# Functional Requirement

# 1. Functional Requirements  
  
## 1.1 Asset Registration Function   
Function ID: FR-01   
Description: Administrators can register new assets in the system by providing details such as name, description, category, and department. The system generates a unique asset ID and stores the asset record.   
Input: Asset details including name, description, category, and department.   
Output: New asset record with a unique AssetID stored in the database.  
  
## 1.2 Asset Categorization Function   
Function ID: FR-02   
Description: Administrators can create and manage asset categories to classify assets. A unique category ID is generated and stored.   
Input: Category details including name, description, and relevant attributes.   
Output: New or updated AssetCategory record with a unique CategoryID stored in the database.  
  
## 1.3 Asset Allocation Function   
Function ID: FR-03   
Description: Administrators can allocate an asset to a specific user, specifying the allocation date and any additional notes. A record is stored in the system.   
Input: Asset and user selection, allocation date, and notes.   
Output: Updated Asset and UsageRecord entries, along with a PermissionAssignment record in the database.  
  
## 1.4 Asset Usage Tracking Function   
Function ID: FR-04   
Description: Administrators can record the usage of an asset by a user, including usage dates, activity type, and notes.   
Input: Selected asset and user, usage start and end times, activity type, and notes.   
Output: New UsageRecord entry stored in the database, with an AuditLog generated.  
  
## 1.5 Asset Return Function   
Function ID: FR-05   
Description: Administrators can process the return of an allocated asset. The system updates the asset status and closes or updates the usage record.   
Input: Selected asset and return confirmation with notes.   
Output: Updated Asset and UsageRecord entries, with an AuditLog generated.  
  
## 1.6 Asset Disposal Function   
Function ID: FR-06   
Description: Administrators can mark an asset as disposed, updating its status and recording the disposal action.   
Input: Selected asset and disposal confirmation with notes.   
Output: Updated Asset record with a Disposed status and an AuditLog generated.  
  
## 1.7 View Asset Information Function   
Function ID: FR-07   
Description: Administrators can view the details of a registered asset, including its category, department, status, and usage history.   
Input: Selected asset ID or name.   
Output: Displayed asset details retrieved from the database.  
  
## 1.8 Modify Asset Details Function   
Function ID: FR-08   
Description: Administrators can update the information of an asset, such as name, description, or department.   
Input: Selected asset and updated information fields.   
Output: Updated Asset record in the database, with an AuditLog generated.  
  
## 1.9 Manage Asset Inventory Function   
Function ID: FR-09   
Description: Administrators can manage the inventory of assets by adding, removing, or modifying quantity, location, and last updated time.   
Input: Selected asset and inventory action (add, remove, or modify).   
Output: Updated AssetInventory record in the database, with an AuditLog generated.  
  
## 1.10 View Usage Records Function   
Function ID: FR-10   
Description: Administrators can view the usage history of an asset, including all associated UsageRecord entries.   
Input: Selected asset ID or name.   
Output: Displayed list of usage records retrieved from the database.  
  
## 1.11 Generate Usage Report Function   
Function ID: FR-11   
Description: Administrators can generate reports based on usage records, filtered by date range, user, or asset category.   
Input: Date range, user, or asset category for report filtering.   
Output: Formatted usage report displayed or downloaded by the Administrator.  
  
## 1.12 View Audit Logs Function   
Function ID: FR-12   
Description: Administrators can view all audit logs, including timestamp, action, and affected entity.   
Input: Filtering criteria such as date range, user, or action type.   
Output: Displayed list of audit logs retrieved from the database.  
  
## 1.13 Export Audit Logs Function   
Function ID: FR-13   
Description: Administrators can export audit logs in a selected format (e.g., CSV, PDF) based on filtering criteria.   
Input: Filtering criteria and selected export format.   
Output: Exported audit logs in the selected format, with an AuditLog entry for the export action.  
  
