

Design and Development of Split Bill Application for Group Expense Management

**Shedbale Nikita Dadaso, Nangare Shravani Shivaji,
Salunkhe Harshad Ramchandra, More Rutuja Hemant**

Students of Department of Information Technology
Dr. J. J. Magdum College of Engineering, Jaysingpur, Sangli, India

Abstract: *The Split Bill Application is an Android-based expense management application developed to simplify the process of sharing and managing expenses among friends, family members, classmates, and other groups. In daily life, people often share expenses for activities such as trips, restaurants, rent, household purchases, and outdoor activities, which can make it difficult to calculate individual contributions and track pending payments.*

The proposed application provides a convenient platform where users can record expenses, divide bills among multiple members, and keep track of the amount each person owes or needs to receive. It helps reduce manual calculations, prevents confusion, and provides greater transparency in group financial transactions. The application includes features for managing user information, recording expenses, viewing pending payments, maintaining transaction details, and calculating balances between users. The project is developed for the Android platform using Kotlin and Java.

It follows the MVVM (Model-View-ViewModel) architecture, which separates the application's user interface, business logic, and data management, making the application easier to maintain and extend. Room Database is used for local data storage and management, while Retrofit is used for communication with APIs and handling network-related operations.

Additional Android libraries such as Jetpack Navigation and Glide can be used to improve navigation and image handling within the application. The main objective of the Split Bill Application is to provide a simple, accurate, and user-friendly solution for managing shared expenses. By automating bill calculations and maintaining transaction records, the application makes expense settlement faster and more organized. Overall, the system offers an efficient digital approach to group expense management and helps users maintain clear and transparent financial records..

Keywords: *Split Bill Application*

I. INTRODUCTION

Managing shared expenses is a common problem among friends, roommates, family members, and colleagues. During trips, parties, restaurant visits, rent payments, or group activities, different people may pay different amounts, making it difficult to calculate who owes money to whom. The proposed Splitwise Clone is an Android-based expense management application that helps users record, divide, and manage shared expenses easily. It provides a simple way to keep track of payments, balances, and individual contributions.

The motivation behind choosing this topic is to reduce the difficulties involved in manually calculating and maintaining shared expenses. Manual calculations can result in mistakes, confusion, and disagreements among group members. The proposed application aims to provide a convenient and organized solution where users can add expenses, split them among members, and keep track of their financial transactions. This project also provides practical experience in Android application development, database management, API integration, and modern software architecture.

Several applications such as Splitwise, Settle Up, and other expense-sharing applications are available in the market. However, the proposed Splitwise Clone focuses on providing a simple, user-friendly, and lightweight solution for



managing group expenses. The project is based on technologies such as Kotlin/Java, MVVM architecture, Room Database, and Retrofit. It aims to make expense management easier for users by providing clear expense records, balance information, and an organized interface, making it suitable for everyday group expense management.

PROBLEM STATEMENT

The main problem addressed in this paper is the difficulty of accurately tracking shared group expenses and calculating the amount payable or receivable by each participant. Manual methods require users to remember who paid, who participated, and how each bill should be divided. When expenses are unequal or involve multiple payers, the calculations become more complicated. The proposed system aims to maintain a structured expense record and calculate net balances using a consistent method.

OBJECTIVES :

- To provide a single place to record group expenses and identify the person who paid each expense.
- To calculate each participant's share using equal or user-defined amounts.
- To display the net amount each participant owes or is entitled to receive.
- To support recording of repayments so that balances can be updated.
- To reduce repeated manual calculations and make the expense history easier to review.
- To consider basic privacy, data accuracy, and user-consent requirements in the system design.

II. RELATED WORK

The official Splitwise help documentation describes a workflow in which users create or join groups, add expenses, choose how to divide each expense, and settle balances . The documentation also lists multiple allocation approaches, including equal division, exact amounts, percentages, shares, adjustments, and itemized expenses . This demonstrates that expense splitting must support more than one allocation rule if it is to represent real-world group spending.

Splitwise's debt-simplification documentation describes restructuring payment paths so that fewer transfers may be needed while each person's total balance remains unchanged . A related student project, "SettleUp: An Expense Splitting Web Application," discusses group expense management and settlement in a web application context . These sources indicate that clear expense records, flexible allocation, balance calculation, and settlement are important design considerations. The present paper uses these ideas as background; it does not claim that the proposed system has been experimentally shown to outperform existing applications.

