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U.G.K.N.HERATH

System Administration & Maintenance

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HUNGER HUB

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1. Introduction

Hunger Hub is a mobile application designed to connect food donors with those in need through a seamless donation and request system. The app ensures secure authentication, allows users to post and request food donations, and features a Live Food Availability Map to display nearby donations. Users can also earn and redeem Cheer Points as part of a gamified incentive system.
Future enhancements may include automated food surplus detection, backend functionalities for managing donation and request records (inserting, updating, and deleting), user profile management, a notification center, and a message hub.

2. Functional Requirements

User Authentication

- Login & Registration

Live Food Availability Map

- Displays real-time food donations on a map.
- Users can search and filter based on food type, location, and urgency.
- Clicking on a donation shows details (food type, donor name, pickup time, etc.).
- Users can request a food donation or offer a donation from within the map view.

Post & Donate Food

- Users can list available food items with the following details:
- Food Name (e.g., "Vegetarian Meal")
- Quantity (e.g., "3 servings")
- Pickup Location (e.g., "Downtown Community Center")
- Expiry Date (optional for packaged items)
- Additional Notes (e.g., "No allergens, packed in containers")
- Users can attach images for better food visibility.
- Donations are automatically marked as 'Claimed' when fulfilled.
- Users can also donate meals directly through a partnered charity system.

Request & Receive Food Donation

- Users can browse available donations from the map or a list.

- Users can send a request message to donors.
- Once a donor approves, a pickup confirmation is sent.
- Users can mark the donation as received after pickup.

Cheer Points System

- Users earn Cheer Points for donations and pickups:
- +10 points for donating food.
- +5 points for successfully receiving a donation.
- Cheer Points can be redeemed for discount coupons, badges, or community recognition.
- A leaderboard showcases the top contributors.

Backend Functionalities

- Future enhancements will include:
- Database integration to manage donation records.
- Insert, update, and delete functionalities for donations.
- Real-time notifications for new donations, messages, and request approvals.

User Interface & Accessibility

- A clean, modern UI ensures smooth navigation.
- Supports both dark and light mode.
- Icons and intuitive buttons for quick access to key features.
- Notifications for new donations, messages, and point updates.

Section 1: Critical Design and Market Analysis

Problem Statement:

HungerHub addresses a significant social issue: the wastage of excess food. It aims to bridge the gap between food donors and those in need by offering a platform to donate surplus food easily and efficiently.

User Personas:

1. **Sajith** – A hotel chef who donates excess food at the end of each day.
2. **Rukanthi** – An NGO worker who uses the app to collect donated food for distribution.
3. **Kavindu** – A young tech-savvy individual using the app to donate or assist in pickups.

User Journey Map:

- User logs into the app
- Navigates to the donation form
- Enters food details with description and expiry
- Submits the form
- NGO staff receives the notification and collects the food

Competitor Analysis:

App Name	Strengths	Weaknesses
OLIO	Strong community focus, wide variety	Limited in rural/less populated areas
Too Good To Go	Partnerships with restaurants	No peer-to-peer (P2P) donations
HungerHub	Localized P2P donation + NGO integration	Limited currently to Firebase backend

Value Proposition:

HungerHub facilitates real-time, localized food sharing between donors and recipients (especially NGOs), thereby reducing food waste and strengthening community support networks.

Section 2: Development Environment and Workflow

Technology Stack:

- **Frontend:** Android XML Layouts (Android Studio)
- **Backend:** Firebase Realtime Database, Firebase Authentication, Firebase Storage
- **Programming Language:** Java
- **IDE Used:** Android Studio

GitHub Workflow:

- Protected branches to avoid direct changes to `main`
- Predefined issue and pull request templates for consistency
- GitHub Projects used for task tracking and milestone planning

Workflow Documentation:

- Detailed `README.md` outlining installation, usage, and contribution
- `workflow.md` describing Git practices
- System Architecture documented with diagrams and folder structure

Section 3: CI/CD and Quality Assurance

CI/CD Implementation:

- GitHub Actions using custom YAML workflows
- Automatic build of APKs on push and pull requests
- Future plans for Play Store deployment automation

Testing Strategy:

- **Unit Testing:** Using JUnit 4 for business logic
- **UI Testing:** Using Espresso for activity and flow validation
- **Static Analysis:** CodeQL for security and code smells

Monitoring and Security:

- Dependency vulnerability scanning via Snyk
- Firebase Authentication logs monitored and periodically audited

