# Functional Requirement

# Chapter 1: Functional Requirements   
## 1.1 Customer Registration Function   
\*\*Function ID\*\*: FR-01   
\*\*Description\*\*: Customers can create new accounts by providing personal information. The system validates the input and stores it securely.   
\*\*Input\*\*: Personal information including name, email, password, and optional fields like address and phone number.   
\*\*Output\*\*: A new Customer data entity with the provided details and a confirmation message.   
  
## 1.2 Customer Login Function   
\*\*Function ID\*\*: FR-02   
\*\*Description\*\*: Customers or administrators can log in using their account credentials. The system validates the credentials and creates a session.   
\*\*Input\*\*: Username and password.   
\*\*Output\*\*: A valid LoginSession data entity and redirection to the appropriate dashboard.   
  
## 1.3 Customer Logout Function   
\*\*Function ID\*\*: FR-03   
\*\*Description\*\*: Customers or administrators can terminate their session. The system updates the session status and redirects to the login or home page.   
\*\*Input\*\*: Request to end the session.   
\*\*Output\*\*: A terminated LoginSession data entity and redirection to login/home page.   
  
## 1.4 Customer Profile Management Function   
\*\*Function ID\*\*: FR-04   
\*\*Description\*\*: Customers can view and edit their profile information. The system updates the Customer data entity if changes are made.   
\*\*Input\*\*: Updated profile information such as name, address, or phone number.   
\*\*Output\*\*: Updated Customer data entity and a confirmation message.   
  
## 1.5 Product Search Function   
\*\*Function ID\*\*: FR-05   
\*\*Description\*\*: Customers can search for products using keywords or product names. The system matches the query with the Product data entity and displays relevant results.   
\*\*Input\*\*: Search term or keyword.   
\*\*Output\*\*: A list of matching products from the Product data entity.   
  
## 1.6 Product Filtering Function   
\*\*Function ID\*\*: FR-06   
\*\*Description\*\*: Customers can filter products by category. The system retrieves products from the Product data entity and filters them based on the selected Category.   
\*\*Input\*\*: Selected category ID or name.   
\*\*Output\*\*: A list of filtered products from the Product data entity.   
  
## 1.7 Product View Function   
\*\*Function ID\*\*: FR-07   
\*\*Description\*\*: Customers can view detailed information about a specific product. The system retrieves the product data from the Product data entity and displays it.   
\*\*Input\*\*: Product ID or name.   
\*\*Output\*\*: Displayed product details such as description, price, image, and availability.   
  
## 1.8 Shopping Cart Management Function   
\*\*Function ID\*\*: FR-08   
\*\*Description\*\*: Customers can add, remove, or modify items in their shopping cart. The system updates the ShoppingCart data entity accordingly.   
\*\*Input\*\*: Product ID, quantity, and action (add, remove, or modify).   
\*\*Output\*\*: Updated ShoppingCart data entity and a summary of the cart contents.   
  
## 1.9 Proceed to Checkout Function   
\*\*Function ID\*\*: FR-09   
\*\*Description\*\*: Customers can proceed from the shopping cart to the checkout page. The system prepares the cart for order creation.   
\*\*Input\*\*: Request to proceed to checkout.   
\*\*Output\*\*: Redirected to the payment processing page and preparation of the ShoppingCart for order creation.   
  
## 1.10 Payment Information Management Function   
\*\*Function ID\*\*: FR-10   
\*\*Description\*\*: Customers can enter and save their payment information. The system validates the input and stores it securely in the PaymentInformation data entity.   
\*\*Input\*\*: Card number, expiration date, CVV, and billing address.   
\*\*Output\*\*: Updated PaymentInformation data entity and a confirmation message.   
  
## 1.11 Order Placement Function   
\*\*Function ID\*\*: FR-11   
\*\*Description\*\*: Customers can place an order using the items in their shopping cart and selected payment information. The system creates a new Order and links it to the Customer and PaymentInformation data entities.   
\*\*Input\*\*: ShoppingCart ID and selected PaymentInformation.   
\*\*Output\*\*: New Order data entity and confirmation message.   
  
