# Functional Requirement

1.1 Customer Registration Function   
 Function ID: FR-01   
 Description: A new customer can register by providing personal information such as name, email, password, address, and phone number. The system validates the input and creates a customer account, followed by sending an email confirmation.   
 Input: Customer information (Name, Email, Password, Address, PhoneNumber)   
 Output: A new Customer entity in the database and an EmailConfirmation entity generated and sent to the customer.  
  
1.2 Customer Login Function   
 Function ID: FR-02   
 Description: A registered and verified customer can log in to the system using their email and password. The system authenticates the credentials and starts a session.   
 Input: Email and Password   
 Output: A valid session initiated for the customer and a confirmation of successful login.  
  
1.3 View Product Details Function   
 Function ID: FR-03   
 Description: A customer (logged in or guest) can view detailed information about a specific product, such as name, description, price, and category. The system also logs the view activity.   
 Input: ProductID   
 Output: Product details and a logged ProductView activity in the system.  
  
1.4 Add Product to Cart Function   
 Function ID: FR-04   
 Description: A customer can add a product to their shopping cart. The system checks the product's availability in the inventory and updates the cart and inventory accordingly.   
 Input: ProductID, Quantity   
 Output: A new CartItem entity added to the ShoppingCart and an updated Inventory record reflecting reduced stock.  
  
1.5 Update Shopping Cart Function   
 Function ID: FR-05   
 Description: A customer can update the quantity of a product in their shopping cart or remove it. The system validates the updated quantity against the available stock and adjusts the cart and inventory.   
 Input: CartItemID, NewQuantity or Remove flag   
 Output: Updated CartItem and ShoppingCart entities, and an updated Inventory record.  
  
1.6 Remove Product from Cart Function   
 Function ID: FR-06   
 Description: A customer can remove a specific product from their shopping cart. The system updates the cart and inventory accordingly.   
 Input: CartItemID   
 Output: Updated CartItem and ShoppingCart entities, and an updated Inventory record.  
  
1.7 Checkout Function   
 Function ID: FR-07   
 Description: A customer can proceed with the checkout process by providing shipping address, selecting a payment method, and confirming the order. The system processes the payment, creates an order, and sends a confirmation email.   
 Input: ShoppingCart, ShippingAddress, PaymentMethodID   
 Output: A new Order entity, updated Inventory records, a new Payment entity, and an EmailConfirmation generated and sent.  
  
1.8 Confirm Order Function   
 Function ID: FR-08   
 Description: A customer can confirm their order after the checkout process. The system verifies the availability of all items in the cart, confirms the payment, and finalizes the order.   
 Input: OrderID   
 Output: Updated Order entity marked as confirmed, updated Inventory records, and a confirmation message displayed to the customer.  
  
1.9 Receive Order Confirmation Email Function   
 Function ID: FR-09   
 Description: After an order is confirmed, the system sends an email to the customer with order details. The system logs the email delivery and provides the necessary information for the customer to review.   
 Input: OrderID, CustomerEmail   
 Output: An EmailConfirmation entity in the database and the email sent to the customer.  
  
1.10 Administrator Login Function   
 Function ID: FR-10   
 Description: An administrator can log in to the system using their username and password. The system authenticates the credentials and starts a session.   
 Input: AdminEmail, AdminPassword   
 Output: A valid session initiated for the administrator and a confirmation of successful login.  
  
1.11 Manage Inventory Function   
 Function ID: FR-11   
 Description: An administrator can manage the inventory by adding, removing, or modifying products. The system updates the Inventory and Product entities and logs the changes.   
 Input: Product details (Name, Description, Price, Quantity, CategoryID) or Inventory action (Add, Remove, Modify)   
 Output: Updated Inventory and Product entities, and a confirmation message displayed to the administrator.  
  
1.12 Manage Product Categories Function   
 Function ID: FR-12   
 Description: An administrator can manage product categories by creating, editing, or deleting categories. The system updates the Category and Product entities accordingly and logs the activity.   
 Input: Category details (Name, Description, ParentCategoryID) or Category action (Add, Edit, Delete)   
 Output: Updated Category and Product entities, and a confirmation message displayed to the administrator.  
  
1.13 Update Product Information Function   
 Function ID: FR-13   
 Description: An administrator can update product details such as name, description, price, stock level, and category. The system validates and updates the relevant Product and Inventory entities and logs the action.   
 Input: ProductID, NewProductDetails (Name, Description, Price, Quantity, CategoryID)   
 Output: Updated Product and Inventory entities, and a confirmation message displayed to the administrator.  
  
1.14 Delete Product Function   
 Function ID: FR-14   
 Description: An administrator can delete a product from the system if it is not part of any active order. The system removes the product from the Inventory and updates the Category associations and logs the action.   
 Input: ProductID   
 Output: Deleted Product entity, updated Inventory and Category entities, and a confirmation message displayed to the administrator.  
  
