can log in using their username and password to access the admin dashboard. The system must validate the credentials and initiate a session.   
 Input: Administrator username and password.   
 Output: An authenticated session initiated for the administrator, and redirection to the admin dashboard.   
  
1.14 Administrator Logout Function   
 Function ID: FR-14   
 Description: Administrators can terminate their session by logging out. The system must clear session data and redirect the administrator to the homepage or login page.   
 Input: Administrator session or logout request.   
 Output: Session terminated, and administrator redirected to the homepage or login page.   
  
1.15 Inventory Management Function   
 Function ID: FR-15   
 Description: Administrators can view, update, or modify the stock levels and status of products. The system must validate input and reflect changes in the inventory and product information.   
 Input: Product ID, new stock level, or inventory status changes.   
 Output: Updated Inventory and Product entities, and a confirmation message.   
  
1.16 Product Information Update Function   
 Function ID: FR-16   
 Description: Administrators can update a product’s details such as name, price, description, and availability. The system must validate the input and reflect the changes in the product entity and inventory.   
 Input: Product ID and updated details (e.g., price, description, stock level).   
 Output: Updated Product and Inventory entities, and a confirmation message.   
  
1.17 Product Categorization Function   
 Function ID: FR-17   
 Description: Administrators can assign products to one or more categories. The system must validate the selected categories and update the product and inventory data accordingly.   
 Input: Product ID and selected category(ies).   
 Output: Updated Product entity with category information, and confirmation message.   
  
1.18 Plugin Development Function   
 Function ID: FR-18   
 Description: Administrators can develop new or update existing plugins. The system must validate the plugin code, register it in the database, and link it to relevant modules.   
 Input: Plugin code and configuration files.   
 Output: Registered Plugin entity and confirmation message of successful deployment.   
  
1.19 Plugin Configuration Function   
 Function ID: FR-19   
 Description: Administrators can configure plugin settings such as API keys and behavior rules. The system must validate the configuration data and update the plugin entity accordingly.   
 Input: Plugin ID and configuration parameters.   
 Output: Updated Plugin entity, and confirmation message of successful configuration.   
  
1.20 Customer Management Function   
 Function ID: FR-20   
 Description: Administrators can view, edit, or delete customer account information. The system must validate input data and update the customer entity in the database.   
 Input: Customer ID and updated or deleted information.   
 Output: Updated or deleted Customer entity, and confirmation message.   
  
1.21 Product Management Function   
 Function ID: FR-21   
 Description: Administrators can add, edit, or delete product records. The system must validate product data and update the product and inventory entities accordingly.   
 Input: Product ID and new or modified product data.   
 Output: Updated or deleted Product entity, and updated Inventory if applicable.   
  
1.22 Order Management Function   
 Function ID: FR-22   
 Description: Administrators can view, update, or cancel orders. The system must validate input, update the order, inventory, and payment entities accordingly, and send notifications if necessary.   
 Input: Order ID and requested action (e.g., update, cancel).   
 Output: Updated or canceled Order entity, updated Inventory and Payment entities, and a confirmation message.   
  
1.23 Payment Management Function   
 Function ID: FR-23   
 Description: Administrators can view, update, or process refunds for payments. The system must validate input and update the payment and order entities accordingly.   
 Input: Payment ID and requested action (e.g., update, refund).   
 Output: Updated Payment and Order entities, and a confirmation message.   
  
1.24 Administrator Management Function   
 Function ID: FR-24   
 Description: Administrators can add, edit, or remove other administrator accounts. The system must validate input and update the administrator entity in the database.   
 Input: Administrator ID and requested action (e.g., add, edit, delete).   
 Output: Updated or deleted Administrator entity, and a confirmation message.

# External Description

# 2. External Interfaces   
  
This section describes the external interfaces that the system must support to ensure proper functionality, usability, and integration with other systems or components. These interfaces include user interfaces, hardware interfaces, software interfaces, and communication interfaces. Each interface is described in detail, including its role, expected inputs, and outputs.   
  
## 2.1 User Interfaces   
  
The user interfaces of the system are primarily web-based and mobile-responsive, allowing customers and administrators to interact with the system through a browser or mobile application. The interfaces are designed to be intuitive and user-friendly, enabling seamless navigation and interaction.   
  
- \*\*Customer Login Interface\*\*:   
 - \*Description\*: A web-based interface where customers enter their email and password to authenticate and start a session.   
 - \*Inputs\*: Email address and password.   
 - \*Outputs\*: Authentication result, redirection to the homepage or shopping cart.   
  
- \*\*Customer Registration Interface\*\*:   
 - \*Description\*: A web-based interface for customers to provide personal information and create a new account.   
 - \*Inputs\*: Name, email address, password, and contact details.   
 - \*Outputs\*: Account creation confirmation, email verification prompt.   
  
