# Functional Requirement

1. Functional Requirements  
  
1.1 Customer Account Creation Function   
Function ID: FR-01   
Description: The system allows a customer to create a new user account by providing personal information such as name, email, password, and contact details. The system must validate the email format and password strength, send a confirmation email, and activate the account after confirmation.   
Input: Name, Email, Password, Address, PhoneNumber   
Output: New UserAccount with status "Pending" or "Active", Confirmation Email sent to the provided email address   
  
1.2 User Login Function   
Function ID: FR-02   
Description: The system authenticates a user by verifying their email and password against the UserAccount database. Upon successful login, a UserSession is created and logged.   
Input: Email, Password   
Output: Active UserSession, User redirected to appropriate dashboard   
  
1.3 User Logout Function   
Function ID: FR-03   
Description: The system terminates the current UserSession and logs the logout event.   
Input: Current UserSession   
Output: Inactive UserSession, User redirected to login or home page   
  
1.4 View Personal Information Function   
Function ID: FR-04   
Description: The system retrieves and displays the personal information of the logged-in user from the UserAccount entity.   
Input: UserID (from UserSession)   
Output: Displayed Name, Email, Address, PhoneNumber, Role, Account Status   
  
1.5 Update Payment Information Function   
Function ID: FR-05   
Description: The system allows the user to edit their PaymentInformation, such as card number, expiration date, and billing address. Validation of the card and expiration date is required.   
Input: PaymentID, CardNumber, ExpiryDate, CVV, BillingAddress   
Output: Updated PaymentInformation, System logs the update   
  
1.6 View Purchase History Function   
Function ID: FR-06   
Description: The system retrieves and displays the user's Order records from the Order database, including product details, total price, and order status.   
Input: UserID (from UserSession)   
Output: List of Orders with associated Product, TotalAmount, OrderDate, Status, and PaymentInformation   
  
1.7 Add Product to Cart Function   
Function ID: FR-07   
Description: The system allows a customer to add a selected product to their ShoppingCart. The system checks product availability from the Inventory and updates the CartItem and CartSummary.   
Input: ProductID, CartID, Quantity   
Output: Updated ShoppingCart, Updated CartItem, Updated CartSummary   
  
1.8 Modify Cart Contents Function   
Function ID: FR-08   
Description: The system allows a customer to update the quantity of a CartItem or remove it from the ShoppingCart. The system recalculates the CartSummary and updates the Inventory if necessary.   
Input: CartItemID, NewQuantity, Action (update/remove)   
Output: Updated CartItem, Updated CartSummary, Updated InventoryQuantityUpdateLog if applicable   
  
1.9 View Cart Summary Function   
Function ID: FR-09   
Description: The system retrieves and displays the total price, total quantity, and list of CartItems for the current ShoppingCart.   
Input: CartID   
Output: Displayed CartSummary including TotalItems and TotalPrice, List of CartItems   
  
1.10 Checkout Order Function   
Function ID: FR-10   
Description: The system processes the customer’s ShoppingCart by validating payment information, reducing inventory, creating an Order, and sending an OrderConfirmationEmail.   
Input: CartID, PaymentID, ShippingMethod   
Output: Created Order, Updated Inventory, Sent OrderConfirmationEmail, Cleared ShoppingCart   
  
1.11 Confirm Order Function   
Function ID: FR-11   
Description: The system confirms the customer’s Order after payment validation. Inventory is updated, and an OrderConfirmationEmail is sent.   
Input: OrderID, PaymentID   
Output: Confirmed Order, Updated Inventory, Sent OrderConfirmationEmail   
  
1.12 Receive Order Confirmation Email Function   
Function ID: FR-12   
Description: The system sends an OrderConfirmationEmail to the customer’s registered email address after an order is confirmed.   
Input: OrderID, CustomerEmail   
Output: Sent OrderConfirmationEmail with Order details, Log of email delivery   
  
1.13 Manage Inventory Function   
Function ID: FR-13   
Description: The system allows the administrator to view, update, and log changes to the Inventory. Product availability is updated accordingly.   
Input: ProductID, NewQuantity, InventoryID   
Output: Updated Inventory, Updated Product availability status, InventoryQuantityUpdateLog   
  