## 1.14 Send Email Notifications Function   
Function ID: FR-14   
Description: The system automatically sends email notifications to users and administrators based on predefined events.   
Input: Event details (e.g., asset allocation, return, or disposal) and recipient email address.   
Output: EmailNotification record stored in the database, and an email sent to the recipient.  
  
## 1.15 Configure Email Settings Function   
Function ID: FR-15   
Description: Administrators can configure the system's email notification settings, including SMTP host, port, and sender email.   
Input: Email server configuration details (e.g., SMTP host, port, authentication credentials, and sender email).   
Output: Updated EmailNotification settings stored in the database, with an AuditLog generated.  
  
## 1.16 Assign Permissions Function   
Function ID: FR-16   
Description: Administrators can assign specific permissions to users for managing assets.   
Input: Selected user and one or more permissions to assign.   
Output: Updated PermissionAssignment record in the database, with an AuditLog generated.  
  
## 1.17 Revoke Permissions Function   
Function ID: FR-17   
Description: Administrators can revoke previously assigned permissions from users.   
Input: Selected user and one or more permissions to revoke.   
Output: Updated PermissionAssignment record in the database, with an AuditLog generated.  
  
## 1.18 View Permission Settings Function   
Function ID: FR-18   
Description: Administrators can view the permission assignments for a selected user.   
Input: Selected user ID or name.   
Output: Displayed list of assigned permissions retrieved from the database.  
  
## 1.19 Manage Permission Assignment Function   
Function ID: FR-19   
Description: Administrators can manage permission assignments, including assigning, revoking, or modifying permissions for users.   
Input: Selected user and action (assign, revoke, or modify).   
Output: Updated PermissionAssignment record in the database, with an AuditLog generated.  
  
## 1.20 User Registration Function   
Function ID: FR-20   
Description: Administrators can register new users in the system by providing details such as name, email, department, and role.   
Input: User details including name, email, department, and role.   
Output: New User record with a unique UserID stored in the database.  
  
## 1.21 User Login Function   
Function ID: FR-21   
Description: Users can log in to the system using their username and password. The system verifies credentials and creates a session.   
Input: Username and password.   
Output: Authenticated session for the user with a redirect to the appropriate dashboard.  
  
## 1.22 Department Setup Function   
Function ID: FR-22   
Description: Administrators can create new departments in the system by providing details such as name, description, and manager.   
Input: Department details including name, description, and manager information.   
Output: New Department record with a unique DepartmentID stored in the database.  
  
## 1.23 Update Department Information Function   
Function ID: FR-23   
Description: Administrators can update the information of an existing department, including name, description, and manager.   
Input: Selected department and updated information fields.   
Output: Updated Department record in the database, with an AuditLog generated.  
  
## 1.24 Delete Department Function   
Function ID: FR-24   
Description: Administrators can delete a department from the system, provided it has no associated assets or users.   
Input: Selected department and deletion confirmation.   
Output: Deleted Department record from the database, with an AuditLog generated.  
  
## 1.25 Manage Asset Status Function   
Function ID: FR-25   
Description: Administrators can update the status of an asset (e.g., Active, Inactive, Maintenance, Disposed, Allocated).   
Input: Selected asset and new status.   
Output: Updated Asset and AssetStatus records in the database, with an AuditLog generated.  
  
## 1.26 View Asset Status Function   
Function ID: FR-26   
Description: Administrators can view the current status of an asset, including the timestamp of the last status change and any related notes.   
Input: Selected asset ID or name.   
Output: Displayed asset status and related information retrieved from the database.  
  
## 1.27 Manage Usage Record Function   
Function ID: FR-27   
Description: Administrators can update or delete an existing usage record.   
Input: Selected usage record and modification or deletion request.   
Output: Updated or deleted UsageRecord entry in the database, with an AuditLog generated.