- \*\*Product Detail Interface\*\*:   
 - \*Description\*: A web-based interface displaying detailed product information, including images, descriptions, price, and availability status.   
 - \*Inputs\*: Product ID or search term.   
 - \*Outputs\*: Product details, availability status, and stock warnings.   
  
- \*\*Product Search Interface\*\*:   
 - \*Description\*: A web-based interface that allows customers to search for products using keywords, product names, or categories.   
 - \*Inputs\*: Search term (e.g., product name, keyword).   
 - \*Outputs\*: A list of products matching the search criteria.   
  
- \*\*Shopping Cart Interface\*\*:   
 - \*Description\*: A web-based interface for customers to view, add, update, or remove items from their shopping cart.   
 - \*Inputs\*: Product ID and quantity for adding/updating, cart item ID for removal.   
 - \*Outputs\*: Updated cart summary, total cost, and stock availability status.   
  
- \*\*Checkout Interface\*\*:   
 - \*Description\*: A web-based interface where customers confirm their shipping and billing information, select a payment method, and proceed with the order.   
 - \*Inputs\*: Shopping Cart ID, shipping and billing information, selected payment method.   
 - \*Outputs\*: Order confirmation, updated inventory, cleared shopping cart.   
  
- \*\*Order Confirmation Interface\*\*:   
 - \*Description\*: A web-based interface that displays the order confirmation after checkout.   
 - \*Inputs\*: Order details and session identifier.   
 - \*Outputs\*: Order confirmation message, order number, and estimated delivery time.   
  
- \*\*Admin Dashboard Interface\*\*:   
 - \*Description\*: A web-based interface for administrators to manage products, inventory, customers, orders, and plugins.   
 - \*Inputs\*: Administrator username and password.   
 - \*Outputs\*: Access to the admin dashboard with various management modules.   
  
- \*\*Inventory Management Interface\*\*:   
 - \*Description\*: A part of the admin dashboard that allows administrators to view and modify product stock levels and statuses.   
 - \*Inputs\*: Product ID, new stock level, or status changes.   
 - \*Outputs\*: Updated inventory display, confirmation message.   
  
- \*\*Product Management Interface\*\*:   
 - \*Description\*: A part of the admin dashboard for administrators to add, update, or delete product records.   
 - \*Inputs\*: Product ID and new or modified product data.   
 - \*Outputs\*: Updated product information in the interface, confirmation message.   
  
- \*\*Order Management Interface\*\*:   
 - \*Description\*: A part of the admin dashboard where administrators can view, update, or cancel orders.   
 - \*Inputs\*: Order ID and requested action (e.g., update, cancel).   
 - \*Outputs\*: Updated order status in the interface, confirmation message.   
  
- \*\*Payment Management Interface\*\*:   
 - \*Description\*: A part of the admin dashboard for administrators to view, update, or process refunds for payments.   
 - \*Inputs\*: Payment ID and requested action (e.g., update, refund).   
 - \*Outputs\*: Updated payment status in the interface, confirmation message.   
  
- \*\*Administrator Management Interface\*\*:   
 - \*Description\*: A part of the admin dashboard for administrators to manage other admin accounts.   
 - \*Inputs\*: Administrator ID and requested action (e.g., add, edit, delete).   
 - \*Outputs\*: Updated or deleted administrator records, confirmation message.   
  
- \*\*Plugin Management Interface\*\*:   
 - \*Description\*: A part of the admin dashboard for administrators to develop, configure, or manage plugins.   
 - \*Inputs\*: Plugin code, configuration parameters, or plugin ID.   
 - \*Outputs\*: Updated plugin configuration or status, confirmation message.   
  
## 2.2 Hardware Interfaces   
  
The system does not directly interact with specific hardware devices. However, it is expected to support common hardware configurations used by web and mobile clients, such as:   
  
- \*\*Web Browsers\*\*:   
 - \*Description\*: The system must be compatible with major web browsers, including Google Chrome, Mozilla Firefox, Safari, and Microsoft Edge.   
 - \*Supported Protocols\*: HTTP/HTTPS, WebSocket for real-time interactions.   
  
- \*\*Mobile Devices\*\*:   
 - \*Description\*: The system must be responsive and functional on various mobile devices, including smartphones and tablets.   
 - \*Supported Protocols\*: HTTP/HTTPS, WebSocket for real-time interactions.   
  
- \*\*Input Devices\*\*:   
 - \*Description\*: The system should support standard input devices such as keyboards, touchscreens, and mice.   
 - \*Supported Protocols\*: Standard input/output (I/O) protocols.   
  