## 1.12 Order Confirmation Function   
\*\*Function ID\*\*: FR-12   
\*\*Description\*\*: Customers can confirm their order after checkout. The system updates the Order data entity to reflect the confirmed status.   
\*\*Input\*\*: Order ID and confirmation request.   
\*\*Output\*\*: Updated Order data entity and a confirmation message.   
  
## 1.13 Order Cancellation Function   
\*\*Function ID\*\*: FR-13   
\*\*Description\*\*: Customers can cancel an order if it is in a cancellable state. The system updates the Order and ShoppingCart data entities.   
\*\*Input\*\*: Order ID and cancellation request.   
\*\*Output\*\*: Updated Order data entity and, if applicable, updated ShoppingCart data entity.   
  
## 1.14 Order Status Viewing Function   
\*\*Function ID\*\*: FR-14   
\*\*Description\*\*: Customers can view the current status of their orders. The system retrieves the Order data entity and displays the status.   
\*\*Input\*\*: Order ID or list of orders.   
\*\*Output\*\*: Displayed order status (e.g., processing, shipped, delivered, canceled).   
  
## 1.15 Product Purchase History Function   
\*\*Function ID\*\*: FR-15   
\*\*Description\*\*: Customers can view their purchase history. The system retrieves and displays a list of past orders and associated products.   
\*\*Input\*\*: Customer ID and request to view purchase history.   
\*\*Output\*\*: A list of previous orders and their details from the Order and OrderDetail data entities.   
  
## 1.16 Product Addition Function   
\*\*Function ID\*\*: FR-16   
\*\*Description\*\*: Administrators can add new products to the system, including assigning them to a category. The system updates the Product and Category data entities.   
\*\*Input\*\*: Product details such as name, description, price, category, and image.   
\*\*Output\*\*: New Product data entity and updated Category data entity.   
  
## 1.17 Product Update Function   
\*\*Function ID\*\*: FR-17   
\*\*Description\*\*: Administrators can modify existing product information. The system updates the Product and Category data entities.   
\*\*Input\*\*: Product ID and updated details.   
\*\*Output\*\*: Updated Product data entity and, if applicable, updated Category data entity.   
  
## 1.18 Product Deletion Function   
\*\*Function ID\*\*: FR-18   
\*\*Description\*\*: Administrators can delete a product from the system. The system removes the product from the Product and Category data entities.   
\*\*Input\*\*: Product ID and deletion request.   
\*\*Output\*\*: Updated Product and Category data entities and a confirmation message.   
  
## 1.19 Category Management Function   
\*\*Function ID\*\*: FR-19   
\*\*Description\*\*: Administrators can create, update, or delete product categories. The system updates the Category data entity.   
\*\*Input\*\*: Category details such as name and description.   
\*\*Output\*\*: Updated Category data entity and a confirmation message.   
  
## 1.20 Order Review and Management Function   
\*\*Function ID\*\*: FR-20   
\*\*Description\*\*: Administrators can review and manage existing orders. The system updates the Order data entity and may notify the customer of changes.   
\*\*Input\*\*: Order ID and requested action (update, cancel, ship, etc.).   
\*\*Output\*\*: Updated Order data entity and, if applicable, a notification to the customer.   
  
## 1.21 Order Detail Management Function   
\*\*Function ID\*\*: FR-21   
\*\*Description\*\*: Administrators can view and modify details of a specific order, such as product quantity or price. The system updates the OrderDetail data entity.   
\*\*Input\*\*: OrderDetail ID and modified information.   
\*\*Output\*\*: Updated OrderDetail data entity and a confirmation message.   
  
