# Functional Requirement

1. Functional Requirements   
  
1.1 Product Creation Function   
 Function ID: FR-01   
 Description: Administrators can create new products by entering details such as name, description, price, category, and stock quantity. The system validates the data and uses the Plugin module to process any additional configurations.   
 Input: Product details including name, description, price, category, stock quantity, and other optional configurations.   
 Output: A new Product entity is created in the database with the provided details.   
  
1.2 Product Update Function   
 Function ID: FR-02   
 Description: Administrators can update existing product details such as name, description, price, category, and stock quantity. The system validates the updated data and uses the Plugin module for additional processing.   
 Input: Updated product details including name, description, price, category, stock quantity, and other optional configurations.   
 Output: The Product entity in the database is updated with the new details.   
  
1.3 Product Deletion Function   
 Function ID: FR-03   
 Description: Administrators can delete a product after confirmation. The system uses the Plugin module to perform pre-deletion checks and removes the Product entity from the database.   
 Input: Product ID and confirmation of deletion.   
 Output: The selected Product entity is removed from the database.   
  
1.4 Product Inventory Management Function   
 Function ID: FR-04   
 Description: Administrators can modify the stock quantity of a product. The system validates the new quantity and uses the Plugin module for inventory-related checks or actions.   
 Input: Product ID and new stock quantity.   
 Output: The Product entity's StockQuantity attribute is updated in the database.   
  
1.5 Product Detail Viewing Function   
 Function ID: FR-05   
 Description: Customers and administrators can view detailed information about a product, such as name, description, price, category, and availability.   
 Input: Product ID or selection from the product catalog.   
 Output: Displayed product details on a dedicated page.   
  
1.6 Customer Registration Function   
 Function ID: FR-06   
 Description: Administrators can register new customers by entering their details such as name, email, password, address, and contact information. The system validates the data and uses the Plugin module for additional checks.   
 Input: Customer details including name, email, password, address, and contact information.   
 Output: A new Customer entity is created in the database and a confirmation email is sent.   
  
1.7 Customer Profile Viewing Function   
 Function ID: FR-07   
 Description: Administrators can view a customer's profile, including name, email, address, and order history.   
 Input: Customer ID or selection from the customer list.   
 Output: Displayed customer profile details.   
  
1.8 Customer Information Update Function   
 Function ID: FR-08   
 Description: Administrators can update a customer's information, such as name, email, address, or contact details. The system validates the updated data and uses the Plugin module for additional checks.   
 Input: Updated customer details including name, email, address, and contact information.   
 Output: The Customer entity is updated in the database.   
  
1.9 Order Placement Function   
 Function ID: FR-09   
 Description: Customers can place an order by confirming their cart selection, shipping and billing information, and payment method. The system creates an Order entity, processes the Payment, and sends an order confirmation Email.   
 Input: Cart items, shipping and billing information, and selected payment method.   
 Output: A new Order entity is created, the Payment is processed, and a confirmation Email is sent.   
  
1.10 Order Cancellation Function   
 Function ID: FR-10   
 Description: Customers or administrators can cancel an order if it has not been shipped. The system updates the Order status, restores inventory levels, and sends a cancellation confirmation Email.   
 Input: Order ID and confirmation of cancellation.   
 Output: The Order status is updated to "Canceled," inventory levels are restored, and a confirmation Email is sent.   
  
1.11 Order Tracking Function   
 Function ID: FR-11   
 Description: Customers and administrators can track the status of an order. The system retrieves the Order entity and may use the Plugin module to verify or fetch the latest status.   
 Input: Order ID or selection from the order list.   
 Output: Displayed order status, shipping information, and estimated delivery time.   
  
1.12 Order History Management Function   
 Function ID: FR-12   
 Description: Administrators and customers can view and manage order history, including order status updates and cancellations.   
 Input: Order ID or selection from the order history list.   
 Output: Updated Order status or cancellation confirmation.   
  
1.13 Order Status Management Function   
 Function ID: FR-13   
 Description: Administrators can update an order’s status (e.g., Processing, Shipped, Delivered). The system validates the status transition and uses the Plugin module for any pre-status change actions.   
 Input: Order ID and new status.   
 Output: The OrderStatus entity is updated in the database, and any related actions (e.g., Email notification) are triggered.   
  
1.14 Payment Processing Function   
 Function ID: FR-14   
 Description: The system processes customer payments by validating the Order, using the Plugin module to execute the payment, and updating the Payment and Order status accordingly.   
 Input: Order ID and selected payment method.   
 Output: A new Payment entity is created and the Order status is updated.   
  