1.14 Add Product Function   
Function ID: FR-14   
Description: The system allows the administrator to add a new Product to the database, including name, price, description, category, and inventory quantity.   
Input: Name, Description, Price, CategoryID, InventoryQuantity, ImageURL   
Output: New Product record, Updated Inventory, Confirmation message   
  
1.15 Update Product Details Function   
Function ID: FR-15   
Description: The system allows the administrator to modify Product details such as name, price, description, or category. Inventory is updated if necessary.   
Input: ProductID, NewName, NewDescription, NewPrice, NewCategoryID, NewInventoryQuantity   
Output: Updated Product record, Updated Inventory, Log of the update   
  
1.16 Delete Product Function   
Function ID: FR-16   
Description: The system allows the administrator to delete a Product and its associated Inventory entry. Products in ShoppingCarts or Orders must be handled before deletion.   
Input: ProductID   
Output: Deleted Product, Updated or deleted Inventory entry, Log of the deletion   
  
1.17 Create Category Function   
Function ID: FR-17   
Description: The system allows the administrator to create a new Category with a name and description.   
Input: Name, Description   
Output: New Category record, Updated product catalog display   
  
1.18 Update Category Function   
Function ID: FR-18   
Description: The system allows the administrator to update the name or description of an existing Category.   
Input: CategoryID, NewName, NewDescription   
Output: Updated Category record, Updated product catalog display   
  
1.19 Delete Category Function   
Function ID: FR-19   
Description: The system allows the administrator to delete a Category, and optionally reassign or mark products as uncategorized.   
Input: CategoryID   
Output: Deleted Category, Updated Product records, Log of the deletion   
  
1.20 View Product List Function   
Function ID: FR-20   
Description: The system retrieves and displays a list of available Products with details such as name, price, description, category, and availability.   
Input: Optional filters (e.g., category, price range, availability)   
Output: Displayed list of Products, User can select to view or add to cart   
  
1.21 Manage Orders Function   
Function ID: FR-21   
Description: The system allows the user to view, update, or cancel their Orders. The system logs the activity and updates the Order status.   
Input: OrderID, Action (update/cancel), NewStatus   
Output: Updated Order record, Log of the action, Confirmation message   
  
1.22 View Order Details Function   
Function ID: FR-22   
Description: The system retrieves and displays detailed information about a specific Order, including product list, total price, and payment and shipping status.   
Input: OrderID   
Output: Displayed Order details, Log of access   
  
1.23 Process Payment Function   
Function ID: FR-23   
Description: The system processes the customer’s payment using the selected PaymentInformation and updates the Order and Inventory accordingly.   
Input: OrderID, PaymentID   
Output: Updated Order status (Paid), Updated Inventory, Sent OrderConfirmationEmail, Log of payment processing   
  
1.24 View Payment Information Function   
Function ID: FR-24   
Description: The system retrieves and displays the PaymentInformation for the logged-in user.   
Input: UserID (from UserSession)   
Output: Displayed Payment details including CardNumber, ExpiryDate, BillingAddress   
  
1.25 Install Plugin Function   
Function ID: FR-25   
Description: The system allows the administrator to install a new Plugin, validate it, and activate it.   
Input: Plugin file or PluginID   
Output: Installed Plugin, Updated system configuration, Log of installation   
  
1.26 View Plugin Documentation Function   
Function ID: FR-26   
Description: The system allows the administrator to view documentation related to a Plugin.   
Input: PluginID   
Output: Displayed Plugin documentation, Log of access   
  
1.27 Manage Cart Item Function   
Function ID: FR-28   
Description: The system allows the customer to manage individual CartItems, including updating quantity or removing them.   
Input: CartItemID, NewQuantity, Action (update/remove)   
Output: Updated CartItem, Updated CartSummary, Log of modification if applicable

# External Description

# 2. External Interfaces  
  
This section describes the external interfaces that the system interacts with in order to fulfill its functional requirements. These interfaces include user interfaces, hardware interfaces, software interfaces (including databases and third-party services), and communication interfaces such as email notifications.  
  