1.15 Manage Payment Methods Function   
 Function ID: FR-15   
 Description: An administrator can manage available payment methods by adding, updating, or removing them. The system validates and updates the PaymentMethod entity and logs the activity.   
 Input: PaymentMethod details (Name, Description, Status) or PaymentMethod action (Add, Update, Remove)   
 Output: Updated PaymentMethod entity and a confirmation message displayed to the administrator.  
  
1.16 View Purchase History Function   
 Function ID: FR-16   
 Description: A customer can view their previous orders and associated product details. The system retrieves and displays the order history and logs the access.   
 Input: CustomerID   
 Output: List of Order entities with associated OrderItem and Product details, and a confirmation of access logged.  
  
1.17 Manage Plugins Function   
 Function ID: FR-17   
 Description: An administrator can manage plugins by installing, updating, or removing them. The system validates the plugin file, updates the Plugin entity, and logs the activity.   
 Input: Plugin details (Name, Version, Description, Status) or Plugin action (Install, Update, Remove)   
 Output: Updated Plugin entity and a confirmation message displayed to the administrator.  
  
1.18 View Email Confirmation Function   
 Function ID: FR-18   
 Description: A customer can view the content of an email confirmation by clicking on the provided link. The system retrieves the confirmation content from the database and logs the access.   
 Input: ConfirmationCode, CustomerID   
 Output: Displayed EmailConfirmation content, and a logged access activity.  
  
1.19 Manage Cart Item Function   
 Function ID: FR-19   
 Description: A customer can modify or remove a specific item in their shopping cart. The system validates the action and updates the CartItem, ShoppingCart, and Inventory entities accordingly.   
 Input: CartItemID, NewQuantity or Remove flag   
 Output: Updated CartItem and ShoppingCart entities, and an updated Inventory record.  
  
1.20 Manage Order Item Function   
 Function ID: FR-20   
 Description: An administrator can modify or remove an item from an existing order. The system validates the action, updates the OrderItem, Order, and Inventory entities, and logs the activity.   
 Input: OrderItemID, NewQuantity or Remove flag   
 Output: Updated OrderItem and Order entities, and an updated Inventory record.

# External Description

2. External Interfaces  
  
2.1 User Interface Output   
The system interacts with users (customers and administrators) through a web-based graphical user interface (GUI) and a mobile-responsive interface. These interfaces support the following interactions:  
  
- \*\*FR-01 (Customer Registration):\*\* The system provides a registration form for customers to input personal details. After successful registration, a confirmation message is displayed, and an email confirmation is sent.  
- \*\*FR-02 (Customer Login):\*\* A login form is presented to customers, allowing them to enter their email and password. Upon successful authentication, a confirmation message is displayed, and a session is initiated.  
- \*\*FR-03 (View Product Details):\*\* The system displays detailed information about a product, including name, description, price, and category. A visual indicator or log message may be shown to the user to confirm that their activity has been recorded.  
- \*\*FR-04 (Add Product to Cart):\*\* A confirmation message is shown to the user indicating the product was successfully added to the cart. The system also provides real-time updates to the shopping cart interface.  
- \*\*FR-05 (Update Shopping Cart):\*\* The system updates the cart interface to reflect the new quantity or removal of a product. A confirmation message is displayed for the action.  
- \*\*FR-06 (Remove Product from Cart):\*\* The system updates the cart interface and displays a confirmation message that the product was removed.  
- \*\*FR-07 (Checkout):\*\* The system presents a checkout page where the customer can enter their shipping address and select a payment method. After the payment is processed and the order is created, a confirmation message is displayed.  
- \*\*FR-08 (Confirm Order):\*\* A confirmation message is shown to the customer after the system verifies the order and finalizes it.  
- \*\*FR-10 (Administrator Login):\*\* A login form is presented to administrators, and a session is initiated with a confirmation message after successful authentication.  
- \*\*FR-16 (View Purchase History):\*\* The system displays a list of previous orders, including associated product details, to the customer. A confirmation message is shown after access is logged.  
- \*\*FR-18 (View Email Confirmation):\*\* The system retrieves and displays the content of an email confirmation when a customer clicks on the provided link.  
- \*\*FR-20 (Manage Order Item):\*\* A confirmation message is shown to the administrator after an order item is updated or removed.  
  
2.2 Hardware Interface Output   
The system does not directly interact with any external hardware devices. It is expected to be compatible with standard web and mobile devices, including desktops, laptops, tablets, and smartphones. No special hardware interfaces or communication protocols are required for system functionality.  
  
