# Ghana Health Service (GHS) Asset Tracking Application

**Introduction**

This document provides details on the development and deployment of a web-based asset tracking application tailored for the Ghana Health Service (GHS). The application is designed to enhance the efficiency of asset management by providing features such as authentication access, organizational access control, security policies, product identification, procurement tracking, lifecycle monitoring, and ensuring key security principles.

**Overview**

The GHS Asset Tracking Application is a web-based tool developed to manage the lifecycle and status of health-related assets efficiently. Utilizing Next.js for the frontend and Firebase for the backend, the application ensures robust authentication, data integrity, and access control aligned with organizational roles.

**Key Features**

• Authentication: Secure user authentication using Firebase Authentication.

• Access Control: Role-based access control distinguishing between admin and user permissions.

• Asset Tracking: Unique identification of assets, lifecycle management, and procurement tracking.

• Data Integrity and Security: Encryption in transit and at rest, with policies ensuring data integrity and confidentiality.

• Non-Repudiation: Reliable record-keeping ensuring that asset management actions are secure and traceable.

**Architecture**

Frontend

• Framework: Next.js

• Responsibilities: User interface, routing, client-side authentication, and interaction with Firebase backend.

Backend

• Platform: Firebase

• Components:

• Firebase Authentication: Manages user authentication and session handling.

• Firestore: NoSQL database storing asset and user data.

• Firebase Functions (if used): For server-side logic and complex data manipulations.

**Authentication Access Features**

Authentication ensures that only authorized users can access the system. The application utilizes Firebase, which offers a suite of authentication services. Here are some key uses and features of Firebase Authentication:

**Email and Password Authentication**

• Sign-Up and Sign-In: Users can create accounts using their email addresses and passwords. Firebase handles the complexities of storing and validating credentials.

• Password Reset: Firebase provides an easy way to send password reset emails to users who have forgotten their passwords.

**User Management**

• User Profiles: Firebase allows you to manage user profiles, including storing additional user information such as display names and profile pictures.

**Access Control Based on Organizational Structure**

The application implements a robust access control system that aligns with the hierarchical structure of the Ghana Health Service:

**Role-Based Access Control (RBAC)**

Users are assigned roles such as Administrator, Manager, Technician, or Staff. Each role has specific permissions.

• Administrators: Full access to all features, including user management and system settings.

• Managers: Access to asset tracking, procurement history, and lifecycle monitoring.

• Technicians: Access to asset details, maintenance records, and updates.

• Staff: Limited access to view assets and request maintenance.

**Department-Based Restrictions**

Access to certain assets can be restricted based on the user’s department, ensuring sensitive equipment is only viewable by relevant personnel.

**Implemented Security Policies**

To safeguard the integrity, confidentiality, and accessibility of data, the following security policies are enforced:

**Activity Logging**

Logging of user activities monitors for suspicious behaviour and ensures accountability.

**Tracking of Procurement**

• Procurement Date: Date when the asset was acquired.

• Supplier Information: Details about the supplier from whom the asset was purchased.

• Purchase Order Details: Information on the purchase order, including order number and cost.

• Warranty Information: Details about the warranty period and conditions.

**Monitoring the Lifecycle of Devices**

The application facilitates lifecycle management for all assets:

**Lifecycle Stages**

Assets move through various stages, including Procurement, Active Use, Maintenance, and Disposal.

**Disposal Records**

Documentation of the disposal process, including the method of disposal and environmental compliance.

## Ensuring Key Security Principles

The application ensures the following key security principles:

**Integrity**

Data integrity is maintained through regular checksums, version control, and audit trails to detect and prevent unauthorized modifications.

**Confidentiality**

Data confidentiality is preserved through encryption, access controls, and secure communication protocols.

**Access Control**

Strict access control mechanisms ensure that only authorized users can access specific data and features.

**Non-Repudiation**

Digital signatures and detailed activity logs ensure non-repudiation, making it impossible for users to deny their actions within the system.

The GHS Asset Tracking Application significantly enhances asset management through robust authentication, access control, security policies, and lifecycle monitoring. By adhering to key security principles and utilizing advanced tracking mechanisms, the application ensures the integrity, confidentiality, and accessibility of asset data, thus supporting the efficient operation of health service organizations.