SYSTEM DESIGN

This system design involves three main components which interact to facilitate the input, processing workflow and output of data.

Components

a. Backend - Server and API
b. Frontend - User Interface
c. Database - Data storage

Input Process

USER INTERACTION (Employee/Staff members)

1. User Authentication and Authorization:
   - ✓ User enters login credentials, ie (employee/staff ID, employee/staff name)
   - ✓ Credentials are sent to the backend API for verification against the database
   - ✓ User is then authenticated and granted access to the system

2. Issuing of gadgets:
   - ✓ User enters gadget details of their choosing in a form, ie (name, model, brand, serial number, issuing date, current condition etc)
   - ✓ The details are then validated and a POST request is sent to the backend API
   - ✓ The request is processed, data is validated and the gadget is checked against the database. If the gadget is present then the user is successfully notified and requested to avail themselves and head for issuing. If not present user is also notified and requested to wait until gadget is available.

3. Repair of gadgets:
   - ✓ If the gadget has an issue or malfunctions, the user fills a Repair request form with gadget details and a description to explain the issue with the gadget, ie (gadget model, serial number, issue description, date reported and priority level)
   - ✓ The details are sent to the backend via an API request
   - ✓ The repair request data is validated and logged in the database
   - ✓ The status of the gadget is updated to show that it is under repair and a technician is sent to retrieve the gadget from user
   - ✓ Once repair is completed, the repair status is updated to completed and records any additional comments
   - ✓ The gadget is then returned to user after a quality check is performed

4. Replacing consumables:
   - ✓ User selects the gadget on their homepage that needs a consumable replaced
   - ✓ User chooses the specific consumable that needs to be replaced from a predefined list of consumables associated with the gadget.
   - ✓ User fills out a form with relevant details such as reason for replacement, quantity and date replaced
   - ✓ The form data is submitted to the backend via an API request.
   - ✓ The replacement request data is validated and logged in the database
   - ✓ The replacement request is reviewed and approved by the administrator.
   - ✓ A technician/staff member is then assigned to replace the consumable
   - ✓ The assigned personnel receives a notification about the replacement task
   - ✓ The assigned personnel logs actions taken during replacement process including removal of old consumable
   - ✓ The consumable can then be disposed

5. Replacing gadget:
   - ✓ User chooses the specific gadget that needs replacement
   - ✓ User selects the replacement option that takes them to a gadget replacement form
   - ✓ User fills out the form with details such as gadget name, serial number, period of ownership, current condition and reason for replacement
   - ✓ The data is submitted to the backend via an API request
   - ✓ The replacement request data is validated and logged into the database in a gadget replacement table updating the gadget status to pending replacement.
   - ✓ After the admin reviews and approves the replacement request, the user is notified. If request is denied the user will receive a notification with reason for rejection
   - ✓ If approved, the relevant personnel are notified to proceed with replacement
   - ✓ When the old gadget is replaced with the new one, the latter's status is updated as in use while the former's status is updated to replaced or disposed
   - ✓ The replacement request is then marked as closed in the database and user is notified of process completion

6. Returning of gadgets:
   - ✓ User selects the gadget to be returned from their user-specific inventory cart and initiates a return gadget request by filling out a form with details such as gadget name, model, brand, serial number, return date and current condition
   - ✓ The form data is submitted to the backend via an API request where the return gadget request is validated and logged in the database, updating the gadget status to pending return

- ✓ The return request is reviewed and approved and the relevant personnel is notified to process the return physically.
- ✓ The returned gadget is in turn received by the inventory management team who inspect for any damages or issues.
- ✓ The inspection details are recorded and the gadget status is updated to Available and the return request is marked as competed in the database.