1.15 Payment Verification Function   
 Function ID: FR-15   
 Description: Administrators can verify the status of a payment. The system retrieves the Payment entity and uses the Plugin module to confirm the transaction with the payment gateway.   
 Input: Payment ID or selection from the payment list.   
 Output: The Payment status is updated and the verification result is displayed.   
  
1.16 Payment Refund Function   
 Function ID: FR-16   
 Description: Administrators can process a refund for a completed payment. The system validates the Order status, uses the Plugin module to execute the refund, updates the Payment and Order status, and sends a refund confirmation Email.   
 Input: Payment ID and confirmation of refund.   
 Output: The Payment status is updated to "Refunded," inventory levels are restored, and a confirmation Email is sent.   
  
1.17 Payment Detail Viewing Function   
 Function ID: FR-17   
 Description: Administrators and customers can view detailed information about a payment, including transaction ID, amount, date, and associated order.   
 Input: Payment ID or selection from the payment history list.   
 Output: Displayed payment details.   
  
1.18 Email Notification Function   
 Function ID: FR-18   
 Description: The system sends Email notifications to customers for order confirmation, status updates, and other system events. The system uses the Email module and may involve the Plugin module for post-notification processing.   
 Input: Order ID, Email template, and customer contact information.   
 Output: A confirmation or update Email is sent to the customer and logged in the Email entity.   
  
1.19 Email Template Management Function   
 Function ID: FR-19   
 Description: Administrators can create, update, or delete Email templates for notifications. The system uses the Plugin module for any pre-processing or validation.   
 Input: Email template details including subject, content, and placeholders.   
 Output: The EmailTemplate entity is created, updated, or deleted in the database.   
  
1.20 Email Settings Management Function   
 Function ID: FR-20   
 Description: Administrators can configure and update the system’s Email settings, such as SMTP server, port, sender address, and authentication details.   
 Input: Updated Email settings (e.g., server address, port, sender email).   
 Output: The Email settings are updated in the configuration database.   
  
1.21 Plugin Installation Function   
 Function ID: FR-21   
 Description: Administrators can install new plugins from a repository or uploaded files. The system validates the plugin for compatibility and security before installation.   
 Input: Plugin file or selection from a repository.   
 Output: A new Plugin entity is created in the database and the plugin is activated.   
  
1.22 Plugin Update Function   
 Function ID: FR-22   
 Description: Administrators can update existing plugins with new configurations or versions. The system validates the new plugin version or configuration before applying the update.   
 Input: Plugin ID, new configuration, or uploaded plugin file.   
 Output: The Plugin entity is updated in the database and the plugin is reactivated.   
  
1.23 Plugin Uninstallation Function   
 Function ID: FR-23   
 Description: Administrators can uninstall plugins after confirmation. The system uses the Plugin module to perform pre-uninstallation checks and removes the plugin from the system.   
 Input: Plugin ID and confirmation of uninstallation.   
 Output: The Plugin entity is removed from the database and the plugin is deactivated.   
  
1.24 Plugin Configuration Function   
 Function ID: FR-24   
 Description: Administrators can configure the settings of an installed plugin. The system validates and applies the new configuration to the Plugin entity.   
 Input: Plugin ID and updated configuration parameters.   
 Output: The Plugin entity is updated in the configuration database.   
  
1.25 Plugin Information Viewing Function   
 Function ID: FR-25   
 Description: Administrators can view detailed information about a plugin, including name, version, status, description, and configuration parameters.   
 Input: Plugin ID or selection from the plugin list.   
 Output: Displayed plugin details.   
  
1.26 Product Category Management Function   
 Function ID: FR-26   
 Description: Administrators can create, update, or delete product categories. The system validates the input data and uses the Plugin module for any additional checks.   
 Input: Category details including name, description, and parent category.   
 Output: The ProductCategory entity is created, updated, or deleted in the database.   
  
1.27 Payment Method Management Function   
 Function ID: FR-27   
 Description: Administrators can create, update, or delete payment methods. The system validates the input data and uses the Plugin module for integration checks.   
 Input: Payment method details including name, type, description, and configuration.   
 Output: The PaymentMethod entity is created, updated, or deleted in the database.   
  
1.28 Administrator Login Function   
 Function ID: FR-28   
 Description: Administrators can log into the system using valid credentials. The system validates the credentials and uses the Plugin module for additional security checks.   
 Input: Administrator username and password.   
 Output: Administrator is authenticated and redirected to the dashboard.

