# Functional Requirement

# 1. Functional Requirements   
  
## 1.1 Customer Account Creation   
\*\*Function ID\*\*: FR-01   
\*\*Description\*\*: The system allows a customer to register an account by providing valid email, password, and other required information.   
\*\*Input\*\*: Customer's email, password, full name, and other optional registration fields.   
\*\*Output\*\*: A new customer account stored in the system with a confirmation email sent.   
  
## 1.2 Customer Login   
\*\*Function ID\*\*: FR-02   
\*\*Description\*\*: The system authenticates a customer’s login request using their email and password.   
\*\*Input\*\*: Email and password.   
\*\*Output\*\*: A successful login with a session established.   
  
## 1.3 Customer Logout   
\*\*Function ID\*\*: FR-03   
\*\*Description\*\*: The system allows a logged-in customer to end their session and log out securely.   
\*\*Input\*\*: Customer session ID or authentication token.   
\*\*Output\*\*: Session data cleared and customer redirected to login/homepage.   
  
## 1.4 Manage Customer Profile   
\*\*Function ID\*\*: FR-04   
\*\*Description\*\*: The system allows a customer to update or delete their profile information, such as email, password, and addresses.   
\*\*Input\*\*: Customer session, new profile data (e.g., updated email, password, address).   
\*\*Output\*\*: Updated or deleted customer profile in the system.   
  
## 1.5 View Purchase History   
\*\*Function ID\*\*: FR-05   
\*\*Description\*\*: The system allows a customer to view a list of their previous orders with detailed information.   
\*\*Input\*\*: Customer session and query parameters (e.g., date range, order status).   
\*\*Output\*\*: A list of order details (e.g., order number, date, total amount, items).   
  
## 1.6 Add Payment Information   
\*\*Function ID\*\*: FR-06   
\*\*Description\*\*: The system allows a customer to add a new payment method, such as credit card details and billing address.   
\*\*Input\*\*: Customer session, payment type, card number (last four digits), expiration date, CVV, billing address ID.   
\*\*Output\*\*: New payment information stored securely in the system.   
  
## 1.7 Update Payment Information   
\*\*Function ID\*\*: FR-07   
\*\*Description\*\*: The system allows a customer to modify an existing payment method.   
\*\*Input\*\*: Customer session, payment ID, updated payment details.   
\*\*Output\*\*: Updated payment information stored in the system.   
  
## 1.8 Delete Payment Information   
\*\*Function ID\*\*: FR-08   
\*\*Description\*\*: The system allows a customer to remove a payment method from their profile.   
\*\*Input\*\*: Customer session, payment ID, and identity verification (e.g., password).   
\*\*Output\*\*: Payment information removed from the system.   
  
## 1.9 Add Product to Shopping Cart   
\*\*Function ID\*\*: FR-09   
\*\*Description\*\*: The system allows a customer to add a product to their shopping cart with a specified quantity.   
\*\*Input\*\*: Customer session (or guest cart ID), product ID, and quantity.   
\*\*Output\*\*: Updated shopping cart with the new item and quantity.   
  
## 1.10 View Shopping Cart   
\*\*Function ID\*\*: FR-10   
\*\*Description\*\*: The system allows a customer to view the current contents of their shopping cart, including product details, quantity, and total cost.   
\*\*Input\*\*: Customer session (or guest cart ID).   
\*\*Output\*\*: Cart contents with total items and total price displayed.   
  
## 1.11 Modify Cart Item Quantity   
\*\*Function ID\*\*: FR-11   
\*\*Description\*\*: The system allows a customer to change the quantity of an item in the shopping cart.   
\*\*Input\*\*: Customer session (or guest cart ID), cart item ID, and new quantity.   
\*\*Output\*\*: Updated cart item with the new quantity and updated total price.   
  
## 1.12 Remove Cart Item   
\*\*Function ID\*\*: FR-12   
\*\*Description\*\*: The system allows a customer to remove a specific item from their shopping cart.   
\*\*Input\*\*: Customer session (or guest cart ID), cart item ID.   
\*\*Output\*\*: Cart item removed and updated cart summary displayed.   
  