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## 2.1 User Interface  
  
### 2.1.1 User Account Creation UI   
\*\*Description:\*\* A form-based interface where users can input their personal information (name, email, password, address, phone number) to create a new account.   
\*\*Inputs:\*\* Name, Email, Password, Address, PhoneNumber   
\*\*Outputs:\*\* Display of confirmation message or error messages; redirection to login page or dashboard upon success.  
  
### 2.1.2 User Login UI   
\*\*Description:\*\* A login screen where users enter their email and password for authentication.   
\*\*Inputs:\*\* Email, Password   
\*\*Outputs:\*\* Redirect to appropriate dashboard if successful, or display an error message if authentication fails.  
  
### 2.1.3 User Logout UI   
\*\*Description:\*\* A button or link that allows the user to log out of their session.   
\*\*Inputs:\*\* Current UserSession   
\*\*Outputs:\*\* Inactive session status; redirect to login or home page.  
  
### 2.1.4 View Personal Information UI   
\*\*Description:\*\* A profile page displaying the user’s personal details (name, email, address, phone number, role, account status).   
\*\*Inputs:\*\* UserID from current session   
\*\*Outputs:\*\* Displayed user information in a structured format.  
  
### 2.1.5 Update Payment Information UI   
\*\*Description:\*\* A form allowing the user to update their payment details (card number, expiration date, CVV, billing address).   
\*\*Inputs:\*\* PaymentID, CardNumber, ExpiryDate, CVV, BillingAddress   
\*\*Outputs:\*\* Confirmation message on successful update; error message on validation failure.  
  
### 2.1.6 View Purchase History UI   
\*\*Description:\*\* A page listing all previous orders made by the user, including product details, total price, order status, and payment information.   
\*\*Inputs:\*\* UserID from current session   
\*\*Outputs:\*\* List of Orders with associated Product, TotalAmount, OrderDate, Status, and PaymentInformation.  
  
### 2.1.7 Add Product to Cart UI   
\*\*Description:\*\* A button or interface allowing the user to add a selected product to their shopping cart.   
\*\*Inputs:\*\* ProductID, CartID, Quantity   
\*\*Outputs:\*\* Updated ShoppingCart, CartItem, and CartSummary displayed on the screen.  
  
### 2.1.8 Modify Cart Contents UI   
\*\*Description:\*\* An interface allowing the user to adjust quantities or remove items from the cart.   
\*\*Inputs:\*\* CartItemID, NewQuantity, Action (update/remove)   
\*\*Outputs:\*\* Updated CartItem, CartSummary, and InventoryQuantityUpdateLog if applicable.  
  
### 2.1.9 View Cart Summary UI   
\*\*Description:\*\* A summary page showing the total price, quantity, and list of items in the user's current cart.   
\*\*Inputs:\*\* CartID   
\*\*Outputs:\*\* Display of CartSummary with TotalItems, TotalPrice, and list of CartItems.  
  
### 2.1.10 Checkout Order UI   
\*\*Description:\*\* A checkout page where the user selects a payment method and shipping option before finalizing the purchase.   
\*\*Inputs:\*\* CartID, PaymentID, ShippingMethod   
\*\*Outputs:\*\* Created Order, updated Inventory, sent OrderConfirmationEmail, and cleared ShoppingCart.  
  
### 2.1.11 Confirm Order UI   
\*\*Description:\*\* A confirmation screen or backend process confirming the order after payment validation.   
\*\*Inputs:\*\* OrderID, PaymentID   
\*\*Outputs:\*\* Confirmed Order, updated Inventory, and sent OrderConfirmationEmail.  
  
### 2.1.12 Receive Order Confirmation Email UI   
\*\*Description:\*\* A system-generated email sent to the user after the order is confirmed.   
\*\*Inputs:\*\* OrderID, CustomerEmail   
\*\*Outputs:\*\* Sent OrderConfirmationEmail with Order details and a log entry of delivery.  
  
### 2.1.13 Manage Inventory UI   
\*\*Description:\*\* An administrative interface for viewing, updating, and logging changes to inventory levels.   
\*\*Inputs:\*\* ProductID, NewQuantity, InventoryID   
\*\*Outputs:\*\* Updated Inventory, updated Product availability status, and InventoryQuantityUpdateLog.  
  
