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EXPENSE ANALYZER: AN INTELLIGENT FINANCIAL MANAGEMENT TOOL FOR INSTITUTIONS AND INDIVIDUALS

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Abstract

Expense Analyzer is a mobile-based financial management system designed to help individuals and institutions monitor, categorize, and analyze their expenses efficiently. Financial mismanagement is a challenge faced by many due to the lack of real-time expense tracking tools. We adopted a structured software engineering methodology (SSADM) and implemented the system using React Native, Firebase, and Firestore to support Android and iOS platforms. The system [redacted] allows users to log transactions, generate reports, receive budget alerts, and visualize spending patterns. Expense Analyzer simplifies personal and institutional budgeting, enabling better financial decisions, accountability, and organization.

Keywords: expense management; financial technology; budgeting system; mobile app development; React Native; Firebase; SSADM

INTRODUCTION

Effective financial management remains a critical challenge for both individuals and institutions. The absence of robust real-time tracking tools often results in poor budgeting, overspending, and ineffective financial planning. Individuals find it difficult to control cash flow and make informed decisions, while institutions lack structured systems for monitoring departmental expenditures and producing accurate financial reports (Smith, 1998; Johnson, 2005).

The objective of this study is to develop an intelligent financial management system that addresses these issues through automation and real-time analytics. Expense Analyzer

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provides a mobile-first solution that enables users to log transactions, generate reports, categorize expenses, and receive alerts on budget thresholds. The system is designed with a simple, intuitive interface, making it accessible to users with limited financial expertise. The use case diagram (Figure 1) illustrates key user interactions including expense logging and report generation.