Section 4: Final Deliverables and Documentation

Firebase Integration:

- Database structure and security rules documented
- Defined storage path conventions for food images and metadata

Divio Documentation Framework:

- **Tutorials:** Step-by-step guide to app usage
- **How-to Guides:** Donation and retrieval flows
- **Reference:** Firebase rules, API paths
- **Explanation:** Rationale behind architecture and tech stack choices
- Future addition: OpenAPI 3.0 specifications for modular APIs

Architecture Decision Records (ADR):

- `firebase_decision.md`: Justification for using Firebase suite
- `tech_stack_selection.md`: Decision analysis for choosing Java + Android Studio

Final Presentation Plan:

- Clear explanation of the problem and how HungerHub solves it
- Live walkthrough: **Login → Donate → Food Listing**
- Highlight tech stack: Java, Android Studio, Firebase
- Share development and technical challenges + how they were overcome
- Future Roadmap:
    - Interactive Map Integration
    - Real-time Pickup Notification System
    - Donor Feedback Mechanism

Product Requirements Document (PRD)

1. Overview

HungerHub is an Android application designed to facilitate food donations, aiming to reduce food waste and support communities in need. The app allows users to register, manage their profiles, and post food donations with relevant details.

2. Objectives

- Enable users to register and authenticate securely.
- Allow users to manage personal profiles, including uploading profile images.
- Provide functionality for users to post, edit, and delete food donation entries.
- Display a dynamic list of food donations using RecyclerView for efficient browsing.

3. Target Audience

- Individuals and organizations willing to donate surplus food.
- Non-profit organizations seeking food donations for distribution.

4. Key Features

- **User Authentication:** Secure registration and login using Firebase Authentication.
- **Profile Management:** Users can add, update, and delete personal information and profile images.
- **Food Donation Management:** Users can post, edit, and delete food donation entries with details like location, expiry date, quantity, and images.
- **Dynamic Listings:** Display of food donations in a scrollable list using RecyclerView.

Technical Design Document (TDD)

1. System Architecture

- **Frontend:** Android application developed using Java and XML.
- **Backend:** Firebase services including Realtime Database, Authentication, and Storage.

2. Modules

- **Authentication Module:** Handles user registration, login, and email verification.
- **Profile Module:** Manages user information and profile image uploads.
- **Donation Module:** Allows users to post, edit, and delete food donations.
- **Home Module:** Displays user profile details and a list of their food donations.

3. Data Flow

1. User registers and verifies their email.
2. Upon login, the app checks for existing user data.
3. If no data exists, the user is prompted to create a profile.
4. User can post food donations, which are stored in Firebase Realtime Database.
5. Donations are displayed in the app's home screen, allowing for real-time updates and management.

User Personas & Journey Maps

User Persona: Donor

- **Name:** Amal Perera
- **Age:** 35
- **Occupation:** Restaurant Owner
- **Goals:** Reduce food waste, contribute to the community.
- **Pain Points:** Lack of a streamlined platform to donate surplus food.

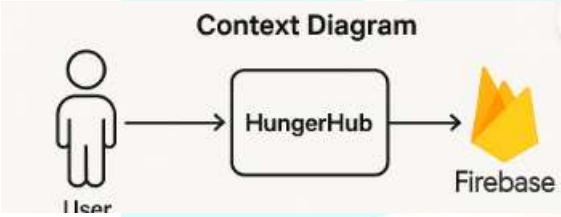
User Journey Map: Donor

Stage	Action	Emotion	Touchpoints
Awareness	Learns about HungerHub via social media	Curious	Social Media
Consideration	Downloads and installs the app	Interested	Google Play Store
Registration	Registers and verifies email	Engaged	HungerHub App
Profile Setup	Adds personal details and profile image	Satisfied	HungerHub App
Donation	Posts a food donation entry	Fulfilled	HungerHub App
Management	Edits or deletes donation entries	Empowered	HungerHub App

