# Functional Requirement

1.1 Customer Account Registration   
Function ID: FR-01   
Description: A customer can register for a new account by providing valid personal information, including a valid email address and a strong password. The system will validate the input, send an email confirmation, and activate the account after confirmation.   
Input: Name, email, password, and optional contact details.   
Output: A new customer account in the system, with email confirmed and account active.  
  
1.2 Customer Login   
Function ID: FR-02   
Description: A registered and confirmed customer can log in using their email and password. The system will verify the credentials and establish a session for the customer.   
Input: Customer email and password.   
Output: Active customer session and redirection to the home page or shopping cart.  
  
1.3 Customer Logout   
Function ID: FR-03   
Description: A logged-in customer can end their session by selecting the logout option. The system will terminate the session and redirect the user to the home page or login page.   
Input: Request to logout from the account menu.   
Output: Session termination and redirection to the home page or login page.  
  
1.4 Product Browsing   
Function ID: FR-04   
Description: Customers can view a list of available products, filter or sort by attributes such as category and price, and view product details, including inventory status.   
Input: Product listing page access or search criteria.   
Output: Display of product information, including name, price, description, inventory status, and an updated shopping cart.  
  
1.5 Product Search   
Function ID: FR-05   
Description: Customers can search for products by name, keyword, or apply filters. The system will return a list of matching products and their details.   
Input: Search query or filter criteria.   
Output: List of matching products with details such as name, price, and inventory status.  
  
1.6 Product Addition to Cart   
Function ID: FR-06   
Description: A customer can add a selected product to their shopping cart after verifying its availability. The system will update the cart with the product and quantity.   
Input: Product ID and quantity.   
Output: Updated shopping cart with the added product and total price.  
  
1.7 Cart Viewing   
Function ID: FR-07   
Description: A customer can view the contents of their shopping cart, including product names, quantities, and total cost.   
Input: Request to view cart.   
Output: Cart contents with product details and total price.  
  
1.8 Cart Modification   
Function ID: FR-08   
Description: A customer can modify the quantity of a product in the cart or remove items. The system will update the cart and recalculate the total cost.   
Input: Product ID and new quantity or removal request.   
Output: Updated cart with new quantities or removed items and recalculated total price.  
  
1.9 Cart Deletion   
Function ID: FR-09   
Description: A customer can delete all items in the shopping cart at once. The system will clear the cart and update the cart summary.   
Input: Request to delete all items in the cart.   
Output: Empty shopping cart and updated cart summary.  
  
1.10 Order Checkout   
Function ID: FR-10   
Description: A logged-in customer with a valid cart can proceed to checkout, provide shipping and payment details, and confirm the order. The system will process the payment, update inventory, and generate an order confirmation.   
Input: Cart contents, shipping address, payment method, and customer confirmation.   
Output: Confirmed order, updated inventory, and an order confirmation email sent to the customer.  
  
1.11 Order Confirmation   
Function ID: FR-11   
Description: After successful checkout, the system confirms the order by updating the order status and sending an email confirmation to the customer.   
Input: Confirmed order and payment details.   
Output: Order marked as confirmed in the system and an email confirmation sent to the customer.  
  
1.12 Order History Viewing   
Function ID: FR-12   
Description: A logged-in customer can view their order history, including order numbers, dates, total costs, and status. The system can also re-send order confirmation emails.   
Input: Request to view order history and optional request to re-send email.   
Output: Display of order history and re-sent email confirmation if requested.  
  
1.13 Product Inventory Management   
Function ID: FR-13   
Description: An administrator can add, update, or delete products in the inventory. The system will reflect these changes in the product list and inventory status.   
Input: Product details (name, description, price, category, quantity) and modification action (add, update, delete).   
Output: Updated inventory database and product list with a success message.  
  
1.14 Product Categorization   
Function ID: FR-14   
Description: An administrator can assign a product to a specific category or change its current category. The system will update the category assignment and display the result.   
Input: Product ID and new category ID or name.   
Output: Updated product category in the database and refreshed product list.  
  
1.15 Product Information Update   
Function ID: FR-15   
Description: An administrator can update the details of an existing product, such as its name, price, description, and category. The system will validate and store the updated information.   
Input: Product ID and updated fields (name, price, description, category).   
Output: Updated product information in the database and success message for the administrator.  
  