PROPOSED SYSTEM :

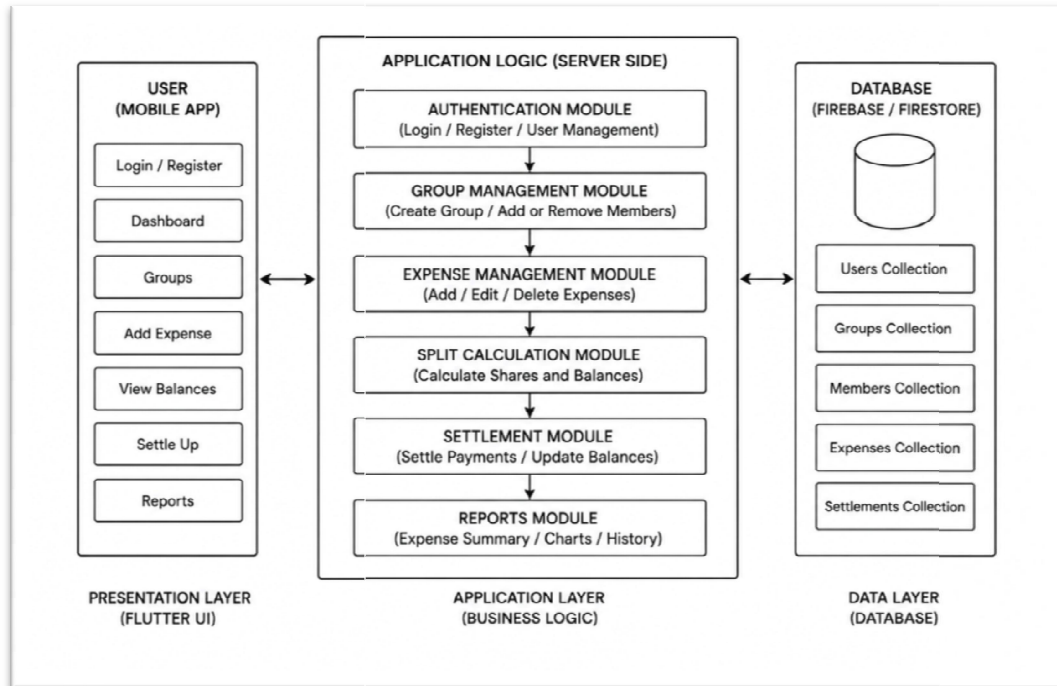
The main objectives of the proposed Splitwise Clone application are:

- To easily split bills among friends or groups.
- To calculate each person's share automatically.
- To reduce calculation mistakes.
- To keep track of expenses and payments.
- To show who has paid and who has to pay.
- To save time and avoid confusion.
- To make bill sharing simple and transparent.



III. METHODOLOGY

Proposed System Architecture



List of Modules-

Module	Purpose
User Authentication	Login and registration
Group Management	Create and manage groups
Expense Management	Add and edit expenses
Split Calculation	Calculate each member's share
Settlement Management	Track payments and balances
Reports & Analytics	Show summaries and charts

Explanation of Modules

1. User Authentication

Register new users
Login with email/password
Maintain secure sessions

2. Group Management

Create groups
Add/remove members



View group details

3. Expense Management

Enter expense amount

Select payer

Add description and category

4. Split Calculation

Equal split

Custom split (future scope)