# External Description

# 2. External Interfaces  
  
## 2.1 User Interface Output   
The system interacts with users through a web-based graphical user interface (GUI), allowing administrators and users to perform actions and view information. The interface is designed to be intuitive and user-friendly, with the following components and interactions:   
  
- \*\*Asset Registration Form\*\*: Administrators enter asset details (name, description, category, and department) via a form. Upon submission, the system displays a confirmation message with the new asset ID.   
- \*\*Asset Categorization Form\*\*: Administrators create or modify asset categories by inputting category name, description, and attributes. A confirmation message with the new or updated category ID is displayed.   
- \*\*Asset Allocation Interface\*\*: Administrators select an asset and a user, input the allocation date and notes, and submit the allocation. The system displays a confirmation and updates the UI to reflect the allocation.   
- \*\*Asset Usage Tracking Interface\*\*: Administrators record usage by selecting an asset and user, specifying usage start and end times, activity type, and notes. A confirmation is displayed, and the usage history is updated on the screen.   
- \*\*Asset Return Confirmation\*\*: Administrators confirm the return of an allocated asset, and the system updates the asset status and usage record accordingly in the UI.   
- \*\*Asset Disposal Confirmation\*\*: Administrators confirm the disposal of an asset, and the system updates the asset status to "Disposed" and logs the action in the UI.   
- \*\*Asset Information View\*\*: Displays detailed asset information including category, department, status, and usage history based on a selected asset ID or name.   
- \*\*Modify Asset Details Form\*\*: Allows administrators to update asset information (e.g., name, description, department). After submission, the system displays the updated asset details and logs the action.   
- \*\*Manage Asset Inventory Interface\*\*: Enables administrators to add, remove, or modify inventory details such as quantity, location, and last updated time. A confirmation message is displayed upon completion.   
- \*\*View Usage Records Interface\*\*: Displays a list of usage records for a selected asset, including timestamps, activity types, and notes.   
- \*\*Generate Usage Report Interface\*\*: Provides a form to select report filters (date range, user, asset category) and generates a formatted usage report for display or download.   
- \*\*View Audit Logs Interface\*\*: Displays a list of audit logs with timestamps, actions, and affected entities, filtered by specified criteria (e.g., date range, user, action type).   
- \*\*Export Audit Logs Interface\*\*: Allows administrators to select audit logs and an export format (e.g., CSV, PDF) and provides a downloadable file of the logs.   
- \*\*Email Notification Interface\*\*: Displays a record of emails sent (e.g., asset allocation, return, or disposal) and allows viewing event details and recipient information.   
- \*\*Configure Email Settings Form\*\*: Provides a form to input and update email server configuration details (e.g., SMTP host, port, authentication credentials, and sender email). The system displays confirmation of the updated settings.   
- \*\*Permission Assignment Interface\*\*: Enables administrators to assign, revoke, or modify permissions for users. A confirmation message is displayed, and the system updates the UI to reflect permission changes.   
- \*\*View Permission Settings Interface\*\*: Displays a list of permissions assigned to a selected user, including details such as permission type and timestamp.   
- \*\*User Registration Form\*\*: Administrators register new users by inputting user details (name, email, department, and role). A confirmation message with the new user ID is displayed.   
- \*\*User Login Interface\*\*: Users enter their username and password to log in. Upon successful authentication, the system redirects them to the appropriate dashboard.   
- \*\*Department Setup Form\*\*: Administrators create new departments by inputting department name, description, and manager information. A confirmation message with the new department ID is displayed.   
- \*\*Update Department Information Form\*\*: Allows administrators to update department details. A confirmation message is displayed, and the system reflects the changes in the UI.   
- \*\*Delete Department Interface\*\*: Provides a confirmation prompt for deleting a department. If successful, the system removes the department and updates the UI.   
- \*\*Manage Asset Status Interface\*\*: Enables administrators to update an asset's status (e.g., Active, Inactive, Maintenance, Disposed, Allocated). The system displays the new status and logs the action.   
- \*\*View Asset Status Interface\*\*: Displays the current status of an asset, along with the timestamp of the last status change and related notes.   
- \*\*Manage Usage Record Interface\*\*: Allows administrators to update or delete existing usage records. A confirmation message is displayed, and the system updates the UI accordingly.  
  
