Project 4 Report

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1. Alignment with Guardian Angel

The integration of the Notification System with the In-App Notifications and the Firebase Cloud Messaging (FCM) is at the heart of the concept of "Guardian Angel." project. The notification serves to directly “guard” the user from putting themselves in unfavorable situations. Our objective is to create a comprehensive safety and communication system between the Angel which helps the user with fatigue/drowsiness, speed limit, driving pattern, crime, and unfavorable weather detection.

In-App Notifications serve to immediately and continuously guide the user if they are fatigued, driving too fast or have an erratic driving pattern with high priority notification channel.

FCM plays a pivotal role in enhancing communication by enabling real-time notifications and alerts to be sent to all our users in the form of notification broadcasts. This ensures that critical safety information reaches multiple users promptly, aligning perfectly with the project's mission of providing a protective and responsive environment.

2. Specifications

Control Flow: The control flow involves the following steps:

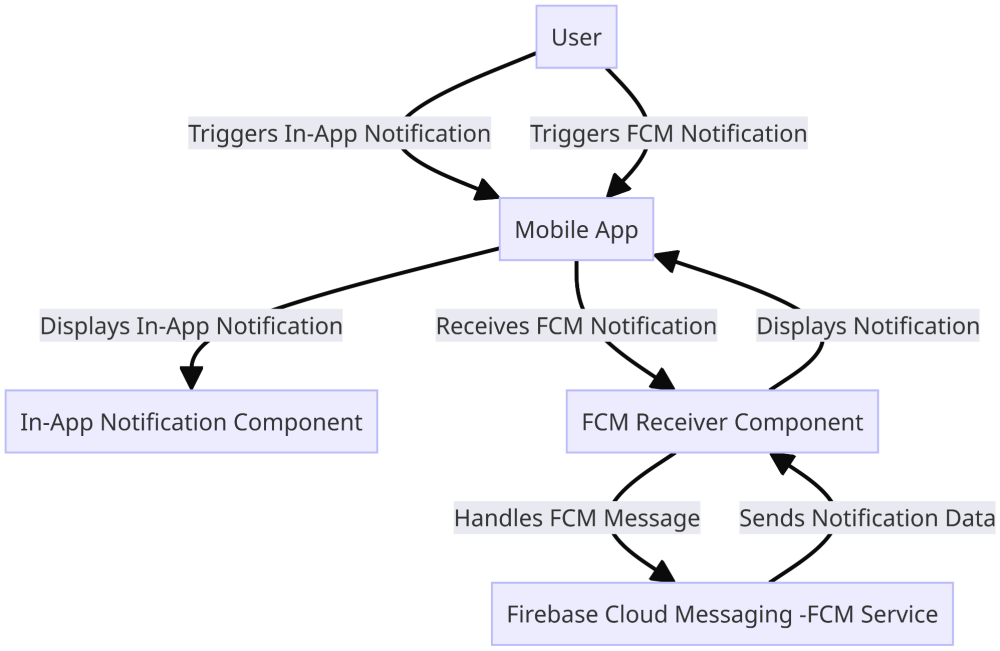
1. Notification fragment has buttons to trigger different types of notifications.
2. The NotificationService service generates notification messages for in-app notifications
3. FCM is used to send cloud messages to multiple devices.
4. The mobile app component receives and displays the notifications.
5. Depending on the type of button and service we provide, a different notification is sent to the user.

3. Design

Component Architecture: The architecture consists of three main components:

Notification Service: Responsible for generating in-app notification messages.
Firebase Cloud Messaging (FCM): Responsible for sending multiple in-app notifications to users based on their unique IDs.
Notification Fragment: Currently consists of buttons to demonstrate ideal functionality of the notification service.

UML Diagram:



Tech-Stack: I've utilize the following technologies:

- Android Studio for mobile app development.
- OkHttp3 library for making HTTP requests.
- Firebase Cloud Messaging API for sending and receiving messages.

4. Testing Strategies

Testing Strategy:

- I will write unit test cases when merging the different branches in order to test for different integrations
- UI Testing: Verifies that notifications are displayed correctly in the app.
- Load Testing: Ensures that the system handles a large number of notifications efficiently.

5. Navigating Challenges

- I faced some initial challenges to Request permission for notifications because Android versions after "Tiramisu" have a more controlled notification permission system
- Working with the Firebase Cloud Messaging API was a little challenging as there are two active API endpoints for doing the same task but one is in the process of deprecation.
- Secure storage of the receiverFcmToken as a server needs to implemented with hashing for the most optimal storage system (works currently to demo end-to-end)