C4 Architecture Diagrams

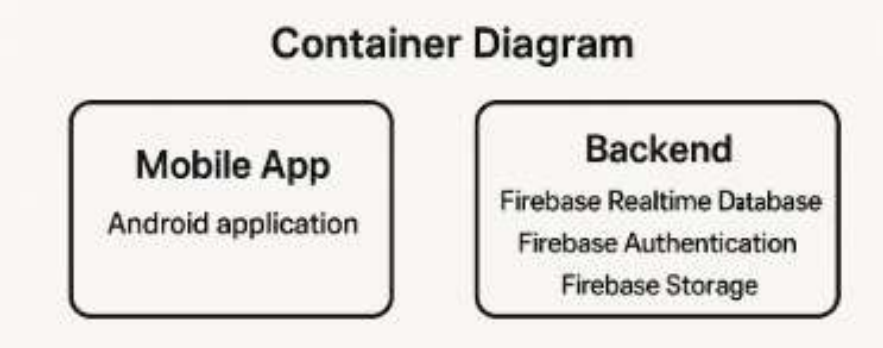
1. Context Diagram

- **Users:** Interact with the HungerHub Android application.
- **HungerHub App:** Connects to Firebase services for authentication, data storage, and image hosting.



2. Container Diagram

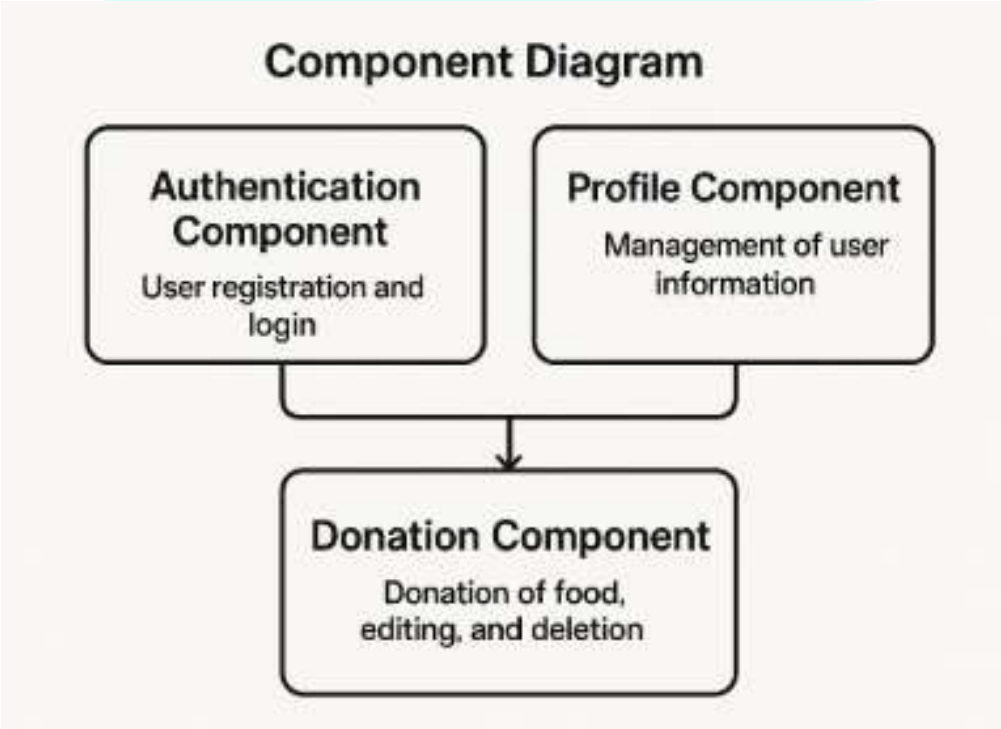
- **Mobile App:** Android application developed in Java.
- **Backend Services:**
  - **Firebase Authentication:** Manages user sign-up and login.
  - **Firebase Realtime Database:** Stores user profiles and donation data.
  - **Firebase Storage:** Hosts user profile images and donation images.



3. Component Diagram

- **Authentication Component:** Handles user registration, login, and email verification.
- **Profile Component:** Manages user information and profile image uploads.
- **Donation Component:** Allows users to post, edit, and delete food donations.

