# Functional Requirement

# 1. Functional Requirements  
  
## 1.1 Customer Registration Function   
Function ID: FR-01   
Description: Allow new customers to create an account by providing their personal information. The system must validate input data and send a confirmation email.   
Input: Name, Email, Password, Address, PhoneNumber   
Output: New Customer entity, Confirmation email, Login page redirect or confirmation page   
  
## 1.2 Customer Login Function   
Function ID: FR-02   
Description: Allow registered customers to log in using their email and password. The system must verify credentials and initiate a session.   
Input: Email, Password   
Output: Active session, Dashboard or intended page redirect, Login event log   
  
## 1.3 Customer Logout Function   
Function ID: FR-03   
Description: Allow customers to terminate their active session securely. The system must log the logout event.   
Input: Logout request   
Output: Session termination, Home page or login page redirect, Logout event log   
  
## 1.4 View Product Details Function   
Function ID: FR-04   
Description: Allow customers to view detailed information about a product, including name, description, price, availability, and images.   
Input: Product ID   
Output: Product details display, View event log, API-related data if configured   
  
## 1.5 Search Products Function   
Function ID: FR-05   
Description: Allow customers to search for products using keywords, categories, or other attributes. The system must return relevant results.   
Input: Search query (e.g., product name, keyword, category)   
Output: List of matching Product entities, Search event log, Plugin-enhanced results if configured   
  
## 1.6 Add Product to Cart Function   
Function ID: FR-06   
Description: Allow customers to add a product to their shopping cart. The system must update the cart and log the action.   
Input: Product ID, Quantity   
Output: Updated ShoppingCart entity, Cart display update, Add event log, Plugin trigger if configured   
  
## 1.7 Remove Product from Cart Function   
Function ID: FR-07   
Description: Allow customers to remove a product from their cart. The system must update the cart and log the action.   
Input: Product ID or CartItem ID   
Output: Updated ShoppingCart entity, Cart display update, Remove event log, Plugin trigger if configured   
  
## 1.8 Place Order Function   
Function ID: FR-08   
Description: Allow customers to complete the checkout process by selecting a payment method and confirming the order. The system must create an Order entity, process payment, and send a confirmation email.   
Input: Cart items, Payment method selection, Shipping address, Customer information   
Output: New Order entity, Updated Product inventory, Confirmation email, Order event log   
  
## 1.9 View Order History Function   
Function ID: FR-09   
Description: Allow customers to view a list of their previous orders with summary details. The system must retrieve Order entities and log the access.   
Input: Customer ID   
Output: List of Order entities, Order history access log, Order details if selected   
  
## 1.10 Cancel Order Function   
Function ID: FR-10   
Description: Allow customers to cancel eligible orders. The system must update the Order status and initiate a refund if necessary.   
Input: Order ID   
Output: Updated Order status to "Cancelled", Refund initiated if paid, Cancellation event log   
  
## 1.11 Update Order Information Function   
Function ID: FR-11   
Description: Allow customers to modify eligible order details such as product quantity or shipping address. The system must validate changes and update the Order entity.   
Input: Order ID, Updated information (e.g., quantity, address)   
Output: Updated Order entity, Order update event log, Plugin trigger if configured   
  
## 1.12 View Order Confirmation Email Function   
Function ID: FR-12   
Description: Allow customers to view the content of their order confirmation email. The system must retrieve and display the email content.   
Input: Order ID or Email ID   
Output: Email content display, Email view event log, Order details if linked   
  
## 1.13 Administrator Login Function   
Function ID: FR-13   
Description: Allow administrators to log in with their credentials. The system must verify the username and password and create an admin session.   
Input: Username, Password   
Output: Active admin session, Admin dashboard redirect, Login event log   
  
## 1.14 Administrator Logout Function   
Function ID: FR-14   
Description: Allow administrators to securely log out of the system. The system must terminate the admin session and log the event.   
Input: Logout request   
Output: Session termination, Admin login page or main site redirect, Logout event log   
  