# External Description

# 2. External Interfaces  
  
This chapter defines and describes all the external interfaces of the system, including user interfaces, hardware interfaces, software interfaces, and communication interfaces. These interfaces are essential for the system to interact with users, external hardware, other software components, and communication channels.  
  
## 2.1 User Interface Output  
  
The system interacts with users through a series of well-defined user interfaces. These interfaces are used to display information, collect input, and confirm actions.  
  
### 2.1.1 Product Catalog Page   
\*\*Description\*\*: This interface allows customers and administrators to view a list of available products. Users can select a product to view its details.   
\*\*Interaction Method\*\*: Web-based interface with clickable product listings.   
\*\*Input/Output\*\*:   
- \*\*Input\*\*: Product ID or selection from the product catalog.   
- \*\*Output\*\*: Displayed product details on a dedicated page.   
  
### 2.1.2 Product Management Interface   
\*\*Description\*\*: This interface is used by administrators to create, update, delete, and manage products. It includes fields for product name, description, price, category, and stock quantity.   
\*\*Interaction Method\*\*: Web-based form interface for data entry and modification.   
\*\*Input/Output\*\*:   
- \*\*Input\*\*: Product details including name, description, price, category, stock quantity, and other optional configurations.   
- \*\*Output\*\*: Confirmation message or error message based on system validation.   
  
### 2.1.3 Customer Management Interface   
\*\*Description\*\*: This interface is used by administrators to register, view, and update customer information. It includes fields for name, email, password, address, and contact information.   
\*\*Interaction Method\*\*: Web-based form interface for customer data entry and modification.   
\*\*Input/Output\*\*:   
- \*\*Input\*\*: Customer details including name, email, password, address, and contact information.   
- \*\*Output\*\*: Displayed customer profile details or confirmation message.   
  
### 2.1.4 Order Management Interface   
\*\*Description\*\*: This interface is used by both customers and administrators to place, cancel, track, and view order history. It includes order status, shipping information, and estimated delivery time.   
\*\*Interaction Method\*\*: Web-based interface with order list and status update forms.   
\*\*Input/Output\*\*:   
- \*\*Input\*\*: Order ID or selection from the order list.   
- \*\*Output\*\*: Displayed order status, shipping information, and estimated delivery time, or updated order status.   
  
### 2.1.5 Payment Management Interface   
\*\*Description\*\*: This interface is used by administrators and customers to view payment details and initiate refunds. It includes fields for transaction ID, amount, date, and associated order.   
\*\*Interaction Method\*\*: Web-based interface with payment history and refund initiation forms.   
\*\*Input/Output\*\*:   
- \*\*Input\*\*: Payment ID or selection from the payment history list.   
- \*\*Output\*\*: Displayed payment details or confirmation of refund processing.   
  
### 2.1.6 Plugin Management Interface   
\*\*Description\*\*: This interface is used by administrators to install, update, uninstall, and configure plugins. It includes plugin details such as name, version, status, description, and configuration parameters.   
\*\*Interaction Method\*\*: Web-based interface with plugin installation, configuration, and management forms.   
\*\*Input/Output\*\*:   
- \*\*Input\*\*: Plugin file or selection from a repository, plugin ID, new configuration, or confirmation of uninstallation.   
- \*\*Output\*\*: Displayed plugin details or confirmation of installation, update, or uninstallation.   
  
### 2.1.7 Email Settings Interface   
\*\*Description\*\*: This interface is used by administrators to configure and update email settings such as SMTP server, port, sender address, and authentication details.   
\*\*Interaction Method\*\*: Web-based form for configuration entry and modification.   
\*\*Input/Output\*\*:   
- \*\*Input\*\*: Updated Email settings (e.g., server address, port, sender email).   
- \*\*Output\*\*: Confirmation message or error message based on system validation.   
  
### 2.1.8 Administrator Login Interface   
\*\*Description\*\*: This interface is used by administrators to log in to the system using valid credentials. It includes fields for username and password.   
\*\*Interaction Method\*\*: Web-based login form with authentication and error feedback.   
\*\*Input/Output\*\*:   
- \*\*Input\*\*: Administrator username and password.   
- \*\*Output\*\*: Administrator is authenticated and redirected to the dashboard, or an authentication error is displayed.   
  
## 2.2 Hardware Interface Output  
  
There are no direct hardware interfaces required for the current functional scope of the system. However, the system may be deployed on servers or other computing hardware, and it is expected to be compatible with standard enterprise-class hardware.  
  
### 2.2.1 Server Infrastructure   
\*\*Description\*\*: The system is expected to be deployed on enterprise-grade servers capable of handling concurrent user requests and database transactions.   
\*\*Interaction Method\*\*: Standard server deployment with no direct user interaction.   
\*\*Input/Output\*\*:   
- \*\*Input\*\*: None directly from user.   
- \*\*Output\*\*: None directly to user.   
  