## 1.22 Inventory Management Function   
\*\*Function ID\*\*: FR-22   
\*\*Description\*\*: Administrators can manage product inventory levels. The system updates the Inventory data entity and adjusts the Product data entity if necessary.   
\*\*Input\*\*: Product ID and updated stock quantity.   
\*\*Output\*\*: Updated Inventory data entity and, if applicable, updated Product data entity.   
  
## 1.23 Plugin Installation Function   
\*\*Function ID\*\*: FR-23   
\*\*Description\*\*: Administrators can install new plugins to extend system functionality. The system updates the Plugin data entity.   
\*\*Input\*\*: Plugin ID or name.   
\*\*Output\*\*: Updated Plugin data entity and a confirmation message.   
  
## 1.24 Plugin Configuration Function   
\*\*Function ID\*\*: FR-24   
\*\*Description\*\*: Administrators can configure plugin settings to customize their behavior. The system updates the PluginSetting data entity.   
\*\*Input\*\*: Plugin ID and configuration key-value pairs.   
\*\*Output\*\*: Updated PluginSetting data entity and a confirmation message.   
  
## 1.25 Plugin Uninstallation Function   
\*\*Function ID\*\*: FR-25   
\*\*Description\*\*: Administrators can uninstall plugins when they are no longer needed. The system updates the Plugin data entity.   
\*\*Input\*\*: Plugin ID and uninstallation request.   
\*\*Output\*\*: Updated Plugin data entity and a confirmation message.   
  
## 1.26 Email Service Configuration Function   
\*\*Function ID\*\*: FR-26   
\*\*Description\*\*: Administrators can configure the email service used for sending order confirmations. The system updates the EmailService data entity.   
\*\*Input\*\*: Email service settings such as SMTP server, port, and authentication.   
\*\*Output\*\*: Updated EmailService data entity and a confirmation message.   
  
## 1.27 Email Notification Function   
\*\*Function ID\*\*: FR-27   
\*\*Description\*\*: The system sends order confirmation emails to customers after an order is placed and confirmed. The system updates the EmailService data entity and logs the activity.   
\*\*Input\*\*: Order details such as customer name, product list, and total amount.   
\*\*Output\*\*: Sent email notification and updated EmailService data entity.   
  
## 1.28 User Account Management Function   
\*\*Function ID\*\*: FR-28   
\*\*Description\*\*: Administrators can manage customer and administrator accounts, including creation, updates, and deletion. The system updates the Customer or Administrator data entities.   
\*\*Input\*\*: User account details such as name, email, password, and role.   
\*\*Output\*\*: Updated Customer or Administrator data entity and a confirmation message.   
  
## 1.29 System Documentation Access Function   
\*\*Function ID\*\*: FR-29   
\*\*Description\*\*: Users can access and view system documentation for plugins and other features. The system retrieves and displays the DocumentReference data entity.   
\*\*Input\*\*: Request to view documentation.   
\*\*Output\*\*: Displayed documentation content and logged access activity.   
  
## 1.30 Registration Record Management Function   
\*\*Function ID\*\*: FR-30   
\*\*Description\*\*: Administrators can view, update, or delete customer registration records. The system updates the RegistrationRecord data entity.   
\*\*Input\*\*: Registration record details such as email, status, and registration date.   
\*\*Output\*\*: Updated or deleted RegistrationRecord data entity and a confirmation message.   
  
## 1.31 Browser Access Control Function   
\*\*Function ID\*\*: FR-31   
\*\*Description\*\*: Administrators can configure access control settings for supported browsers. The system updates the Browser and SystemAccessControl data entities.   
\*\*Input\*\*: Selected browser types and access rules (allowed or restricted).   
\*\*Output\*\*: Updated Browser and SystemAccessControl data entities and a confirmation message.   
  
## 1.32 Browsing History Tracking Function   
\*\*Function ID\*\*: FR-32   
\*\*Description\*\*: The system tracks customer browsing behavior, including pages visited and time spent. The system updates the BrowsingHistory data entity.   
\*\*Input\*\*: Page URL and timestamp.   
\*\*Output\*\*: Updated BrowsingHistory data entity and logged activity.   
  