## 1.13 Proceed to Checkout   
\*\*Function ID\*\*: FR-13   
\*\*Description\*\*: The system allows a customer to proceed from the shopping cart to the checkout process, where payment and shipping information is collected.   
\*\*Input\*\*: Customer session (or guest cart ID), selected payment method, shipping address.   
\*\*Output\*\*: A checkout page with all cart items, selected payment, and shipping address.   
  
## 1.14 Confirm Order Placement   
\*\*Function ID\*\*: FR-14   
\*\*Description\*\*: The system allows a customer to confirm and finalize their order after completing the checkout process.   
\*\*Input\*\*: Customer session, confirmed cart items, payment method, and shipping address.   
\*\*Output\*\*: A new order record created in the system with updated inventory and a confirmation email sent.   
  
## 1.15 Send Order Confirmation Email   
\*\*Function ID\*\*: FR-15   
\*\*Description\*\*: The system sends a confirmation email to the customer after an order is successfully placed.   
\*\*Input\*\*: Order ID, customer email, and order details.   
\*\*Output\*\*: Email notification sent to the customer with the order summary.   
  
## 1.16 Manage Inventory   
\*\*Function ID\*\*: FR-16   
\*\*Description\*\*: The system allows an administrator to add, update, or delete product inventory records.   
\*\*Input\*\*: Admin session, product ID, stock quantity, restock threshold, and restock date.   
\*\*Output\*\*: Updated inventory records in the system.   
  
## 1.17 Add New Product   
\*\*Function ID\*\*: FR-17   
\*\*Description\*\*: The system allows an administrator to add a new product, including name, price, description, category, and image.   
\*\*Input\*\*: Admin session, product name, price, description, category ID, stock quantity, and image file (optional).   
\*\*Output\*\*: A new product record stored in the database and associated with a category.   
  
## 1.18 Update Product Details   
\*\*Function ID\*\*: FR-18   
\*\*Description\*\*: The system allows an administrator to update an existing product's details, such as name, price, description, category, and image.   
\*\*Input\*\*: Admin session, product ID, updated product details.   
\*\*Output\*\*: Updated product record in the database.   
  
## 1.19 Delete Product   
\*\*Function ID\*\*: FR-19   
\*\*Description\*\*: The system allows an administrator to delete a product from the system, ensuring it is not part of any active orders.   
\*\*Input\*\*: Admin session, product ID.   
\*\*Output\*\*: Product record removed from the system and associated inventory updated.   
  
## 1.20 Assign Product to Category   
\*\*Function ID\*\*: FR-20   
\*\*Description\*\*: The system allows an administrator to assign a product to a specific category.   
\*\*Input\*\*: Admin session, product ID, category ID.   
\*\*Output\*\*: Updated product-category association stored in the database.   
  
## 1.21 Create Product Category   
\*\*Function ID\*\*: FR-21   
\*\*Description\*\*: The system allows an administrator to create a new product category with a name and description.   
\*\*Input\*\*: Admin session, category name, description, and parent category ID (optional).   
\*\*Output\*\*: A new category record stored in the database.   
  
## 1.22 Update Product Category   
\*\*Function ID\*\*: FR-22   
\*\*Description\*\*: The system allows an administrator to modify an existing product category’s name or description.   
\*\*Input\*\*: Admin session, category ID, updated category name and description.   
\*\*Output\*\*: Updated category record in the database.   
  
## 1.23 Delete Product Category   
\*\*Function ID\*\*: FR-23   
\*\*Description\*\*: The system allows an administrator to delete a product category after ensuring no products are associated with it.   
\*\*Input\*\*: Admin session, category ID.   
\*\*Output\*\*: Category record removed from the database.   
  
## 1.24 Process Payment   
\*\*Function ID\*\*: FR-24   
\*\*Description\*\*: The system processes the customer's selected payment method during checkout and confirms the transaction.   
\*\*Input\*\*: Order ID, payment method details (e.g., card number, expiration, billing address).   
\*\*Output\*\*: Payment processed, order status updated to "Paid", and transaction recorded.   
  
## 1.25 Manage Order Detail   
\*\*Function ID\*\*: FR-25   
\*\*Description\*\*: The system allows an administrator to modify order details such as product quantity or item status.   
\*\*Input\*\*: Admin session, order detail ID, updated product quantity or status.   
\*\*Output\*\*: Updated order detail stored in the database.   
  