### 2.1.14 Add Product UI   
\*\*Description:\*\* An administrative interface for adding new products to the database.   
\*\*Inputs:\*\* Name, Description, Price, CategoryID, InventoryQuantity, ImageURL   
\*\*Outputs:\*\* New Product record, updated Inventory, and confirmation message.  
  
### 2.1.15 Update Product Details UI   
\*\*Description:\*\* An administrative interface for modifying product details.   
\*\*Inputs:\*\* ProductID, NewName, NewDescription, NewPrice, NewCategoryID, NewInventoryQuantity   
\*\*Outputs:\*\* Updated Product record, updated Inventory, and log of the update.  
  
### 2.1.16 Delete Product UI   
\*\*Description:\*\* An administrative interface for deleting a product and its inventory entry.   
\*\*Inputs:\*\* ProductID   
\*\*Outputs:\*\* Deleted Product, updated or deleted Inventory entry, and log of deletion.  
  
### 2.1.17 Create Category UI   
\*\*Description:\*\* An administrative interface for creating new categories.   
\*\*Inputs:\*\* Name, Description   
\*\*Outputs:\*\* New Category record and updated product catalog display.  
  
### 2.1.18 Update Category UI   
\*\*Description:\*\* An administrative interface for updating category names or descriptions.   
\*\*Inputs:\*\* CategoryID, NewName, NewDescription   
\*\*Outputs:\*\* Updated Category record and updated product catalog display.  
  
### 2.1.19 Delete Category UI   
\*\*Description:\*\* An administrative interface for deleting a category and optionally reassigning or marking products as uncategorized.   
\*\*Inputs:\*\* CategoryID   
\*\*Outputs:\*\* Deleted Category, updated Product records, and log of deletion.  
  
### 2.1.20 View Product List UI   
\*\*Description:\*\* A product listing page with optional filters (category, price range, availability).   
\*\*Inputs:\*\* Optional filters (e.g., category, price range, availability)   
\*\*Outputs:\*\* Displayed list of Products with name, price, description, category, and availability; ability to view or add to cart.  
  
### 2.1.21 Manage Orders UI   
\*\*Description:\*\* A user-facing interface for viewing, updating, or canceling orders.   
\*\*Inputs:\*\* OrderID, Action (update/cancel), NewStatus   
\*\*Outputs:\*\* Updated Order record, log of action, and confirmation message.  
  
### 2.1.22 View Order Details UI   
\*\*Description:\*\* A detailed view of a specific order, including product list, total price, and payment/shipping status.   
\*\*Inputs:\*\* OrderID   
\*\*Outputs:\*\* Displayed Order details and log of access.  
  
### 2.1.23 Process Payment UI   
\*\*Description:\*\* A payment processing interface that validates and processes customer payment.   
\*\*Inputs:\*\* OrderID, PaymentID   
\*\*Outputs:\*\* Updated Order status (Paid), updated Inventory, sent OrderConfirmationEmail, and log of payment processing.  
  
### 2.1.24 View Payment Information UI   
\*\*Description:\*\* A user-facing interface that displays the user’s payment details.   
\*\*Inputs:\*\* UserID from current session   
\*\*Outputs:\*\* Displayed Payment details including CardNumber, ExpiryDate, BillingAddress.  
  
### 2.1.25 Install Plugin UI   
\*\*Description:\*\* An administrative interface for installing plugins.   
\*\*Inputs:\*\* Plugin file or PluginID   
\*\*Outputs:\*\* Installed Plugin, updated system configuration, and log of installation.  
  
### 2.1.26 View Plugin Documentation UI   
\*\*Description:\*\* An administrative interface for viewing plugin documentation.   
\*\*Inputs:\*\* PluginID   
\*\*Outputs:\*\* Displayed Plugin documentation and log of access.  
  
### 2.1.27 Manage Cart Item UI   
\*\*Description:\*\* A user-facing interface for managing individual cart items (updating quantity or removing).   
\*\*Inputs:\*\* CartItemID, NewQuantity, Action (update/remove)   
\*\*Outputs:\*\* Updated CartItem, updated CartSummary, and log of modification if applicable.  
  