## 2.2 Hardware Interface Output   
The system does not have direct interaction with external hardware devices. Therefore, no hardware interfaces are defined in this document.   
  
## 2.3 Software Interface Output   
The system interacts with several software components and databases to store, retrieve, and manage asset and user data. These interfaces are described as follows:   
  
### 2.3.1 Asset Database Interface   
- \*\*Description\*\*: Stores and retrieves asset records, including asset ID, name, description, category, department, status, and other relevant details.   
- \*\*Interaction Method\*\*: CRUD (Create, Read, Update, Delete) operations via the system's internal database layer.   
- \*\*Inputs\*\*: Asset details (name, description, category, department, status, etc.), modification requests (e.g., update or delete).   
- \*\*Outputs\*\*: Asset records (new or updated), error messages in case of invalid data or constraints.   
  
### 2.3.2 AssetCategory Database Interface   
- \*\*Description\*\*: Stores and retrieves asset category records, including category ID, name, description, and relevant attributes.   
- \*\*Interaction Method\*\*: CRUD operations via the system's internal database layer.   
- \*\*Inputs\*\*: Category details (name, description, attributes), modification requests (e.g., update or delete).   
- \*\*Outputs\*\*: AssetCategory records (new or updated), error messages for invalid data or constraints.   
  
### 2.3.3 UsageRecord Database Interface   
- \*\*Description\*\*: Stores and retrieves records of asset usage, including timestamps, user ID, asset ID, activity type, and notes.   
- \*\*Interaction Method\*\*: CRUD operations via the system's internal database layer.   
- \*\*Inputs\*\*: Asset and user selection, usage start and end times, activity type, and notes.   
- \*\*Outputs\*\*: UsageRecord entries (new, updated, or deleted), error messages for invalid usage data.   
  
### 2.3.4 PermissionAssignment Database Interface   
- \*\*Description\*\*: Stores and retrieves user permission assignments, including user ID, permission type, and timestamp of assignment.   
- \*\*Interaction Method\*\*: CRUD operations via the system's internal database layer.   
- \*\*Inputs\*\*: User selection, permission type, and action (assign, revoke, or modify).   
- \*\*Outputs\*\*: PermissionAssignment records (updated or deleted), error messages for invalid permission configurations.   
  
### 2.3.5 AuditLog Database Interface   
- \*\*Description\*\*: Logs all system actions (e.g., asset allocation, modification, disposal, and permission changes) with timestamps, action type, and affected entity.   
- \*\*Interaction Method\*\*: Write-only operations via the system's internal database layer.   
- \*\*Inputs\*\*: Action details (e.g., type, timestamp, entity ID).   
- \*\*Outputs\*\*: AuditLog entries (new or updated), no direct output to user interface.   
  
### 2.3.6 EmailNotification Database Interface   
- \*\*Description\*\*: Stores records of email notifications sent by the system, including event type, recipient email address, timestamp, and status (e.g., sent, failed).   
- \*\*Interaction Method\*\*: Write-only operations via the system's internal database layer.   
- \*\*Inputs\*\*: Event details (e.g., asset allocation, return, or disposal) and recipient email address.   
- \*\*Outputs\*\*: EmailNotification records (new), no direct output to user interface.   
  
### 2.3.7 Email Server Interface   
- \*\*Description\*\*: Configures and sends email notifications using an external email server (e.g., SMTP server).   
- \*\*Interaction Method\*\*: Uses email server configuration (e.g., host, port, authentication credentials) to send emails to recipients.   
- \*\*Inputs\*\*: Email server settings (host, port, username, password, sender email), recipient email addresses, and message content.   
- \*\*Outputs\*\*: Emails sent to users/administrators, and EmailNotification records stored in the database.   
  