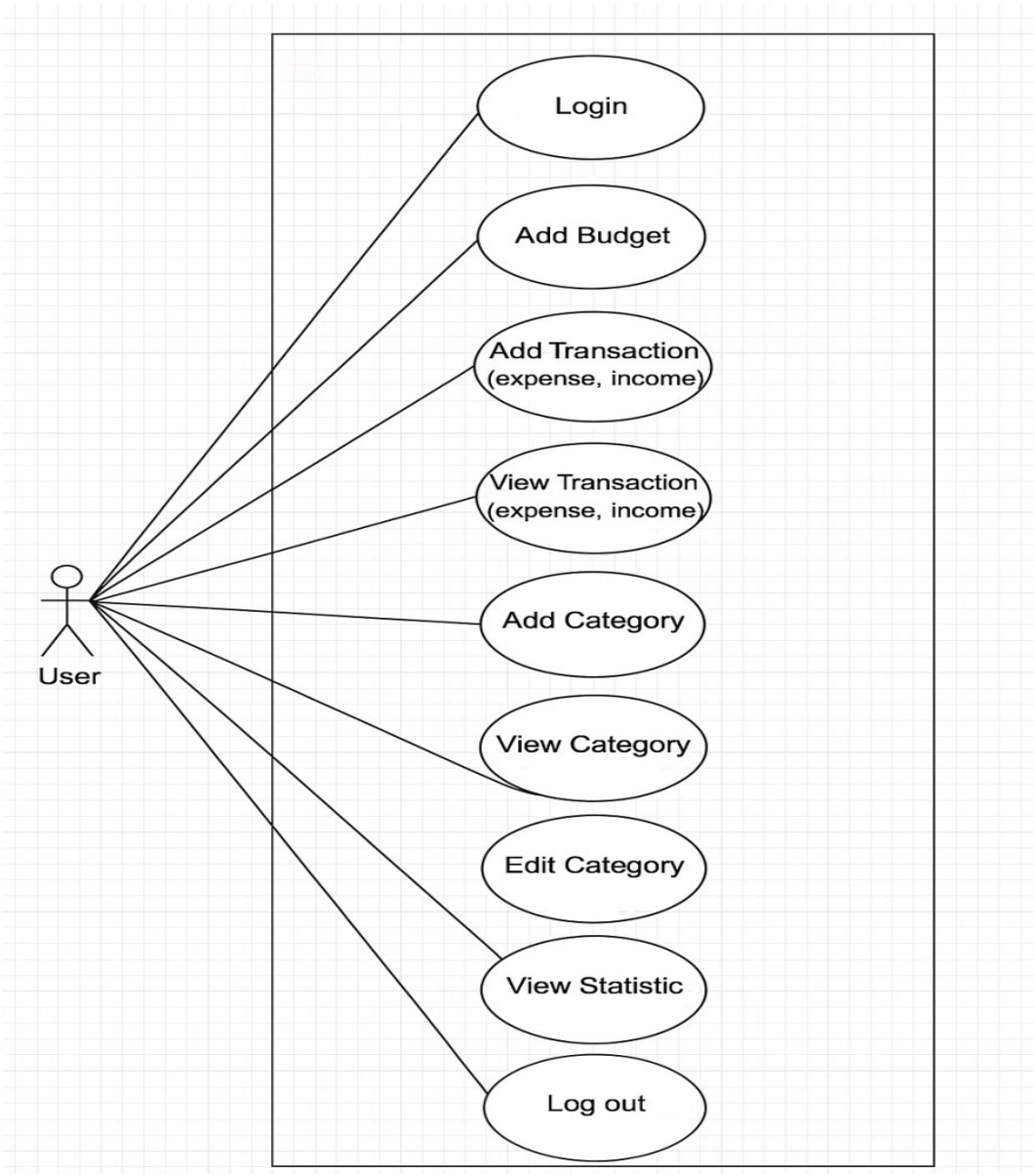


Figure 1. Use case diagram showing user interactions with the Expense Analyzer system, including roles such as individual users and institutional administrators.

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Materials and Methods

Methodology

This project employed the Structured Systems Analysis and Design Methodology (SSADM), which supports systematic software development from requirement gathering to system deployment. SSADM ensures clarity in planning and reduces implementation risks. The system architecture (Figure 2) integrates modern technologies to ensure cross-platform compatibility and scalability.