1.16 Administrator Login   
Function ID: FR-16   
Description: An administrator can log in using their registered email and password. The system will authenticate the credentials and redirect the administrator to the dashboard.   
Input: Administrator email and password.   
Output: Active administrator session and redirection to the dashboard.  
  
1.17 Administrator Logout   
Function ID: FR-17   
Description: A logged-in administrator can end their session by selecting the logout option. The system will terminate the session and redirect the user to the login page or home page.   
Input: Request to logout from the account menu.   
Output: Session termination and redirection to the login page or home page.  
  
1.18 Payment Processing   
Function ID: FR-18   
Description: The system processes a customer's payment during checkout, verifies the transaction, and updates the order and inventory accordingly.   
Input: Payment details (method, card information), order details, and customer session.   
Output: Processed and confirmed payment, updated order status, and updated inventory levels.  
  
1.19 Payment Method Configuration   
Function ID: FR-19   
Description: A customer can add or edit their preferred payment methods. The system will validate and securely store the updated payment information.   
Input: Payment method details (e.g., card number, expiration date, billing address).   
Output: Updated list of payment methods in the customer's account and confirmation message.  
  
1.20 Email Notification Setup   
Function ID: FR-20   
Description: A customer can configure their email notification preferences, such as for order updates, promotions, or inventory alerts. The system will validate the email and send a confirmation.   
Input: Notification preferences and valid email address.   
Output: Updated notification settings and confirmation email sent.  
  
1.21 Email Confirmation Sending   
Function ID: FR-21   
Description: The system sends an email confirmation to a customer for specific actions such as account registration, order placement, or notification setup.   
Input: Customer email address and confirmation action (e.g., registration, checkout).   
Output: Confirmation email with a verification link sent to the customer.  
  
1.22 Manage Product Info   
Function ID: FR-22   
Description: An administrator can modify the information of a product, such as its name, price, description, or category. The system will validate and store the updated information.   
Input: Product ID and updated information fields.   
Output: Updated product information in the database and success message for the administrator.  
  
1.23 Manage Order Info   
Function ID: FR-23   
Description: An administrator can modify the status, shipping address, or payment method of an order. The system will update the order and related records, and notify the customer of the changes.   
Input: Order ID and updated fields (e.g., status, address).   
Output: Updated order, inventory, and payment records; email notification sent to the customer.  
  
1.24 Manage Administrator Info   
Function ID: FR-24   
Description: An administrator can edit their own account information, such as email, password, or profile details. The system will validate and store the updated information.   
Input: Administrator ID and updated account details.   
Output: Updated administrator account in the system and a confirmation message.

# External Description

2. External Interfaces   
This chapter describes the external interfaces of the system, including user interfaces, hardware interfaces, software interfaces, and communication interfaces. These interfaces define how the system interacts with external entities such as users, hardware, software components, and communication protocols.  
  
2.1 User Interface Output   
The user interface (UI) of the system is designed to support both customers and administrators in performing actions and receiving relevant feedback. The UI includes the following components:   
  
- \*\*Account Registration Page\*\*: Provides a form for customers to input their name, email, password, and optional contact details. After successful registration, the system displays a confirmation message and redirects the user to the login page.   
- \*\*Login Page\*\*: Allows registered users (both customers and administrators) to input their email and password. Upon successful authentication, the system redirects the user to their respective home page or dashboard.   
- \*\*Home Page\*\*: Displays the main navigation options, including product browsing, cart access, and order history.   
- \*\*Product Listing Page\*\*: Enables customers to view a list of products, apply filters (e.g., category, price), and sort results. The system displays product information such as name, price, description, and inventory status.   
- \*\*Product Detail Page\*\*: Provides detailed information about a selected product, including its availability and options to add it to the cart.   
- \*\*Shopping Cart Page\*\*: Shows the contents of the customer’s shopping cart, including product names, quantities, and total cost. The cart can be modified by changing quantities or removing items. The system also supports deletion of all items in the cart at once.   
- \*\*Checkout Page\*\*: Allows customers to provide shipping and payment details and confirm their order. The system displays a summary of the cart, shipping address, and payment method.   
- \*\*Order Confirmation Page\*\*: Displays a confirmation message after a successful checkout and provides a summary of the order details.   
- \*\*Order History Page\*\*: Shows a list of the customer’s past orders, including order numbers, dates, total costs, and statuses. It also allows the customer to request a re-sent confirmation email.   
- \*\*Administrator Dashboard\*\*: Provides administrators with tools to manage products, orders, and their own account information. It includes forms for adding, updating, and deleting products or orders.   
- \*\*Payment Method Configuration Page\*\*: Allows customers to add or edit their preferred payment methods. The system validates and securely stores the information.   
- \*\*Email Notification Preferences Page\*\*: Enables customers to configure their notification preferences, such as for order updates, promotions, or inventory alerts. The system validates the email and sends a confirmation.   
  