Workflow Process

1. Input Validation:
   - ✓ The backend validates the input data to ensure it meets the needed format

2. CRUD operations (HTTP methods)
   - ✓ Create (POST method) - new gadget data is stored in the database
   - ✓ Read (GET method) - gadget data is retrieved from the database according to user and admin queries
   - ✓ Update (PUT method) - the existing gadget data is modified in the database
   - ✓ Delete (DELETE method) - the existing gadget data is removed from the database

3. Systems integration

How the system may interact with other systems in other departments such as procurement, and audit to ensure data consistency and be well updated

Output Process

1. Dashboard
   - ✓ Where users can see their account, settings, listings, orders,user-specific inventory cart of gadgets and consumables issued to them, recent activities and statuses, and notifications.

2. Information
   - ✓ Users can view detailed information about the gadgets only in their inventory cart including their history and current status.

3. Analysis and Reports
   - ✓ The system can generate reports and analysis on areas such as gadget usage

4. Notifications
   - ✓ Users can receive notifications on events such as maintenance due, low stock, unavailable gadgets, gadgets available for repair or replacement and even system experiencing high user traffic or when servers are down.

ADMIN INTERACTION (Administrator)

1. Admin Authentication/Authorization:
   - ✓ The administrator logs in the system using their credentials
   - ✓ The system authenticates the admin's credentials and authorizes access to the admin dashboard

2. Dashboard overview:
   - ✓ The admin can views the dashboard that displays an overview of the system, recent activities, pending requests/approvals and key notifications
   - ✓ The admin can navigate to different sections such as; inventory, user management (employers/staff members), listings, orders, reports and notifications

3. Inventory management:
   - ✓ The administrator can add new gadgets and consumables to the inventory listings by filling out a form with details such as gadget name, serial number, model, brand, purchase details (receipt numbers and purchase dates) and status
   - ✓ Admin can update gadget and consumables information and also change their status i.e (In use, maintenance underway, under repair, not in store, etc)
   - ✓ The admin can also remove or delete gadgets or their consumables by marking them as disposed of from the inventory listings and database

4. Managing requests:
   - ✓ Admin can view a list of pending request from users in the notifications section such as requests for repair, maintenance, gadget replacement, consumable replacement, issuing, and returning.
   - ✓ The admin can then review the pending request details and decide to either approve or reject them.
   - ✓ If the requests are approved then the admin can assign the tasks to the relevant staff members/personnel
   - ✓ The system then sends notifications to the staff assigned the task and also to the user about their request status and the assigned technician

5. User management:
   - ✓ Admin can add, modify or remove users (employees and staff members) from the system and also their roles in the organization i.e; (board member, director, manager, officer, intern, etc)
   - ✓ Admin can also reset user passwords if need be