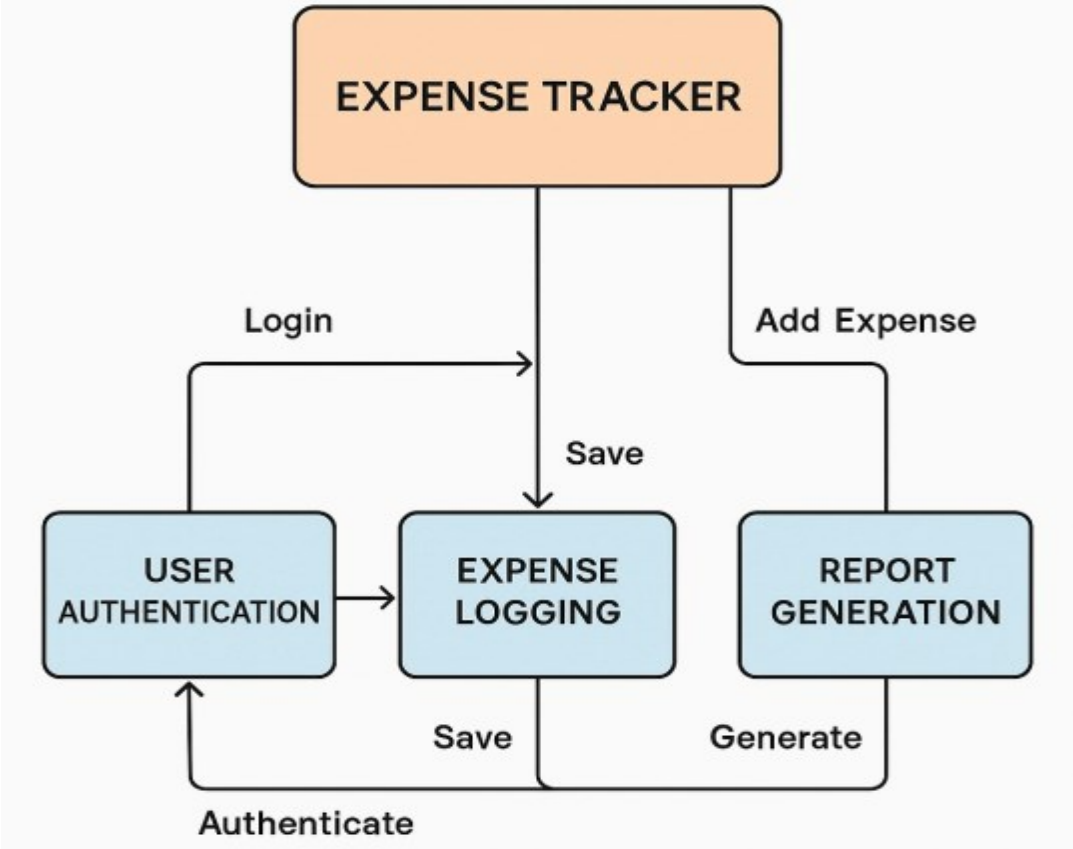


Figure 2. System architecture of the Expense Analyzer, detailing the mobile frontend, Firebase backend, and cloud-based Firestore database

Tools and Technologies

React Native enables cross-platform development using a single JavaScript codebase. Firebase provides real-time cloud services including authentication and Firestore database. Redux handles component state, and React Native Paper/Chart Libraries provide UI components and visualizations. Expo CLI and EAS facilitate testing and over-the-air updates (Expo Documentation, 2025).

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System Requirements

Hardware: A modern multi-core processor, minimum 8GB RAM, SSD. Software: macOS/Windows, Visual Studio Code, Android Emulator, Expo Go, Chrome mobile preview.

Database Design

The system uses Cloud Firestore, a NoSQL document-based database with real-time synchronization and offline persistence. Data models include user profiles, expense records, budget categories, and report logs. Data is encrypted at rest and in transit.

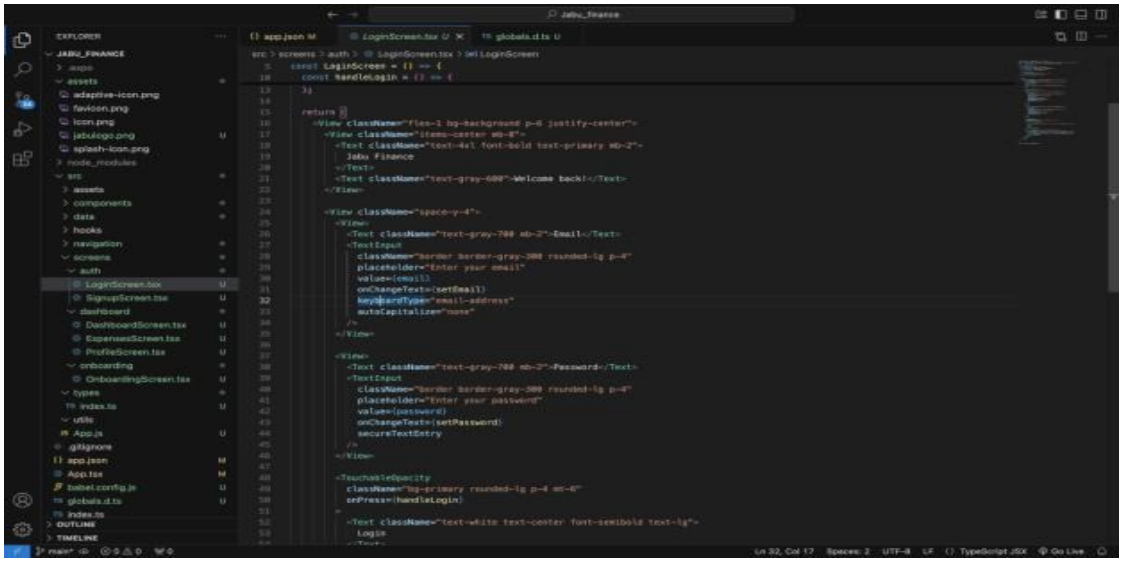
Security Features

Security features include Firebase Authentication, role-based access control, and encrypted communication. Firestore rules and Firebase Hosting protect against unauthorized access.

Discussion

Manual expense tracking via spreadsheets or paper records is inefficient and error-prone (Miller, 2019; Garcia, 2018). Popular digital tools such as Mint and YNAB often have limitations like steep learning curves or paywalled features (Deloitte, 2019; Stevens, 2019). Expense Analyzer addresses these shortcomings with real-time data sync, intuitive UI, and flexible categorization.