### 2.3.8 Department Database Interface   
- \*\*Description\*\*: Stores and retrieves department records, including department ID, name, description, and manager information.   
- \*\*Interaction Method\*\*: CRUD operations via the system's internal database layer.   
- \*\*Inputs\*\*: Department details (name, description, manager), modification or deletion requests.   
- \*\*Outputs\*\*: Department records (new, updated, or deleted), error messages for invalid department data.   
  
### 2.3.9 User Database Interface   
- \*\*Description\*\*: Stores and retrieves user records, including user ID, name, email, department, and role.   
- \*\*Interaction Method\*\*: CRUD operations via the system's internal database layer.   
- \*\*Inputs\*\*: User details (name, email, department, role), modification or deletion requests.   
- \*\*Outputs\*\*: User records (new, updated, or deleted), error messages for invalid user data.   
  
### 2.3.10 AssetStatus Database Interface   
- \*\*Description\*\*: Tracks and stores asset status changes, including status type (e.g., Active, Inactive, Maintenance, Disposed, Allocated) and timestamps.   
- \*\*Interaction Method\*\*: Write-only operations via the system's internal database layer.   
- \*\*Inputs\*\*: Asset ID and new status.   
- \*\*Outputs\*\*: AssetStatus records (updated), no direct output to user interface.   
  
### 2.3.11 AssetInventory Database Interface   
- \*\*Description\*\*: Stores and retrieves inventory data for assets, such as quantity, location, and last updated time.   
- \*\*Interaction Method\*\*: CRUD operations via the system's internal database layer.   
- \*\*Inputs\*\*: Inventory action (add, remove, or modify) and relevant asset details.   
- \*\*Outputs\*\*: Updated AssetInventory records, error messages for invalid inventory actions.   
  
## 2.4 Communication Interface Output   
The system communicates with external entities via the following interfaces:   
  
### 2.4.1 Email Notification Communication Interface   
- \*\*Description\*\*: Sends email notifications to users and administrators based on predefined events such as asset allocation, return, or disposal.   
- \*\*Interaction Method\*\*: Uses the configured email server (e.g., SMTP) to send emails in plain text or HTML format.   
- \*\*Inputs\*\*: Recipient email address, event type, and message content.   
- \*\*Outputs\*\*: Email sent to the recipient, and a record stored in the EmailNotification database.   
  
### 2.4.2 Audit Log Communication Interface   
- \*\*Description\*\*: Logs all system actions and changes in the AuditLog database for transparency and tracking.   
- \*\*Interaction Method\*\*: Internal logging mechanism that writes to the AuditLog table.   
- \*\*Inputs\*\*: Action type, timestamp, user ID, and affected entity ID.   
- \*\*Outputs\*\*: AuditLog entry stored in the database.   
  
### 2.4.3 Export Audit Logs Communication Interface   
- \*\*Description\*\*: Exports audit logs in a selected format (e.g., CSV, PDF) based on filtering criteria such as date range, user, or action type.   
- \*\*Interaction Method\*\*: Generates files in the specified format and provides a download link or file to the user.   
- \*\*Inputs\*\*: Filtering criteria and export format selection.   
- \*\*Outputs\*\*: Exported audit logs file (e.g., CSV, PDF), and an AuditLog entry for the export action.   
  
### 2.4.4 Web Session Communication Interface   
- \*\*Description\*\*: Manages user authentication and session creation after a successful login.   
- \*\*Interaction Method\*\*: Validates user credentials against the User database and creates a session token for subsequent interactions.   
- \*\*Inputs\*\*: Username and password.   
- \*\*Outputs\*\*: Authenticated session token and a redirect to the appropriate dashboard.   
  
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This section defines all external interfaces necessary for the system to interact with users, databases, and external communication systems. Each interface is clearly described with its role, interaction method, and relevant inputs and outputs to ensure clarity and ease of implementation.