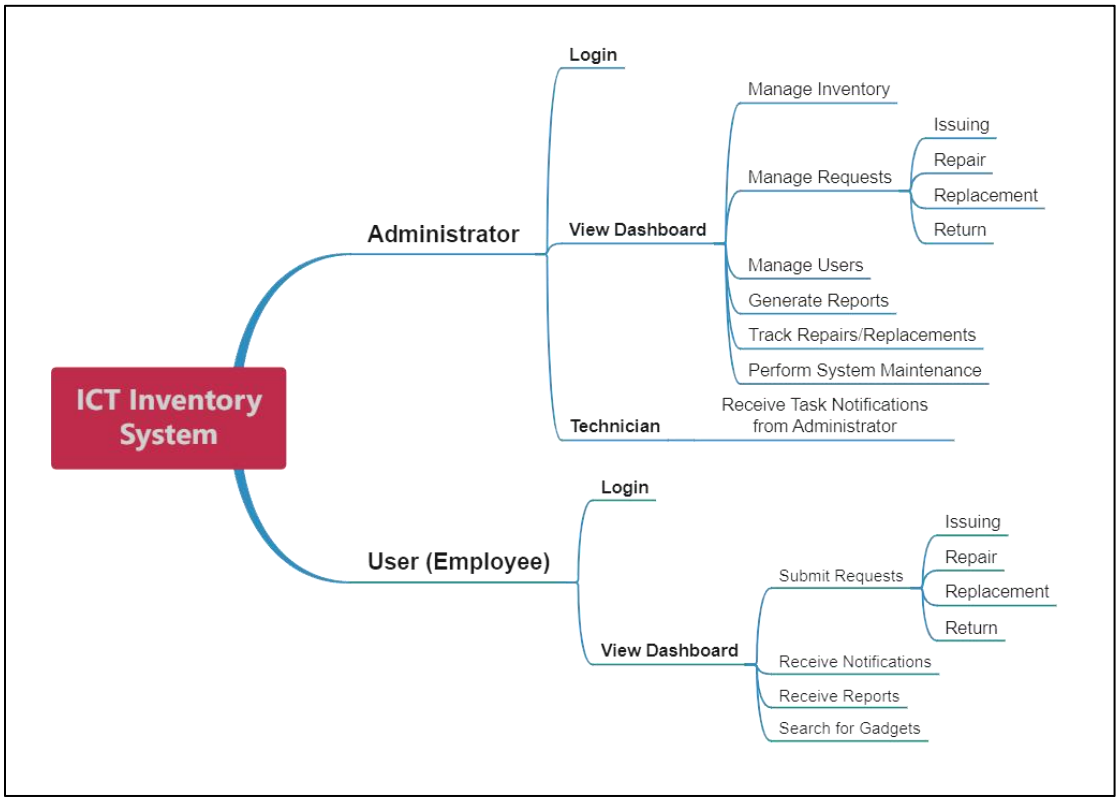
6. Tracking repairs, replacement and maintenance of gadgets:
   - ✓ Admin can track the progress of current repairs, replacements and maintenance of gadgets as well as their history status
   - ✓ Admin can also update records and add any comments or update status from the technicians
   - ✓ From time to time the admin can also conduct inspections to ensure efficient repair and maintenance is done

7. Generate reports:
   - ✓ The admin can generate reports on various sections of the system such as user activity trends over a certain period of time, repair and maintenance activity, gadget status and history
   - ✓ Admin can also send these various reports in various formats like excel sheets and PDFs to appropriate personnel i.e; (those intended for users only, for procurement, department heads of every office and for when ordering new gadgets)