## 1.15 Add Product Function   
Function ID: FR-15   
Description: Allow administrators to add new products to the system. The system must validate input data and store the new Product entity.   
Input: Product name, Description, Price, Category, Image, Stock quantity   
Output: New Product entity, Updated product list, Product addition event log   
  
## 1.16 Update Product Information Function   
Function ID: FR-16   
Description: Allow administrators to modify existing product details. The system must validate the input and update the Product entity in the database.   
Input: Product ID, Updated product details (e.g., name, price, description)   
Output: Updated Product entity, Updated product list, Product update event log   
  
## 1.17 Delete Product Function   
Function ID: FR-17   
Description: Allow administrators to delete an existing product. The system must confirm the deletion and update the inventory accordingly.   
Input: Product ID   
Output: Deleted Product entity, Updated inventory, Product deletion event log   
  
## 1.18 View Product Inventory Function   
Function ID: FR-18   
Description: Allow administrators to view the current inventory levels of all products. The system must retrieve and display the inventory data.   
Input: Inventory filter/sort criteria (e.g., category, status)   
Output: Product inventory list, Inventory view event log, Plugin sync if configured   
  
## 1.19 View Order Details Function   
Function ID: FR-19   
Description: Allow customers and administrators to view detailed information about a specific order. The system must retrieve the Order entity and associated data.   
Input: Order ID   
Output: Order details display, Order view event log, Plugin-related data if available   
  
## 1.20 Plugin Registration Function   
Function ID: FR-20   
Description: Allow administrators to register new plugins. The system must validate the plugin and store the Plugin entity.   
Input: Plugin name, Version, Description, Author, Plugin file or API endpoint   
Output: New Plugin entity, Updated plugin list, Plugin registration event log   
  
## 1.21 Plugin Configuration Function   
Function ID: FR-21   
Description: Allow administrators to configure plugin settings. The system must update the PluginConfiguration entity and log the action.   
Input: Plugin ID, Configuration name, Configuration value   
Output: Updated PluginConfiguration entity, Plugin update if applicable, Configuration event log   
  
## 1.22 Plugin Deletion Function   
Function ID: FR-22   
Description: Allow administrators to delete an existing plugin. The system must confirm the deletion and log the event.   
Input: Plugin ID   
Output: Deleted Plugin entity, Updated plugin list, Plugin deletion event log   
  
## 1.23 Manage Payment Methods Function   
Function ID: FR-23   
Description: Allow customers to view, add, update, or delete their saved payment methods. The system must manage the Payment entity and synchronize with payment gateways if configured.   
Input: Customer ID, Payment method details (e.g., card info, gateway settings)   
Output: Updated Payment entity, Payment method list, Payment method event log   
  
## 1.24 View Payment Details Function   
Function ID: FR-24   
Description: Allow customers to view detailed information about their payment transactions. The system must retrieve and display the Payment entity.   
Input: Payment ID or Order ID   
Output: Payment details display, Payment view event log, Plugin-related data if available   
  
## 1.25 View Order Status Function   
Function ID: FR-25   
Description: Allow customers to view the current status of their orders. The system must retrieve the OrderStatus entity and display it along with any related tracking information.   
Input: Order ID   
Output: Order status display, Status event log, Plugin-related data if available   
  
## 1.26 Access API Documentation Function   
Function ID: FR-26   
Description: Allow administrators and developers to access the API documentation for plugins. The system must retrieve and display the documentation from the Documentation module.   
Input: Plugin ID or Documentation ID   
Output: API documentation display, Access event log, Plugin-related data if configured   
  
## 1.27 Update Plugin Documentation Function   
Function ID: FR-27   
Description: Allow administrators or developers to update the API documentation for a plugin. The system must validate the updated content and store it in the Documentation module.   
Input: Plugin ID, Updated documentation content   
Output: Updated Documentation entity, Documentation update event log, Plugin update if required   
  
