

Technical Specifications Document: English Vocabulary Learning Android App

Overview

This document outlines the technical stack, API integration, data sources, and external libraries/tools planned for the development of the Vocabulary Learning Android App. The app will use Firebase for authentication, real-time sync, and push notifications; Room for offline access; and additional tools for a smooth and responsive user experience across multiple devices and orientations. Notably, the app will leverage the OpenAI ChatGPT API to generate context-based quizzes, example sentences, and personalized vocabulary explanations to enhance the user's learning experience.

1. Technology Stack

- - Language: Kotlin (primary development language)
- - UI Framework: Jetpack Compose (modern declarative UI toolkit)
- - Database: Room Persistence Library for offline storage and Firebase Firestore for real-time sync
- - Networking: Retrofit with Kotlin Coroutines for asynchronous API requests
- - Authentication: Firebase Authentication with Google Sign-In
- - Push Notifications: Firebase Cloud Messaging
- - Analytics & Error Logging: Firebase Analytics and Firebase Crashlytics
- - AI Content Generation: OpenAI ChatGPT API for personalized vocabulary content
- - API Integration: Oxford Dictionaries API for vocabulary definitions and examples
- - Backend and Cloud Storage: Firebase Cloud Firestore for user data sync and caching

2. Core Features and Functionalities

- 1. Authentication:
 - Firebase Authentication with Google Sign-In will enable secure, simple user login.
 - This will facilitate user management, ensuring a seamless onboarding experience.
- 2. Real-Time Data Synchronization:
 - Firebase Firestore will enable live synchronization of vocabulary data, progress, and settings across devices.
 - Cloud sync will ensure that users can seamlessly switch between devices.
- 3. Offline Access:
 - Room Persistence Library will cache data locally, enabling the app to work offline.
 - On re-establishing connectivity, data will sync with Firestore to ensure data consistency.
- 4. Search and Filtering:
 - A search bar and filter options will allow users to locate specific vocabulary entries based on difficulty level, theme, and word type.
 - This feature will enhance discoverability and facilitate more efficient learning.

- 5. User Interaction and Feedback:
 - Users can engage with each vocabulary word through features like comments and likes.
 - Each word page will have a comment section, where users can share tips or memory aids.
- 6. Push Notifications:
 - Firebase Cloud Messaging will send notifications to reinforce spaced repetition learning.
 - Notifications for words that users struggled with in quizzes will help reinforce memory.
- 7. AI-Powered Content Generation:
 - The ChatGPT API from OpenAI will provide personalized content generation for context-based quizzes, vocabulary example sentences, and tailored vocabulary explanations.
 - Using ChatGPT's natural language generation capabilities, the app will generate scenario-based articles, context sentences, and detailed explanations to improve engagement and retention.
- 8. Dark Mode Support:
 - Using Jetpack Compose's theming system, the app will support both light and dark modes to cater to user preferences and reduce eye strain.