## 1.33 Product View Tracking Function   
\*\*Function ID\*\*: FR-33   
\*\*Description\*\*: The system tracks when customers view product details. The system updates the ProductView data entity.   
\*\*Input\*\*: Product ID and timestamp.   
\*\*Output\*\*: Updated ProductView data entity and logged activity.   
  
## 1.34 Search Query Tracking Function   
\*\*Function ID\*\*: FR-34   
\*\*Description\*\*: The system tracks customer search queries for analytics and improvement. The system updates the SearchQuery data entity.   
\*\*Input\*\*: Search term and timestamp.   
\*\*Output\*\*: Updated SearchQuery data entity and logged activity.   
  
## 1.35 Notification Management Function   
\*\*Function ID\*\*: FR-35   
\*\*Description\*\*: The system sends notifications to customers for order status changes. The system updates the NotificationLog data entity.   
\*\*Input\*\*: Message content and timestamp.   
\*\*Output\*\*: Updated NotificationLog data entity and sent notification to the customer.

# External Description

# Chapter 2: External Interfaces  
  
This chapter describes the external interfaces of the system, categorized into \*\*User Interface\*\*, \*\*Hardware Interface\*\*, \*\*Software Interface\*\*, and \*\*Communication Interface\*\*. These interfaces facilitate interaction between the system and its users, external systems, hardware, and communication channels.  
  
---  
  
## 2.1 User Interface Output  
  
### 2.1.1 Web-Based User Interface  
\*\*Description\*\*: The system provides a web-based interface accessible through modern web browsers (e.g., Chrome, Firefox, Safari) for both customers and administrators to interact with the system.  
  
\*\*Interaction Method\*\*:  
- Customers use this interface to register, log in, search products, manage shopping carts, place orders, view order status, and access purchase history.  
- Administrators use this interface to manage products, categories, orders, plugins, email services, user accounts, registration records, browser access control, and documentation.  
  
\*\*Inputs/Outputs\*\*:  
- \*\*Inputs\*\*: Form data such as personal information, product details, category names, order actions, plugin settings, etc.  
- \*\*Outputs\*\*: Confirmation messages, dashboards, product listings, order summaries, error messages, and other UI elements.  
  
---  
  
## 2.2 Hardware Interface Output  
  
### 2.2.1 Browser Compatibility Interface  
\*\*Description\*\*: The system supports standard web browsers and adapts to various screen sizes and resolutions.  
  
\*\*Interaction Method\*\*:  
- The system dynamically adjusts layout and functionality based on browser type and device capabilities.  
- Administrators can configure which browsers are allowed or restricted via the Browser Access Control function.  
  
\*\*Inputs/Outputs\*\*:  
- \*\*Inputs\*\*: Browser types and versions selected by users.  
- \*\*Outputs\*\*: Updated Browser and SystemAccessControl data entities reflecting allowed/restricted browser configurations.  
  
---  
  
## 2.3 Software Interface Output  
  
### 2.3.1 Database Interface  
\*\*Description\*\*: The system interacts with a relational database to store and retrieve structured data including customer profiles, product inventories, orders, plugins, and logs.  
  
\*\*Data Entities Involved\*\*:  
- Customer  
- LoginSession  
- ShoppingCart  
- Product  
- Category  
- Order  
- PaymentInformation  
- Plugin  
- EmailService  
- NotificationLog  
- BrowsingHistory  
- SearchQuery  
- ProductView  
- RegistrationRecord  
  
\*\*Interaction Method\*\*:  
- The system performs CRUD (Create, Read, Update, Delete) operations on these entities as required by functional requirements.  
- Data is stored securely with appropriate validation and encryption.  
  