## 1.28 Manage Payment Method Function   
Function ID: FR-28   
Description: Allow administrators to add, update, or delete payment methods available in the system. The system must manage the PaymentMethod entity and synchronize with payment gateways if configured.   
Input: Payment method ID or configuration details   
Output: Updated PaymentMethod entity, Payment method list, Plugin sync if configured, Event log

# External Description

# 2. External Interfaces  
  
## 2.1 User Interface Output  
  
The system interacts with users through a series of well-defined user interfaces that support customer and administrator actions. These interfaces are primarily web-based and designed to be intuitive and accessible on various devices, including desktops, tablets, and mobile phones. The following are the key user interfaces and their interactions:  
  
### 2.1.1 Customer Account Creation Interface   
\*\*Description:\*\* A form-based interface where new customers can input their personal information (Name, Email, Password, Address, PhoneNumber) to create an account.   
\*\*Interaction:\*\* The system validates the input data and sends a confirmation email. After successful registration, the user is redirected to the login page or a confirmation page.  
  
### 2.1.2 Customer Login Interface   
\*\*Description:\*\* A login form where registered customers can enter their Email and Password to authenticate.   
\*\*Interaction:\*\* The system verifies the credentials and initiates a session. If successful, the user is redirected to the Dashboard or the intended page.  
  
### 2.1.3 Customer Logout Interface   
\*\*Description:\*\* A button or link within the customer interface that allows users to terminate their active session.   
\*\*Interaction:\*\* The system logs the logout event and redirects the user to the Home page or the login page.  
  
### 2.1.4 Product Details Interface   
\*\*Description:\*\* A display interface for showing detailed product information (Name, Description, Price, Availability, Images).   
\*\*Interaction:\*\* The system retrieves product data based on the Product ID and displays it to the user. A View event is logged for analytics.  
  
### 2.1.5 Product Search Interface   
\*\*Description:\*\* A search bar or form where users can enter keywords, categories, or attributes to find products.   
\*\*Interaction:\*\* The system processes the search query and displays a list of matching products. A Search event is logged for tracking and analytics.  
  
### 2.1.6 Shopping Cart Interface   
\*\*Description:\*\* A user interface for managing the shopping cart, including adding and removing products.   
\*\*Interaction:\*\* The system allows users to add a Product ID and Quantity to the cart. It updates the cart display and logs the Add event. Similarly, the system allows users to remove products by Product ID or CartItem ID, updating the cart and logging the Remove event.  
  
### 2.1.7 Order Placement Interface   
\*\*Description:\*\* A checkout interface where customers can confirm their order, select a payment method, and enter a shipping address.   
\*\*Interaction:\*\* The system processes the cart items, payment method selection, shipping address, and customer information to create a new Order entity. It updates the product inventory, logs the Order event, and sends a confirmation email.  
  
### 2.1.8 Order History Interface   
\*\*Description:\*\* A list view interface for displaying the customer's previous orders with summary details.   
\*\*Interaction:\*\* The system retrieves a list of Order entities based on the Customer ID and displays them. It logs the Order history access event.  
  
### 2.1.9 Order Cancellation Interface   
\*\*Description:\*\* An interface where customers can cancel eligible orders.   
\*\*Interaction:\*\* The system updates the Order status to "Cancelled" and initiates a refund if applicable. It logs the Cancellation event.  
  
### 2.1.10 Order Information Update Interface   
\*\*Description:\*\* A form where customers can modify eligible order details such as product quantity or shipping address.   
\*\*Interaction:\*\* The system validates the changes and updates the Order entity accordingly. It logs the Order update event and triggers a Plugin if configured.  
  
### 2.1.11 Order Confirmation Email Interface   
\*\*Description:\*\* A display interface for showing the content of the order confirmation email.   
\*\*Interaction:\*\* The system retrieves and displays the email content based on the Order ID or Email ID. It logs the Email view event and may show Order details if linked.  
  
### 2.1.12 Administrator Login Interface   
\*\*Description:\*\* A login form for administrators to input their Username and Password for authentication.   
\*\*Interaction:\*\* The system verifies the credentials and creates an admin session. If successful, the user is redirected to the Admin Dashboard.  
  