- \*\*Output Devices\*\*:   
 - \*Description\*: The system should be compatible with standard output devices such as monitors and mobile screens.   
 - \*Supported Protocols\*: Standard rendering protocols for web and mobile interfaces.   
  
## 2.3 Software Interfaces   
  
The system interacts with various software components, including databases, external APIs, and third-party tools, to perform its functions.   
  
- \*\*Database Interface (Customer, Product, Order, Inventory, Plugin, Administrator entities)\*\*:   
 - \*Description\*: The system must interact with a relational database to store and retrieve data related to customers, products, orders, inventory, plugins, and administrators.   
 - \*Data Access Methods\*: SQL queries, ORM (Object-Relational Mapping), and database transactions.   
 - \*Inputs\*: Data to be stored, such as customer information, product details, order records, inventory levels, plugin configurations, and admin credentials.   
 - \*Outputs\*: Retrieved data for display or processing, such as customer account details, product information, order status, inventory stock levels, plugin status, and admin account details.   
  
- \*\*Payment Gateway API (Third-Party)\*\*:   
 - \*Description\*: The system must integrate with a third-party payment gateway API to process customer payments during checkout.   
 - \*Supported Protocols\*: RESTful API, HTTPS.   
 - \*Inputs\*: Payment method, amount, customer billing information.   
 - \*Outputs\*: Payment confirmation, transaction status, and response data from the gateway.   
  
- \*\*Email Service API (Third-Party)\*\*:   
 - \*Description\*: The system must use an email service API to send confirmation messages and order confirmation emails to customers.   
 - \*Supported Protocols\*: RESTful API, SMTP.   
 - \*Inputs\*: Recipient email address, message content, subject line.   
 - \*Outputs\*: Email delivery confirmation, log entry indicating successful email sending.   
  
- \*\*Search Engine API (Optional Third-Party)\*\*:   
 - \*Description\*: If implemented, the system may integrate with a search engine API to enhance product search functionality.   
 - \*Supported Protocols\*: RESTful API, HTTPS.   
 - \*Inputs\*: Search term, category, or keyword.   
 - \*Outputs\*: List of products matching the search criteria.   
  
- \*\*Plugin Interface\*\*:   
 - \*Description\*: The system must support a plugin architecture where administrators can develop or update plugins.   
 - \*Supported Protocols\*: RESTful API or internal module integration.   
 - \*Inputs\*: Plugin code, configuration files.   
 - \*Outputs\*: Registered or updated plugin, confirmation message.   
  
- \*\*Session Management System\*\*:   
 - \*Description\*: The system must manage user sessions for both customers and administrators, ensuring secure and persistent session handling.   
 - \*Data Access Methods\*: Session tokens, cookie-based authentication.   
 - \*Inputs\*: Session identifier or login credentials.   
 - \*Outputs\*: Session initiation or termination status, user redirection.   
  
## 2.4 Communication Interfaces   
  
The system must communicate with external services and users via network-based interfaces. These include:   
  
- \*\*Email Communication Interface\*\*:   
 - \*Description\*: The system must send confirmation and order confirmation emails to customers using an email service.   
 - \*Supported Protocols\*: SMTP, RESTful API.   
 - \*Inputs\*: Customer email address, order details, message template.   
 - \*Outputs\*: Email sent to the customer, log entry indicating email delivery.   
  
- \*\*Web Communication Interface (HTTP/HTTPS)\*\*:   
 - \*Description\*: The system must support HTTP/HTTPS protocols to allow customers and administrators to access the system through web browsers.   
 - \*Supported Protocols\*: HTTP/1.1, HTTP/2, HTTPS.   
 - \*Inputs\*: HTTP requests from clients (e.g., login, search, checkout).   
 - \*Outputs\*: HTTP responses, including HTML pages, JSON data, and redirections.   
  
- \*\*WebSocket Communication Interface (Real-Time Updates)\*\*:   
 - \*Description\*: The system may use WebSocket for real-time communication, such as inventory updates or order status changes.   
 - \*Supported Protocols\*: WebSocket over HTTPS.   
 - \*Inputs\*: Real-time event triggers (e.g., stock change, order update).   
 - \*Outputs\*: Real-time notifications or updates to the client.   
  
- \*\*API Communication Interface (Plugin and Admin Modules)\*\*:   
 - \*Description\*: The system must provide internal or external APIs for plugin and admin module interactions.   
 - \*Supported Protocols\*: RESTful API, JSON format.   
 - \*Inputs\*: Plugin code, configuration parameters, admin commands.   
 - \*Outputs\*: Plugin registration status, admin operation confirmation.   
  
By defining these external interfaces, the system ensures that all necessary interactions with users, hardware, software, and communication channels are clearly understood and can be implemented effectively.