## 1.26 View Order Details   
\*\*Function ID\*\*: FR-26   
\*\*Description\*\*: The system allows a customer or administrator to view the detailed information of a specific order.   
\*\*Input\*\*: Order ID and user session.   
\*\*Output\*\*: Display of order items, total amount, payment method, and status.   
  
## 1.27 Cancel Order   
\*\*Function ID\*\*: FR-28   
\*\*Description\*\*: The system allows a customer to cancel an order before it is shipped and updates inventory accordingly.   
\*\*Input\*\*: Customer session, order ID.   
\*\*Output\*\*: Order status updated to "Canceled", inventory updated, and cancellation email sent.   
  
## 1.28 Manage Address   
\*\*Function ID\*\*: FR-29   
\*\*Description\*\*: The system allows a customer to add, update, or delete shipping and billing addresses.   
\*\*Input\*\*: Customer session, address ID (for update/delete), address details (for add/update).   
\*\*Output\*\*: Updated or deleted address record stored in the system.   
  
## 1.29 Manage Session   
\*\*Function ID\*\*: FR-30   
\*\*Description\*\*: The system manages customer login sessions, including session creation, expiration, and invalidation.   
\*\*Input\*\*: Customer login credentials, session ID, or logout request.   
\*\*Output\*\*: Session created, updated, or destroyed.   
  
## 1.30 Manage Notification Preference   
\*\*Function ID\*\*: FR-31   
\*\*Description\*\*: The system allows a customer to set their notification preferences (e.g., enable/disable email, SMS, push notifications).   
\*\*Input\*\*: Customer session, notification preference ID, and updated preferences.   
\*\*Output\*\*: Updated notification preference stored in the system.   
  
## 1.31 Manage Plugin   
\*\*Function ID\*\*: FR-32   
\*\*Description\*\*: The system allows an administrator to install, uninstall, or configure plugins to extend system functionality.   
\*\*Input\*\*: Admin session, plugin ID, plugin file (for install), configuration parameters (for update).   
\*\*Output\*\*: Plugin installed, uninstalled, or configured, and system functionality updated accordingly.   
  
## 1.32 View Order History   
\*\*Function ID\*\*: FR-33   
\*\*Description\*\*: The system allows a customer to view a summary of all their previous orders.   
\*\*Input\*\*: Customer session.   
\*\*Output\*\*: A list of orders with order numbers, dates, total prices, and statuses.   
  
## 1.33 Send Email Notification   
\*\*Function ID\*\*: FR-34   
\*\*Description\*\*: The system sends email notifications to customers for various events, such as account confirmation, order updates, or reminders.   
\*\*Input\*\*: Notification type, recipient email, and content.   
\*\*Output\*\*: Email sent to the customer and notification status updated in the system.

# External Description

# Chapter 2: External Interfaces  
  
This chapter defines the external interfaces that the system interacts with, categorized into \*\*User Interface\*\*, \*\*Hardware Interface\*\*, \*\*Software Interface\*\*, and \*\*Communication Interface\*\*. These interfaces facilitate interaction between the system and its users, other systems, hardware devices, or external services.  
  
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## 2.1 User Interface  
  
### 2.1.1 Web-Based User Interface (UI)  
  
\*\*Description\*\*:   
The system provides a web-based user interface through which customers and administrators interact with the system to perform various functions such as account creation, product browsing, order placement, and inventory management.  
  
\*\*Functions Supported\*\*:  
- Customer Account Creation (FR-01)  
- Customer Login/Logout (FR-02, FR-03)  
- Profile Management (FR-04)  
- Purchase History & Order Details (FR-05, FR-26, FR-33)  
- Shopping Cart Management (FR-09–FR-13)  
- Checkout and Order Placement (FR-13, FR-14, FR-24)  
- Payment Information Management (FR-06–FR-08)  
- Address Management (FR-29)  
- Notification Preferences (FR-31)  
- Administrator Product and Category Management (FR-16–FR-23)  
- Order Management (FR-25, FR-28)  
- Plugin Management (FR-32)  
  
\*\*Interaction Method\*\*:  
- HTML/CSS/JavaScript-based frontend.  
- Responsive design for desktop and mobile devices.  
- Input via form fields, buttons, dropdowns, etc.  
- Output includes dynamic content rendering (e.g., cart summary, order history).  
  