### 2.1.13 Administrator Logout Interface   
\*\*Description:\*\* A button or link for administrators to terminate their active session.   
\*\*Interaction:\*\* The system logs the logout event and redirects the user to the Admin login page or the main site.  
  
### 2.1.14 Product Management Interface   
\*\*Description:\*\* An interface for administrators to add, update, or delete products.   
\*\*Interaction:\*\* The system validates the input data and updates the Product entity in the database. It logs the Product addition, update, or deletion events and updates the product list.  
  
### 2.1.15 Plugin Management Interface   
\*\*Description:\*\* An interface for administrators to register, configure, or delete plugins.   
\*\*Interaction:\*\* The system validates the plugin and its configuration and updates the Plugin and PluginConfiguration entities accordingly. It logs the Plugin registration, configuration, or deletion events and updates the plugin list.  
  
### 2.1.16 Payment Method Management Interface   
\*\*Description:\*\* An interface for customers and administrators to manage payment methods (view, add, update, delete).   
\*\*Interaction:\*\* The system processes the Payment method details and synchronizes with payment gateways if configured. It updates the Payment or PaymentMethod entities and logs the event.  
  
### 2.1.17 Order Status Interface   
\*\*Description:\*\* An interface for customers to view the current status of their orders.   
\*\*Interaction:\*\* The system retrieves the OrderStatus entity and displays it along with any related tracking information. It logs the Status event and may include Plugin-related data if available.  
  
### 2.1.18 API Documentation Interface   
\*\*Description:\*\* An interface for administrators and developers to access or update API documentation for plugins.   
\*\*Interaction:\*\* The system retrieves or updates the Documentation entity based on the Plugin ID or Documentation ID. It logs the Access or Update event and may include Plugin-related data if configured.  
  
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## 2.2 Hardware Interface Output  
  
The system does not have direct hardware dependencies or require specialized hardware for its core functionalities. All interactions with hardware are indirect and occur through standard software interfaces or user interfaces. However, the following hardware-related considerations are relevant:  
  
### 2.2.1 Mobile Device Compatibility   
\*\*Description:\*\* The system supports interactions via mobile devices.   
\*\*Interaction:\*\* The user interfaces are responsive and optimized for touch-based navigation. No direct hardware interface is required, but the system must function correctly on various mobile hardware platforms (iOS, Android).  
  
### 2.2.2 Point of Sale (POS) Integration (Optional)   
\*\*Description:\*\* If the system is integrated with a physical store, hardware interfaces may be required for POS devices (e.g., barcode scanners, payment terminals).   
\*\*Interaction:\*\* The system may communicate with POS hardware via serial or USB connections to process product scans or payment transactions. This is not a core requirement and is considered optional.  
  
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## 2.3 Software Interface Output  
  
The system interacts with various software components, including databases, third-party APIs, and internal modules. These interfaces are essential for storing, retrieving, and processing data. The following are the key software interfaces:  
  
### 2.3.1 Customer Database   
\*\*Description:\*\* A database storing customer entities (Name, Email, Password, Address, PhoneNumber).   
\*\*Interaction:\*\* The system reads and writes customer data to this database during registration, login, and other user-related functions. It supports queries by Customer ID or Email.  
  
### 2.3.2 Product Database   
\*\*Description:\*\* A database storing product entities (Name, Description, Price, Category, Image, Stock Quantity).   
\*\*Interaction:\*\* The system retrieves product data based on Product ID for display and updates inventory levels after order placement or product deletion.  
  
### 2.3.3 Order Database   
\*\*Description:\*\* A database storing order entities (Cart items, Payment method, Shipping address, Customer information).   
\*\*Interaction:\*\* The system creates new orders, retrieves order details, and updates order status (e.g., to "Cancelled"). It also logs order events for tracking and reporting.  
  