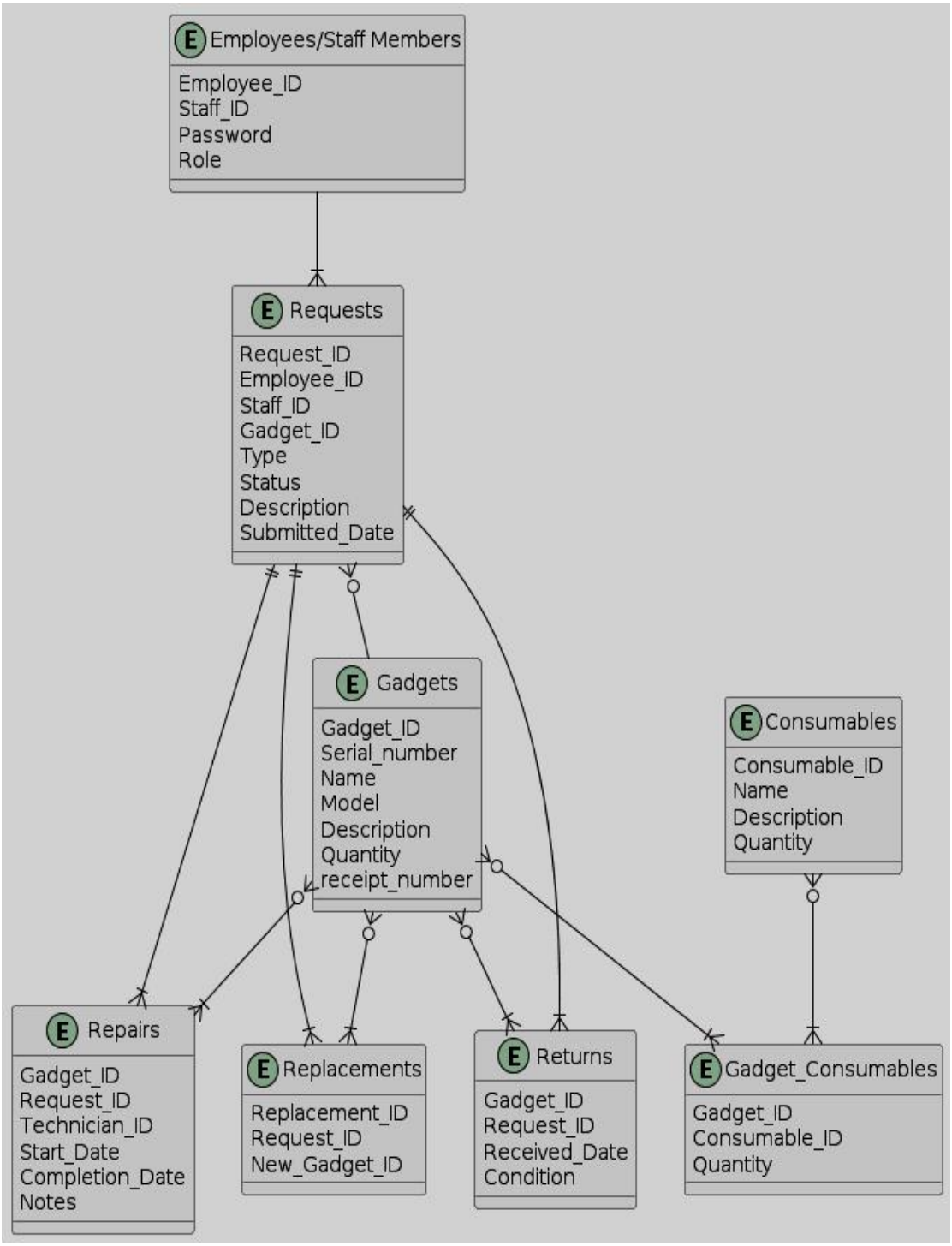
8. System Maintenance:
   - ✓ The admin needs to be able to perform regular data updates in the database and maintenance to ensure security and data integrity is kept
   - ✓ Admin also needs to be able to perform system updates and patches to deal with high traffic and keep the system up-to-date