Figures 3 and 4 demonstrate the dashboard and reporting features. These include budget visualizations, pie charts, and temporal graphs for trend analysis.



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Figure 3. Presents the dashboard interface, where users can monitor their monthly spending, view budget utilization, and access visual summaries

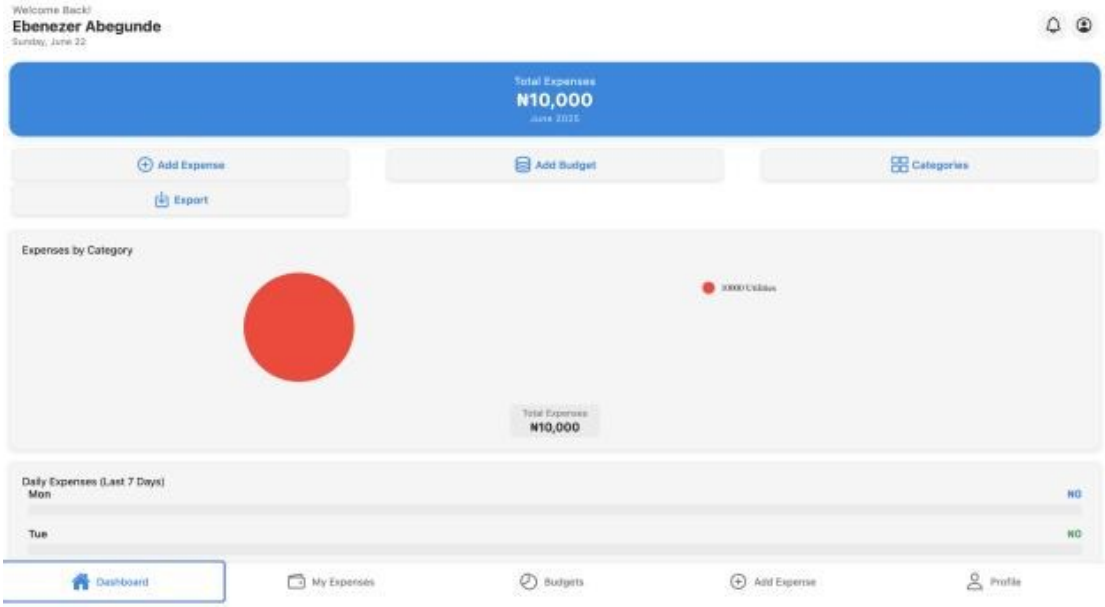


Figure 4. Report visualization including a pie chart of spending by category and a line chart showing expenses over time.

Advantages Over Existing Systems

- User-friendly interface
- Real-time tracking and synchronization
- Customization of budgets and categories
- Free and accessible mobile-first platform

Limitations in Other Systems

- High learning curve (e.g., YNAB)
- Privacy risks with bank-synced apps
- Locked features behind paywalls (Wilson, 2020)

Future Work

Future enhancements may include:

- AI-driven financial recommendations (McKinsey & Company, 2022)
- Secure API-based bank integrations (FreeCodeCamp, 2025)
- Multi-user collaborative budgeting for teams or families

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Conclusions

Expense Analyzer delivers a user-centered and scalable financial tracking solution. Built with React Native and Firebase, it promotes effective budgeting and decision-making. While it meets its primary objectives, future versions may incorporate AI forecasting, bank syncing, and team collaboration features.

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Author Contributions

Conceptualization, A.O.M. and A.O.E.; methodology, A.O.M. and A.O.E; software, A.O.M and A.O.E.; validation, A.O.M. and A.O.E.; formal analysis, A.O.M. and A.O.E; investigation, A.O.E.; data curation, A.O.E.; writing-original draft preparation, A.O.M.; writing-review and editing, A.O.M. and A.O.E.; visualization, A.O.M.; supervision, A.O.M.; project administration, A.O.M. All authors have read and agreed to the published version of the manuscript.

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Data Availability Statement
The source code and example data used to develop the Expense Analyzer are available from the corresponding author upon reasonable request. No external datasets were used.

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