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## 2.2 Hardware Interface  
  
There are no direct interactions with specific hardware devices in the current functional scope of the system. The system is designed to operate on standard computing hardware and does not require any specialized peripheral devices for normal operation.  
  
\*\*Note\*\*: In future extensions, hardware interfaces may be introduced (e.g., barcode scanners, payment terminals), but they are not part of the current requirements.  
  
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## 2.3 Software Interface  
  
### 2.3.1 Database System  
  
\*\*Description\*\*:   
The system interacts with a relational database system to store and retrieve persistent data such as customer accounts, product information, orders, inventory, payment details, and notification preferences.  
  
\*\*Data Entities\*\*:  
- Customers (FR-01–FR-04)  
- Products (FR-17–FR-23)  
- Inventory (FR-16)  
- Orders (FR-14, FR-25–FR-28)  
- Payments (FR-06–FR-08, FR-24)  
- Addresses (FR-29)  
- Categories (FR-20–FR-23)  
- Notifications (FR-31, FR-34)  
- Plugins (FR-32)  
  
\*\*Database Interaction Method\*\*:  
- CRUD operations via SQL queries or ORM framework.  
- Secure access using authentication credentials.  
- Transactions used where applicable (e.g., during order placement and inventory update).  
- Encrypted storage of sensitive data (e.g., passwords, payment details).  
  
### 2.3.2 Third-Party Payment Gateway API  
  
\*\*Description\*\*:   
The system integrates with a third-party payment gateway to securely process payments during checkout.  
  
\*\*Supported Functions\*\*:  
- Process Payment (FR-24)  
  
\*\*Interaction Method\*\*:  
- RESTful API calls to the payment service provider.  
- Input: Order ID, payment method details (card number, expiration date, billing address).  
- Output: Transaction status (success/failure), transaction ID.  
- Security: TLS encryption, tokenization of card data, PCI-DSS compliance.  
  
### 2.3.3 Email Service API  
  
\*\*Description\*\*:   
The system uses an email service API to send automated emails to customers for notifications such as account confirmation, order confirmation, cancellations, and reminders.  
  
\*\*Supported Functions\*\*:  
- Send Order Confirmation Email (FR-15)  
- Send Email Notification (FR-34)  
  
\*\*Interaction Method\*\*:  
- Integration with SMTP server or cloud-based email service (e.g., SendGrid, Amazon SES).  
- Input: Recipient email, subject, message body, attachments (if any).  
- Output: Delivery status (sent/delivered/failed) logged in the system.  
  
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## 2.4 Communication Interface  
  
### 2.4.1 HTTP/HTTPS Protocol  
  
\*\*Description\*\*:   
The system communicates over the internet using HTTP/HTTPS protocols for all client-server interactions, ensuring secure and encrypted communication.  
  
\*\*Supported Functions\*\*:  
- All user-facing operations (e.g., login, registration, shopping cart, checkout).  
- Administrator functions (product and order management).  
  
\*\*Interaction Method\*\*:  
- RESTful API endpoints for backend-to-frontend communication.  
- JSON format for request/response payloads.  
- HTTPS for encryption in transit.  
- Session tokens or cookies used for state management.  
  
### 2.4.2 Email Communication  
  
\*\*Description\*\*:   
Email is used as a communication channel to notify users about important events related to their account, orders, and system updates.  
  
\*\*Supported Functions\*\*:  
- Send Order Confirmation Email (FR-15)  
- Send Email Notification (FR-34)  
  
\*\*Interaction Method\*\*:  
- Asynchronous communication triggered by system events.  
- Emails sent via integrated email service.  
- Content dynamically generated based on event type and user context.  
  
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## Summary Table of External Interfaces  
  
| Interface Type | Interface Name | Associated Functional Requirements |  
|----------------------|------------------------------|--------------------------------------------------------|  
| User Interface | Web-Based UI | FR-01–FR-04, FR-05–FR-14, FR-16–FR-34 |  
| Software Interface | Database System | FR-01–FR-08, FR-14–FR-29, FR-31–FR-34 |  
| Software Interface | Payment Gateway API | FR-24 |  
| Software Interface | Email Service API | FR-15, FR-34 |  
| Communication Interface | HTTP/HTTPS Protocol | All |  
| Communication Interface | Email Communication | FR-15, FR-34 |  
  
All external interfaces have been identified and mapped directly from the functional requirements to ensure traceability and completeness.