### 2.3.4 Plugin Database   
\*\*Description:\*\* A database storing plugin entities (Plugin name, Version, Description, Author, Plugin file or API endpoint) and their configurations.   
\*\*Interaction:\*\* The system reads and writes plugin data to manage plugin registration, configuration, and deletion. It also retrieves and updates the PluginConfiguration entity.  
  
### 2.3.5 Payment Gateway Integration   
\*\*Description:\*\* Integration with third-party payment gateways (e.g., PayPal, Stripe, Alipay).   
\*\*Interaction:\*\* The system communicates with payment gateways to process payments and manage refunds. It may update the PaymentMethod entity and synchronize with gateway systems.  
  
### 2.3.6 Email Service Interface   
\*\*Description:\*\* An external email service for sending and retrieving confirmation and transactional emails.   
\*\*Interaction:\*\* The system sends confirmation emails to customers after registration and order placement. It also retrieves email content for display in the Order Confirmation Email interface.  
  
### 2.3.7 API Communication Interface   
\*\*Description:\*\* A set of APIs for interacting with plugins and external systems.   
\*\*Interaction:\*\* The system communicates with plugins via APIs for enhanced functionality (e.g., search, cart updates, order tracking). It retrieves data from the Documentation module for API documentation.  
  
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## 2.4 Communication Interface Output  
  
The system communicates with external entities via various protocols and methods, including email and API calls. These communication interfaces are used to exchange data with users, payment gateways, and plugins.  
  
### 2.4.1 Email Notification Interface   
\*\*Description:\*\* A communication interface for sending confirmation and transactional emails to users.   
\*\*Interaction:\*\* The system sends emails to customers for account confirmation and order confirmation. It uses an external email service and logs the email events (e.g., send, view).  
  
### 2.4.2 Web Browsing Interface   
\*\*Description:\*\* The system is accessed via web browsers (e.g., Chrome, Firefox, Safari).   
\*\*Interaction:\*\* Users and administrators interact with the system through HTTP/HTTPS protocols. All web-based interfaces are designed for compatibility with modern browsers.  
  
### 2.4.3 Plugin API Communication Interface   
\*\*Description:\*\* A RESTful or GraphQL API for communicating with registered plugins.   
\*\*Interaction:\*\* The system sends and receives data to and from plugins for functionalities such as enhanced search, cart updates, order tracking, and payment synchronization. Inputs and outputs are defined in the PluginConfiguration and Plugin entities.  
  
### 2.4.4 Payment Gateway API Communication Interface   
\*\*Description:\*\* An API for interacting with payment gateway services (e.g., Stripe, PayPal).   
\*\*Interaction:\*\* The system sends payment requests and receives transaction responses from payment gateways. It updates the Payment and PaymentMethod entities based on the API responses.  
  
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## 2.5 Summary of External Data Sources and Their Interfaces  
  
The following table summarizes the external data sources referenced in the functional requirements and the corresponding interfaces defined in this section:  
  
| \*\*External Data Source\*\* | \*\*Interface Type\*\* | \*\*Description\*\* |  
|----------------------------------------|----------------------------|----------------------------------------------------------------------------------|  
| Customer Database | Software Interface | Stores and retrieves customer entities for registration and login. |  
| Product Database | Software Interface | Stores and retrieves product entities for display and inventory management. |  
| Order Database | Software Interface | Stores and retrieves order entities for order placement and cancellation. |  
| Plugin Database | Software Interface | Stores and retrieves plugin entities and configurations for plugin management. |  
| Payment Gateway | Software Interface / API | Processes payments and refunds via third-party payment services. |  
| Email Service | Communication Interface | Sends and retrieves confirmation and transactional emails. |  
| API Documentation Module | Software Interface | Stores and retrieves API documentation for plugins. |  
| Plugin API (for enhanced functionality) | Communication Interface / API | Enables interaction with plugins for additional features. |  
  
All external data sources are consistently mapped to the appropriate interfaces, ensuring that developers and stakeholders can clearly understand the system's dependencies and interactions.