Each of these user interfaces is designed to be intuitive and user-friendly, with clear input fields, validation feedback, and output displays. The system ensures that all user interactions are secure, especially when handling sensitive data such as payment information.  
  
2.2 Hardware Interface Output   
The system does not directly interact with any external hardware devices. However, it is designed to be compatible with standard hardware used by web-based applications, including:   
  
- \*\*Web Browsers\*\*: The system is accessible through modern web browsers such as Google Chrome, Mozilla Firefox, Safari, and Microsoft Edge. It supports responsive design to ensure compatibility with various screen sizes, including desktops, laptops, tablets, and smartphones.   
- \*\*Mobile Devices\*\*: The system is optimized for use on mobile devices, with touch-friendly navigation and adaptive layouts.   
  
No specific hardware communication protocols are required for the system, as all interactions are conducted through standard web technologies.  
  
2.3 Software Interface Output   
The system interacts with several external software components, primarily through APIs and database connections. These include:   
  
- \*\*Database Systems\*\*: The system stores and retrieves data from a relational database. The database contains tables for customers, products, orders, payment methods, and notification preferences. The system uses SQL queries to interact with the database, ensuring data integrity and efficient data retrieval.   
 - \*\*Customer Database\*\*: Stores customer account information, including name, email, password, and contact details.   
 - \*\*Product Database\*\*: Stores product details such as name, description, price, category, and inventory status.   
 - \*\*Order Database\*\*: Stores order details, including order number, customer ID, product IDs, quantities, shipping address, payment method, and order status.   
 - \*\*Payment Database\*\*: Stores customer payment methods, including card information and billing addresses. The data is encrypted for security.   
 - \*\*Notification Database\*\*: Stores customer notification preferences, including email subscriptions for order updates, promotions, and inventory alerts.   
  
- \*\*Payment Gateway API\*\*: The system integrates with a third-party payment gateway API to process transactions securely. The API receives payment details (e.g., card number, expiration date, billing address) and returns a transaction confirmation or error message. The system uses HTTPS to communicate with the API, ensuring secure data transmission.   
  
- \*\*Email Service API\*\*: The system interacts with an email service API to send confirmation emails to customers. The API receives the customer’s email address and a confirmation action (e.g., registration, checkout, notification setup), and sends a confirmation email with a verification link. The system uses HTTPS to communicate with the API.   
  
- \*\*Inventory Management System\*\*: The system updates the inventory database during checkout and product management actions. This ensures that product availability is accurately reflected in the product listing and detail pages.   
  
2.4 Communication Interface Output   
The system communicates with external entities through the following methods:   
  
- \*\*Email Notifications\*\*: The system sends email notifications to customers for actions such as account registration, order placement, and notification preference updates. These emails include a verification link that customers can click to confirm their actions. The system uses an email service API to handle the sending of these notifications securely.   
- \*\*Web Browsing\*\*: The system is accessed via standard web protocols (HTTP/HTTPS). Users interact with the system through web browsers, and the system communicates with the client-side (e.g., JavaScript, HTML) to provide dynamic content and real-time updates.   
- \*\*API Communication\*\*: The system communicates with external APIs for payment processing and email notifications. The APIs are accessed using HTTPS, and the system sends and receives structured data in JSON format.   
  
Each communication interface is designed to be secure, reliable, and efficient, ensuring that the system can interact seamlessly with external services and users.