My Expense Tracker

Open Ended Lab Report of Android Development

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Date: December 31,2025

Declaration

I hereby declare that this project report titled **"My Expense Tracker"** is my own work and has not been submitted previously for any academic qualification. All sources of information used in this report have been properly acknowledged.

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Acknowledgement

I would like to express my sincere gratitude to my instructor and the Department of Computer Science for their continuous guidance and support throughout the development of this project. I am also thankful to my peers and online developer communities for their valuable resources and discussions that helped me complete this project successfully.

Abstract

This report presents the design and development of **My Expense Tracker**, an Android-based mobile application aimed at helping users track, manage, and analyze their daily expenses. The application utilizes modern Android development practices, Firebase services, and Material Design principles to provide a secure, user-friendly, and feature-rich experience. The system supports cloud synchronization, offline storage, authentication, and visual expense analysis, making it a practical solution for real-world financial management.

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1. Introduction

1.1 Objective

The objective of this project is to design, develop, and deploy a fully functional Android mobile application that provides a meaningful solution to a real-world problem while adhering to modern mobile development practices. The goal was to create a robust, scalable, and user-friendly application from scratch that fulfills all specified academic and technical requirements.

1.2 Problem Statement

In an era of increasing digital transactions, individuals often struggle to keep track of their daily expenses, leading to ineffective budgeting and financial mismanagement. The **My Expense Tracker** application provides a simple yet powerful solution for logging, monitoring, and analyzing personal expenses, thereby helping users gain better financial awareness and control.

2. Technology Stack

2.1 Development Tools and Technologies

The application was developed using the following technologies:

- **Programming Language:** Java
- **User Interface:** XML with Material Design Components
- **Architecture:** Model-View-Controller (MVC)
- **Authentication:** Firebase Authentication

2.2 Database Technologies

A hybrid data storage approach was implemented:

- **Cloud Database:** Google Firestore (Primary)
- **Local Database:** SQLite (Offline backup)

2.3 Libraries and Dependencies

- androidx.appcompat:appcompat
- com.google.android.material:material
- androidx.recyclerview:recyclerview
- com.google.firebase:firebase-bom
- com.google.firebase:firebase-auth
- com.google.firebase:firebase-firestore

3. System Features

3.1 Core Features

The application successfully fulfills all core requirements:

1. **Splash Screen:** Animated entry screen displaying the application logo.
2. **Authentication:** Secure login and registration using Firebase Authentication.
3. **Main Dashboard:** Displays a list of user-specific expenses.
4. **Add Expense Module:** Allows users to enter expense details using a structured form.
5. **Statistics Screen:** Provides summarized financial insights.

3.2 Navigation and UI

Navigation is handled using explicit intents and a modern **BottomAppBar**. Proper back stack management ensures a logical and intuitive user flow. The user interface follows Material Design guidelines for consistency and usability.

3.3 Data Management

- Firestore acts as the primary cloud data source, enabling real-time synchronization.
- SQLite provides offline storage support, ensuring data persistence without internet connectivity.

3.4 User Interaction

- Floating Action Button (FAB) for adding new expenses
- TextInputLayout for clean and professional forms
- AlertDialog for system permission prompts
- Password visibility toggle for better usability

4. Advanced and Bonus Features

- **Firebase Authentication:** Complete email/password authentication flow.
- **REST API Integration:** Firestore cloud database accessed via RESTful APIs.
- **Notifications:** Daily reminders implemented using AlarmManager and BroadcastReceiver.
- **Location Services:** Mandatory location service validation at application launch.
- **Dark Mode and Material You:**
  - Light and Dark themes
  - Theme toggle button across major screens
  - Modern Material UI components

5. Development Challenges and Solutions

5.1 Resource Linking Errors

Challenge: Missing or invalid resource references caused build failures.

Solution: Standardized theme attributes and ensured proper resource definitions in XML files.

5.2 Firestore Permission Issues

Challenge: Permission denied errors during database operations.

Solution: Configured appropriate Firestore security rules for authenticated users.

5.3 Query and Indexing Problems

Challenge: Filtered and sorted queries failed due to missing indexes.

Solution: Identified and created composite indexes through the Firebase Console.

5.4 App Icon Rendering Issue

Challenge: Adaptive icon did not display correctly.

Solution: Designed a static foreground drawable to resolve theme attribute conflicts.

6. Conclusion

The **My Expense Tracker** application is a complete and robust Android solution that fulfills all project requirements. It demonstrates strong understanding of Android development fundamentals, Firebase integration, modern UI/UX design principles, and real-world problem solving. The project reflects professional-level implementation and is suitable for academic submission as well as practical use.