## 2.3 Software Interface Output  
  
The system interacts with various software components, including databases, third-party tools, and internal modules. These interfaces are defined as follows:  
  
### 2.3.1 Database Interface   
\*\*Description\*\*: The system interacts with a relational database to store and retrieve product, customer, order, payment, email, and plugin data.   
\*\*Interaction Method\*\*: SQL queries and ORM-based interactions for data manipulation.   
\*\*Input/Output\*\*:   
- \*\*Input\*\*: Data such as product details, customer details, order status, payment methods, and plugin configurations.   
- \*\*Output\*\*: Persisted data in the database, including Product, Customer, Order, Payment, EmailTemplate, Plugin, and ProductCategory entities.   
  
### 2.3.2 Plugin Module Interface   
\*\*Description\*\*: The system uses the Plugin module to perform additional processing, validation, and checks for various functions such as product creation, order status updates, and plugin management.   
\*\*Interaction Method\*\*: API-style integration with the Plugin module to execute specific actions.   
\*\*Input/Output\*\*:   
- \*\*Input\*\*: Plugin file or configuration, or data requiring validation or processing (e.g., product details, order status changes).   
- \*\*Output\*\*: Execution results from the Plugin module, such as validation status, additional processing output, or error messages.   
  
### 2.3.3 Email Module Interface   
\*\*Description\*\*: The system uses the Email module to send notifications to customers. It may also interact with the Plugin module for post-notification processing.   
\*\*Interaction Method\*\*: API-style integration with the Email module to send and log emails.   
\*\*Input/Output\*\*:   
- \*\*Input\*\*: Email template, customer contact information, and system event data (e.g., order confirmation, refund notification).   
- \*\*Output\*\*: Sent email notifications and logged email records in the Email entity.   
  
### 2.3.4 Payment Gateway Interface   
\*\*Description\*\*: The system interacts with external payment gateways to process, verify, and refund payments.   
\*\*Interaction Method\*\*: API-style integration with supported payment gateways.   
\*\*Input/Output\*\*:   
- \*\*Input\*\*: Order ID, payment method, and transaction details.   
- \*\*Output\*\*: Payment confirmation, transaction status, or refund processing result.   
  
### 2.3.5 Email Template Management Interface   
\*\*Description\*\*: The system provides an interface to manage email templates, including creation, update, and deletion of templates.   
\*\*Interaction Method\*\*: Internal system module for email template handling.   
\*\*Input/Output\*\*:   
- \*\*Input\*\*: Email template details including subject, content, and placeholders.   
- \*\*Output\*\*: Created, updated, or deleted EmailTemplate entity in the database.   
  
## 2.4 Communication Interface Output  
  
The system communicates with users and external services through various communication channels, including email and web-based interactions.  
  
### 2.4.1 Email Notification Communication   
\*\*Description\*\*: The system sends email notifications to customers for events such as order confirmation, status updates, and payment refunds.   
\*\*Interaction Method\*\*: SMTP-based email sending, with integration to the Email module and optionally the Plugin module.   
\*\*Input/Output\*\*:   
- \*\*Input\*\*: Order ID, Email template, and customer contact information.   
- \*\*Output\*\*: A confirmation or update email is sent to the customer and logged in the Email entity.   
  
### 2.4.2 Web-Based Communication   
\*\*Description\*\*: The system communicates with users through web-based interfaces for all administrative and customer-facing functions.   
\*\*Interaction Method\*\*: HTTP/HTTPS-based communication for rendering web pages and handling form submissions.   
\*\*Input/Output\*\*:   
- \*\*Input\*\*: Web form data, user selections, and navigation actions.   
- \*\*Output\*\*: Rendered web pages, confirmation messages, and error notifications.   
  
### 2.4.3 Plugin Communication   
\*\*Description\*\*: The system communicates with installed plugins to perform pre-processing, validation, and post-processing actions.   
\*\*Interaction Method\*\*: Internal API-style communication with plugin modules.   
\*\*Input/Output\*\*:   
- \*\*Input\*\*: Plugin ID, configuration parameters, or data requiring processing (e.g., product creation, order status change).   
- \*\*Output\*\*: Plugin execution results, including validation status, processing output, or error messages.   
  
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By defining these external interfaces, the system ensures a clear and consistent method of interaction with users, internal modules, and external services. This clarity helps reduce implementation errors and improves communication between developers and stakeholders.