2.3 Software Interface Output   
The system interacts with several external software components and databases to fulfill its functional requirements. These interfaces are described below:  
  
- \*\*Database (DB):\*\*   
 The system maintains a relational database to store entities such as Customer, Product, ShoppingCart, CartItem, Order, OrderItem, Inventory, PaymentMethod, Plugin, and EmailConfirmation. The system performs CRUD (Create, Read, Update, Delete) operations on these entities to support functional requirements.  
  
 - \*\*FR-01, FR-07, FR-09:\*\* The system creates and updates Customer and EmailConfirmation entities in the database.   
 - \*\*FR-02, FR-10:\*\* The system reads and updates session data in the database to manage user authentication.   
 - \*\*FR-03, FR-16:\*\* The system retrieves Product and Order entities from the database and logs activities.   
 - \*\*FR-04, FR-05, FR-06, FR-19:\*\* The system updates the ShoppingCart and CartItem entities and adjusts Inventory records.   
 - \*\*FR-07, FR-08:\*\* The system creates and updates Order and Payment entities and modifies Inventory records.   
 - \*\*FR-11, FR-13, FR-14:\*\* The system updates Inventory and Product entities.   
 - \*\*FR-12, FR-17:\*\* The system updates Category and Plugin entities.   
 - \*\*FR-15:\*\* The system manages PaymentMethod entities.   
 - \*\*FR-20:\*\* The system updates OrderItem, Order, and Inventory entities.  
  
- \*\*Email Service (Email API):\*\*   
 The system integrates with an external email service to send and log confirmation emails to customers. The email service is responsible for delivering the message to the customer's inbox.  
  
 - \*\*FR-01, FR-09:\*\* The system sends an email to the customer’s email address with a confirmation link or order details.   
 - \*\*FR-07, FR-08:\*\* An email is sent to the customer after the order is confirmed.   
 - \*\*FR-18:\*\* The system retrieves the EmailConfirmation content from the database and displays it to the customer when they click on the confirmation link.  
  
- \*\*Payment Gateway (Payment API):\*\*   
 The system integrates with a third-party payment gateway to process customer payments during the checkout process. The payment gateway provides a secure interface for transaction processing and returns a payment status to the system.  
  
 - \*\*FR-07, FR-08, FR-15:\*\* The system communicates with the Payment Gateway to process payments, verify payment methods, and update the Payment entity in the database.  
  
- \*\*Logging System (Log API):\*\*   
 The system uses a logging service to record user activities, such as viewing product details, updating the cart, or managing orders. The logging system stores these activities for audit and analytics purposes.  
  
 - \*\*FR-03, FR-05, FR-06, FR-11, FR-12, FR-13, FR-14, FR-15, FR-16, FR-17, FR-19, FR-20:\*\* The system logs activities related to user interactions and administrative changes.  
  
2.4 Communication Interface Output   
The system uses network-based communication to interact with external services and users:  
  
- \*\*Email Communication (Email API):\*\*   
 The system sends confirmation emails to customers using an external email service. The email includes a unique confirmation code or order details. The system also logs the delivery of these emails for tracking purposes.  
  
 - \*\*FR-01, FR-07, FR-08, FR-09, FR-18:\*\* The system communicates with the email service to send and verify email confirmations.  
  
- \*\*Web Browsing (HTTP/HTTPS):\*\*   
 The system is accessed through a web browser using HTTP/HTTPS protocols. This allows users to interact with the system via the GUI and perform actions such as registration, login, and product viewing.  
  
 - \*\*All user-facing functions (FR-01 to FR-08, FR-16 to FR-18, FR-19 to FR-20):\*\* The system communicates with users through a web browser to display interfaces and receive input.  
  
- \*\*Payment Gateway Communication (HTTP/HTTPS):\*\*   
 The system communicates with the Payment Gateway via HTTP/HTTPS to securely process transactions. This includes sending payment requests and receiving transaction confirmations.  
  
 - \*\*FR-07, FR-08, FR-15:\*\* The system uses secure communication to interact with the Payment Gateway during checkout and payment management.  
  
- \*\*API Communication for Inventory and Product Management:\*\*   
 The system communicates with internal APIs to manage Inventory and Product entities. These APIs ensure consistency between inventory levels and product information.  
  
 - \*\*FR-04, FR-05, FR-06, FR-11, FR-13, FR-14, FR-19, FR-20:\*\* The system interacts with inventory-related APIs to update stock levels and product data.  
  
- \*\*Plugin Communication (Plugin API):\*\*   
 The system interacts with a plugin API to install, update, or remove plugins. This API validates the plugin file and updates the Plugin entity accordingly.  
  
 - \*\*FR-17:\*\* The system uses the Plugin API to manage plugins.  
  
By defining these external interfaces, the system ensures clear communication with users, external services, and internal software components. Developers can use this information to implement the necessary integrations and interactions for the system.