SYSTEM DESIGN DIAGRAMS

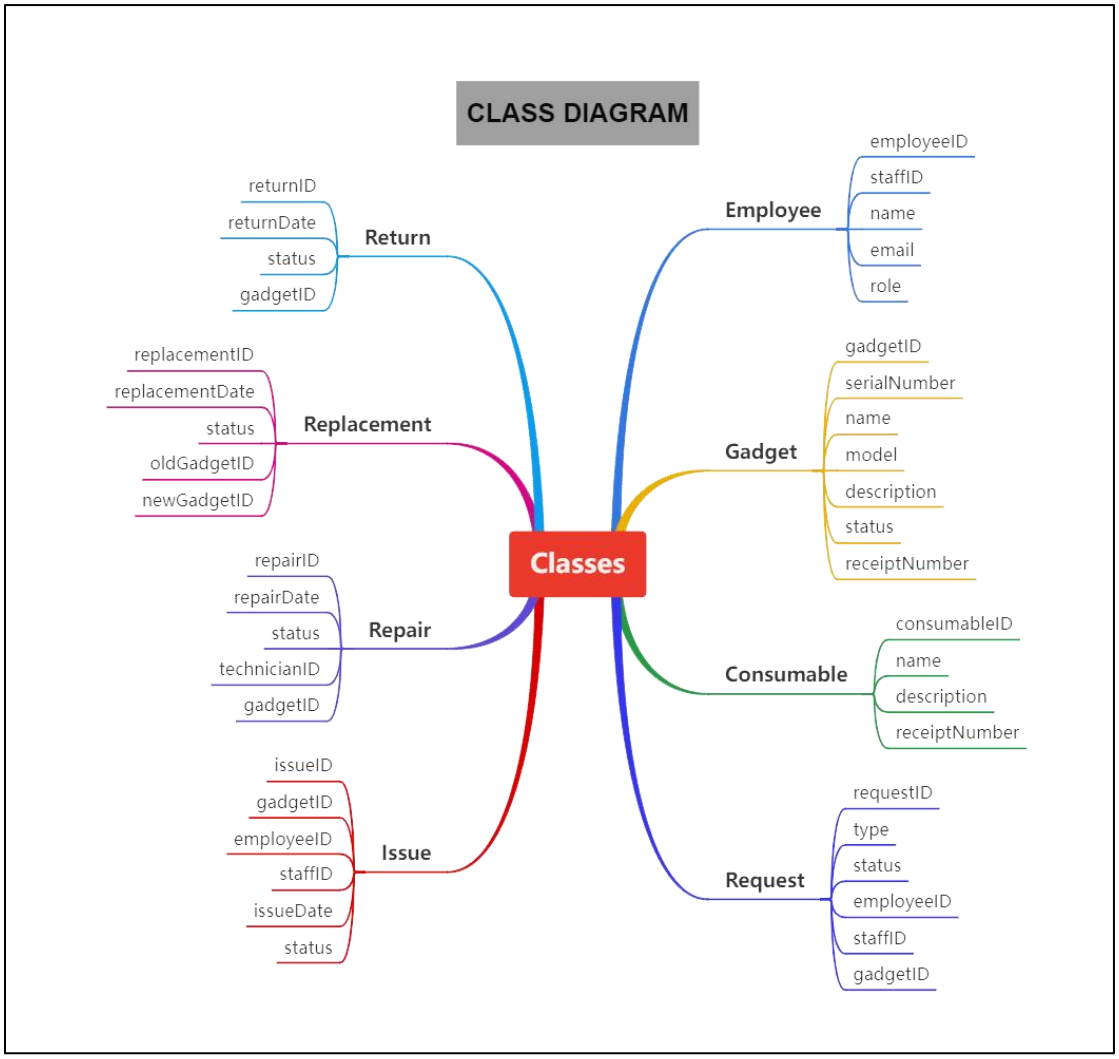
1. Use Case Diagram



2. Entity-Relationship Diagram



3. Class Diagram



4. Sequence Diagram

Scenarios:

- ✓ User Login and Authentication
- ✓ Gadget issue process
- ✓ Repair Request Approval
- ✓ Gadget Return Process
- ✓ Replacement Process

Detailed Descriptions:

User Login and Authentication:

- ✓ User: Enters credentials and attempts to log in.
- ✓ Inventory System: Validates the credentials against the database.
- ✓ Database: Checks user data and returns authentication results.

Gadget Issue Request:

- ✓ User: Requests to issue a gadget.
- ✓ Admin: Validates and approves the request.
- ✓ Inventory System: Updates the gadget status in the database.
- ✓ Database: Reflects the updated status.

Repair Request Approval:

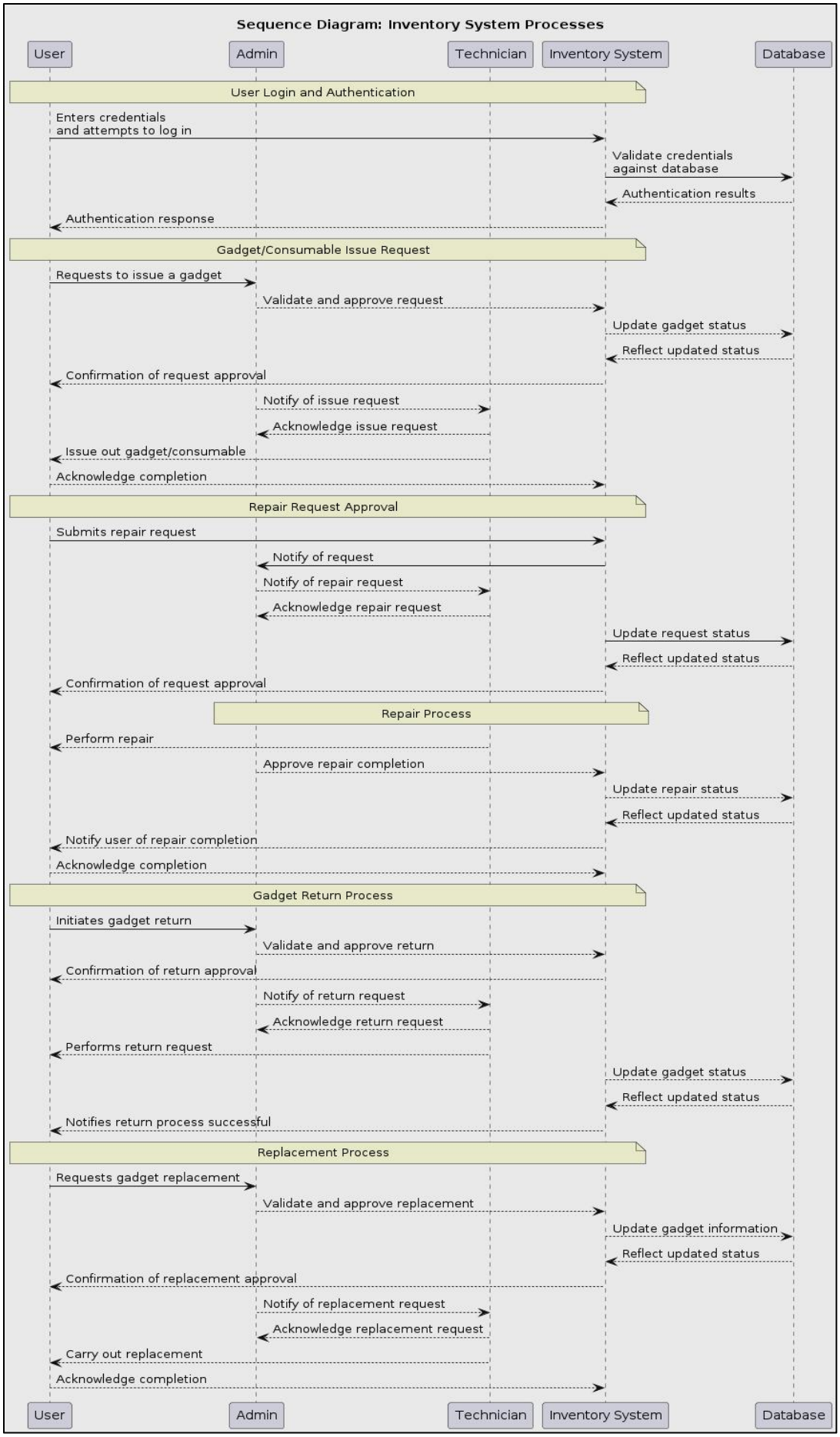
- ✓ User: Submits a repair request.
- ✓ Technician: Receives notification of the request.
- ✓ Admin: Validates and approves the request.
- ✓ Inventory System: Updates the request status in the database.
- ✓ Database: Reflects the updated status.
- ✓ Technician: Performs repair
- ✓ Inventory system: Notifies user of repair completion
- ✓ User: Acknowledges repair completion

Gadget Return Process:

- ✓ User: Initiates the return process.
- ✓ Admin: Validates the request and approves it.
- ✓ Inventory System: Updates the status of the gadget in the database.
- ✓ Database: Reflects the updated status.