\*\*Inputs/Outputs\*\*:  
- \*\*Inputs\*\*: Structured data from forms, API calls, or internal processes.  
- \*\*Outputs\*\*: Updated or retrieved database records.  
  
---  
  
### 2.3.2 Plugin Interface  
\*\*Description\*\*: The system supports third-party plugins to extend functionality. It allows installation, configuration, and uninstallation of plugins.  
  
\*\*Interaction Method\*\*:  
- Plugins interact with the system via defined APIs and data structures.  
- Plugin settings are stored in the PluginSetting data entity.  
  
\*\*Inputs/Outputs\*\*:  
- \*\*Inputs\*\*: Plugin ID/name, configuration key-value pairs.  
- \*\*Outputs\*\*: Updated Plugin and PluginSetting data entities.  
  
---  
  
### 2.3.3 Documentation Interface  
\*\*Description\*\*: The system provides access to internal documentation resources for plugins and features.  
  
\*\*Interaction Method\*\*:  
- Users request documentation via the UI, and the system retrieves and displays the DocumentReference data entity.  
  
\*\*Inputs/Outputs\*\*:  
- \*\*Inputs\*\*: Request to view documentation.  
- \*\*Outputs\*\*: Displayed documentation content and logged access activity.  
  
---  
  
## 2.4 Communication Interface Output  
  
### 2.4.1 Email Service Interface  
\*\*Description\*\*: The system integrates with an email service to send notifications related to orders, account activities, and confirmations.  
  
\*\*Interaction Method\*\*:  
- Administrators configure the email service using SMTP settings.  
- The system sends emails upon specific events like order confirmation and status updates.  
  
\*\*Inputs/Outputs\*\*:  
- \*\*Inputs\*\*: Email service settings (SMTP server, port, authentication), order details.  
- \*\*Outputs\*\*: Sent emails, updated EmailService data entity, and activity logs.  
  
---  
  
### 2.4.2 Notification Service Interface  
\*\*Description\*\*: The system sends real-time notifications to users regarding order status changes and administrative actions.  
  
\*\*Interaction Method\*\*:  
- Notifications are generated internally and pushed to users via supported notification channels (e.g., in-app alerts, SMS, or push notifications if integrated).  
  
\*\*Inputs/Outputs\*\*:  
- \*\*Inputs\*\*: Message content and timestamp.  
- \*\*Outputs\*\*: Sent notification, updated NotificationLog data entity.  
  
---  
  
### 2.4.3 Analytics and Tracking Interface  
\*\*Description\*\*: The system tracks user behavior for analytics purposes, including browsing history, product views, and search queries.  
  
\*\*Interaction Method\*\*:  
- The system logs interactions and stores them in respective tracking entities for later analysis.  
  
\*\*Inputs/Outputs\*\*:  
- \*\*Inputs\*\*: Page URL, product ID, search term, and timestamp.  
- \*\*Outputs\*\*: Updated BrowsingHistory, ProductView, and SearchQuery data entities.  
  
---  
  
## Summary Table of External Interfaces  
  
| Interface Type | Interface Name | Description |  
|-----------------------|-------------------------------------|-----------------------------------------------------------------------------|  
| User Interface | Web-Based User Interface | Primary interface for customer and admin interaction |  
| Hardware Interface | Browser Compatibility Interface | Supports multiple browsers and device types |  
| Software Interface | Database Interface | Manages persistent storage and retrieval of all system data |  
| Software Interface | Plugin Interface | Enables extension of system functionality via third-party modules |  
| Software Interface | Documentation Interface | Provides access to internal documentation |  
| Communication Interface | Email Service Interface | Sends transactional and informational emails |  
| Communication Interface | Notification Service Interface | Delivers real-time updates to users |  
| Communication Interface | Analytics and Tracking Interface | Logs user behavior for monitoring and improvement |  
  
---  
  
All external interfaces have been mapped directly from the functional requirements to ensure alignment and completeness. Developers should refer to this section for implementation guidance on integrating with external components and managing system interactions.