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## 2.2 Hardware Interface  
  
There are no direct hardware interfaces required for this system. All operations are conducted through software components and web-based interactions. However, the system may be deployed on servers or cloud infrastructure that require standard hardware support, such as:  
  
- \*\*Server Hardware:\*\* Standard server configurations (CPU, RAM, storage).  
- \*\*Network Equipment:\*\* Routers, switches, and firewalls for secure data transmission.  
- \*\*Client Devices:\*\* Web browsers and mobile devices used by customers and administrators.  
  
These hardware components are considered part of the deployment environment and not directly interfaced with by the application logic.  
  
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## 2.3 Software Interface  
  
### 2.3.1 Database Interface   
\*\*Description:\*\* The system interacts with one or more relational databases to store and retrieve data related to Users, Orders, Products, Inventory, PaymentInformation, and Logs.  
  
\*\*Data Sources:\*\*  
- \*\*UserAccount\*\* – Stores user registration details, roles, and account status.  
- \*\*PaymentInformation\*\* – Stores credit card details, billing addresses, etc.  
- \*\*Order\*\* – Tracks order details, status, and payment information.  
- \*\*Product\*\* – Contains product metadata like name, price, description, and category.  
- \*\*Inventory\*\* – Tracks available stock for each product.  
- \*\*Cart\*\* – Manages user shopping carts and cart items.  
- \*\*Category\*\* – Defines product categories.  
- \*\*Plugin\*\* – Stores plugin configurations and documentation.  
- \*\*Log\*\* – Tracks system events, updates, and user actions.  
  
\*\*Interaction Method:\*\* SQL queries via ORM or direct SQL execution for CRUD operations.  
  
### 2.3.2 Third-Party API Interfaces   
\*\*Description:\*\* The system may interact with external APIs for payment processing, email notification, or other functionalities not implemented internally.  
  
\*\*Examples:\*\*  
- \*\*Payment Gateway API\*\* – For validating and processing payments (e.g., Stripe, PayPal).  
- \*\*Email Service API\*\* – For sending confirmation emails (e.g., SendGrid, SMTP).  
  
\*\*Interaction Method:\*\* RESTful API calls using HTTP verbs (GET, POST, PUT, DELETE) with JSON payload formats.  
  
### 2.3.3 Plugin Management Interface   
\*\*Description:\*\* The system provides an interface for installing, configuring, and managing plugins. Plugins may extend functionality or modify existing behavior.  
  
\*\*Interaction Method:\*\* File upload or PluginID-based activation, followed by validation and integration into the system.  
  
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## 2.4 Communication Interface  
  
### 2.4.1 Email Notification Interface   
\*\*Description:\*\* The system sends email notifications to users regarding account creation, order confirmation, and other relevant events.  
  
\*\*Interaction Method:\*\*  
- \*\*Input:\*\* OrderID, CustomerEmail  
- \*\*Output:\*\* Sent OrderConfirmationEmail with order details.  
- \*\*Communication Protocol:\*\* SMTP or use of third-party email service API (e.g., SendGrid).  
  
### 2.4.2 Network Communication Interface   
\*\*Description:\*\* The system communicates over HTTP/HTTPS protocols for web traffic between the client browser and the server backend.  
  
\*\*Interaction Method:\*\*  
- \*\*Input:\*\* HTTP requests from clients (e.g., GET, POST)  
- \*\*Output:\*\* JSON/XML responses or HTML content depending on the request type.  
  
### 2.4.3 Logging Interface   
\*\*Description:\*\* The system logs various events (user actions, system errors, database updates, etc.) to ensure traceability and auditing.  
  
\*\*Interaction Method:\*\*  
- \*\*Input:\*\* LogEvent (type, timestamp, user, action, details)  
- \*\*Output:\*\* Stored in a logging database or file system.  
  
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## Summary  
  
The system relies on a combination of user interfaces, software interfaces (databases and third-party APIs), and communication interfaces (email and network protocols) to fulfill its functional requirements. Each external interface has been clearly defined with its inputs, outputs, and interaction methods to guide development and implementation.