Replacement Process:

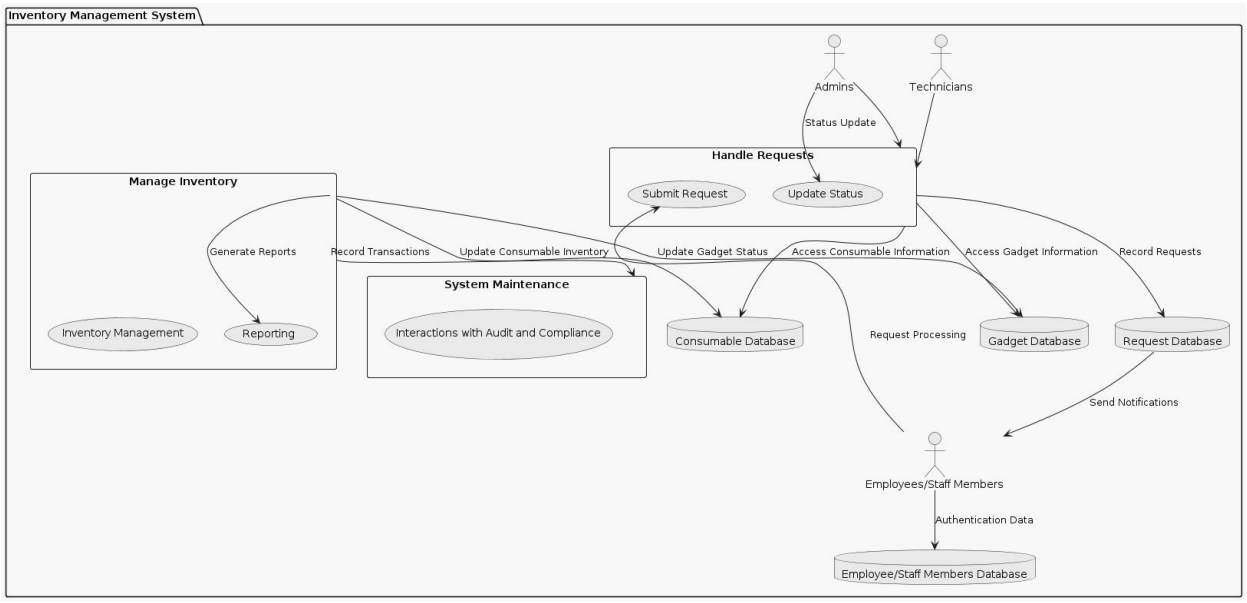
- ✓ User: Requests a gadget replacement.
- ✓ Admin: Validates and approves the replacement.
- ✓ Inventory System: Updates the gadget information in the database.
- ✓ Database: Reflects the updated status.


Sequence Diagram: Inventory System Processes
User
Admin
Technician
Inventory System
Database
User Login and Authentication
Enters credentials and attempts to log in
Validate credentials against database
Authentication results
Authentication response
Gadget/Consumable Issue Request
Requests to issue a gadget
Validate and approve request
Update gadget status
Reflect updated status
Confirmation of request approval
Notify of issue request
Acknowledge issue request
Issue out gadget/consumable
Acknowledge completion
Repair Request Approval
Submits repair request
Notify of request
Notify of repair request
Acknowledge repair request
Update request status
Reflect updated status
Confirmation of request approval
Repair Process
Perform repair
Approve repair completion
Update repair status
Reflect updated status
Notify user of repair completion
Acknowledge completion
Gadget Return Process
Initiates gadget return
Validate and approve return
Confirmation of return approval
Notify of return request
Acknowledge return request
Performs return request
Update gadget status
Reflect updated status
Notifies return process successful
Replacement Process
Requests gadget replacement
Validate and approve replacement
Update gadget information
Reflect updated status
Confirmation of replacement approval
Notify of replacement request
Acknowledge replacement request
Carry out replacement
Acknowledge completion
User
Admin
Technician
Inventory System
Database

5. Data Flow Diagrams

Components:

- ✓ External Entities (Employees, Staff members, Admins, Technicians, Regulatory bodies, Vendors)
- ✓ Processes (Manage Inventory, Handle Requests, system maintenance)
- ✓ Data Stores (Employee and staff members Database, Gadget Database, Consumable Database, Request Database)
- ✓ Data Flows (employee and staff authentication, notifications, inventory management, reporting, Submit Request, Update Status, Interactions with Audit and Compliance)



Its Interaction with other systems (Regulatory bodies, Procurement, Vendors)