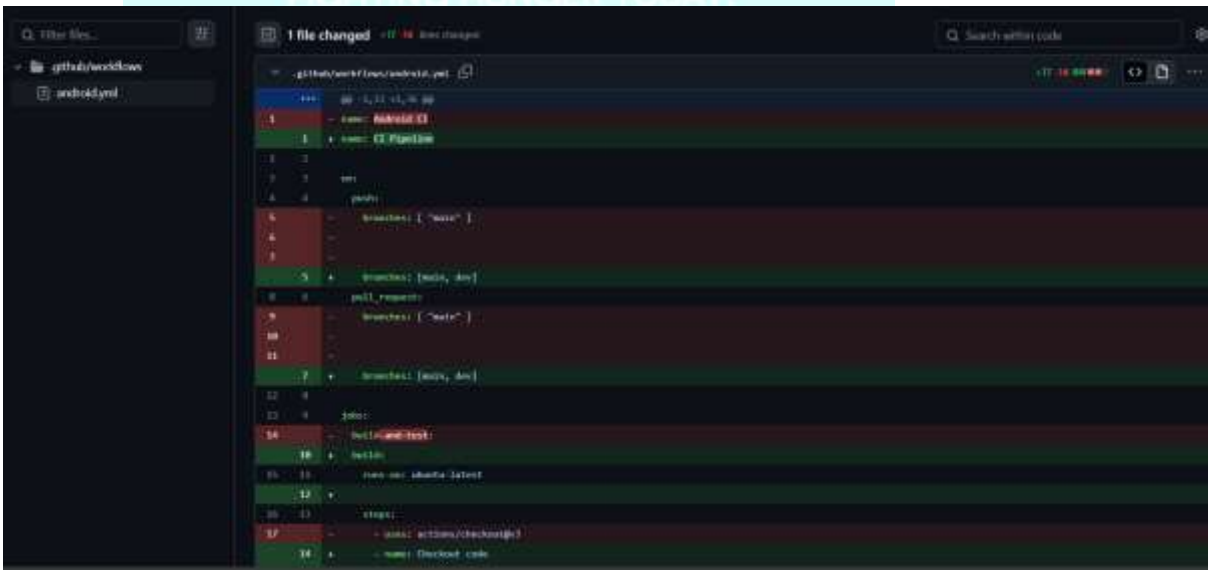
- **Display Component:** Utilizes RecyclerView to display dynamic lists of donations.
-

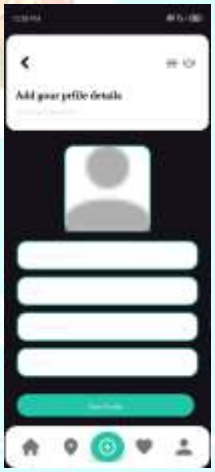


GitHub CI/CD Pipeline Setup

To set up a CI/CD pipeline for your Android application using GitHub Actions:

1. **Create a GitHub Repository:** Host your Android project on GitHub.
2. **Add a Workflow File:** In your repository, create a `.github/workflows/android.yml` file with the following content:





✓ Problem and Solution Overview:

Food wastage remains a critical global and local issue, while many individuals and organizations struggle with food insecurity. HungerHub aims to bridge this gap by providing a localized, easy-to-use Android platform where individuals and organizations can **donate excess food** and **NGOs can collect it in real time**. This initiative not only reduces food waste but also strengthens community ties through purposeful technology.

✓ Live Walkthrough:

We will demonstrate the core flow of the HungerHub app:

1. **Login** – Secure Firebase Authentication.
2. **Donate** – Users fill out a simple form with food details and upload an image.
3. **Food Listing** – NGOs and other authorized users can view available food donations in real time.

This flow represents the heart of the app: **connect → donate → deliver**.

✓ Tech Stack Highlight:

- **Java** – For Android backend logic.
- **Android Studio** – Main IDE used for designing and building the application.
- **Firebase Realtime Database** – Manages live food data.
- **Firebase Authentication** – Ensures secure access for donors and NGO users.
- **Firebase Storage** – Stores images of donated food.

These tools were selected for their real-time capabilities, scalability, and developer-friendly ecosystem.

✓ Challenges and How We Solved Them:

Challenge	Solution
Realtime data syncing	Leveraged Firebase Realtime Database for instant updates
Image upload and storage issues	Used Firebase Storage with structured path conventions
Managing roles (Donors vs NGOs)	Implemented role-based access logic in Firebase and app UI
Ensuring smooth UI navigation	Refactored code using Java OOP principles and proper activity flows

✅ Future Roadmap:

1. 🗺️ **Interactive Map Integration**
   - Real-time map to show nearby donations and NGOs for easier coordination.
2. 📲 **Real-time Pickup Notification System**
   - Instant alerts for NGOs when a new donation is available and vice versa.
3. 🌟 **Donor Feedback Mechanism**
   - Allow NGOs to rate and provide feedback on donations, encouraging quality and accountability.

Github link

https://github.com/NIDURANGANI/HungerHub.git

THANK YOU.