Calculate individual balances

5. Settlement Management

Record payments

Update balances

Show who owes whom

6. Reports & Analytics

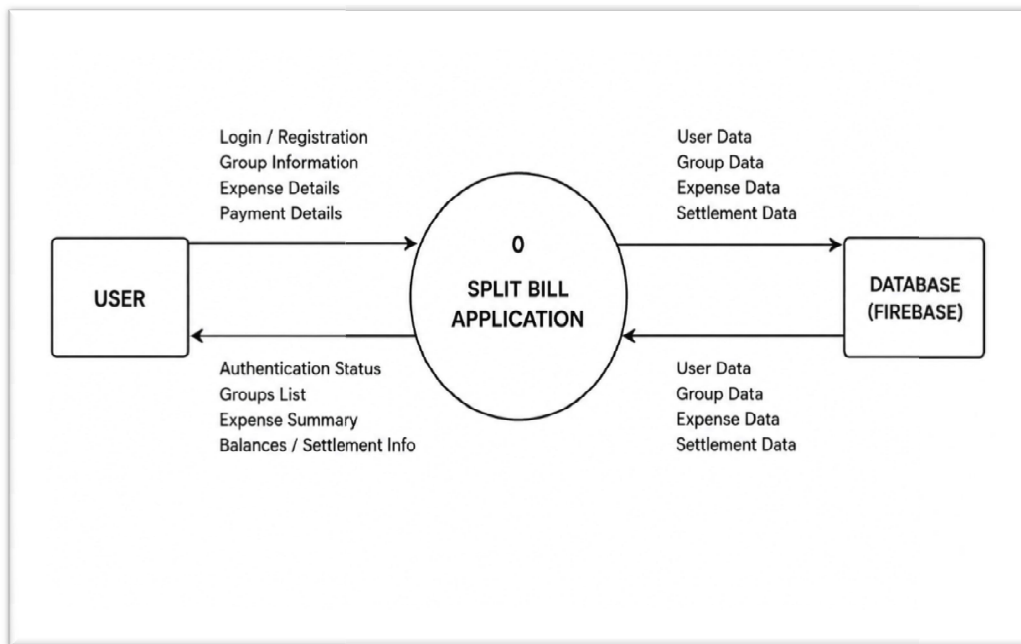
Total expenses

Individual contribution

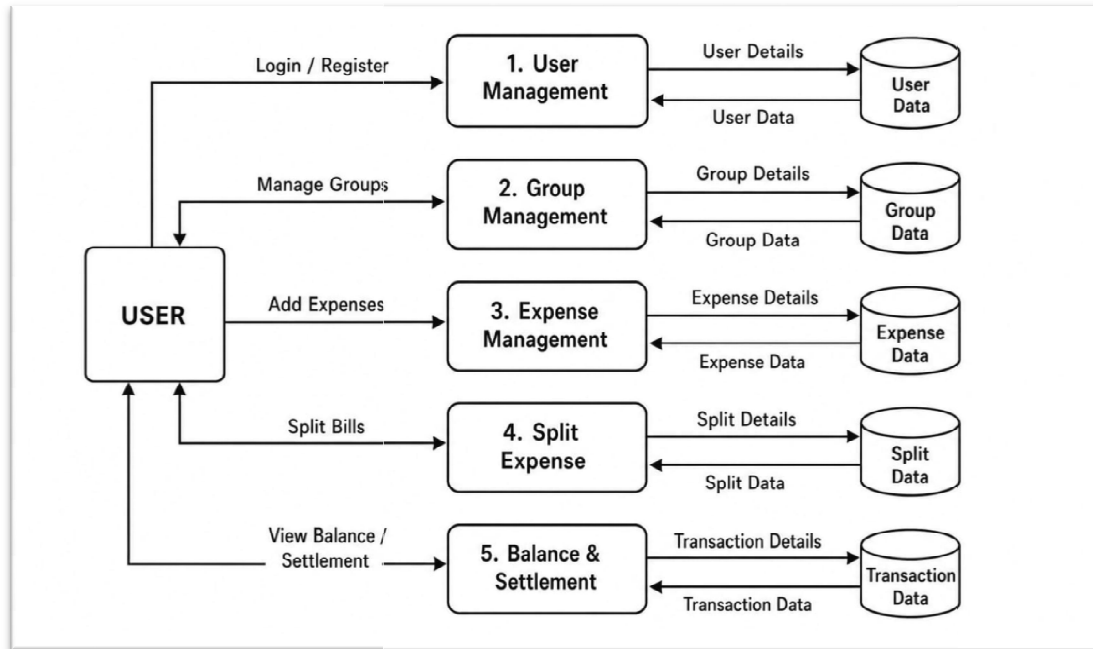
Monthly/weekly charts

Dataflow Diagrams

DFD Level 0 –



DFD LEVEL 1 –



IV. BALANCE CALCULATION

For each participant, the system can calculate a net balance by subtracting that participant's total allocated share from the total amount that the participant paid on behalf of the group, and then accounting for recorded settlements. For a simplified expense-only example before repayments, the net balance of participant i is:

$$\text{Net Balance}_i = \text{Total Paid}_i - \text{Total Share}_i$$

A positive result means the participant should receive money; a negative result means the participant owes money. The sum of all net balances should equal zero, apart from any explicitly handled rounding differences, because the total paid by the group equals the total allocated expense.

Illustrative example: three participants share a total expense of ₹1,500 equally. Rahul pays ₹900, Priya pays ₹600, and Amit pays ₹0. Each person's share is ₹500. Rahul's balance is +₹400, Priya's balance is +₹100, and Amit's balance is -₹500. A settlement plan is for Amit to pay Rahul ₹400 and Priya ₹100. After those payments are recorded, all three participants have a net balance of zero. This example demonstrates the calculation method; it is not a result from a user study or a deployed application.

TABLE I: ILLUSTRATIVE EXPENSE BALANCES

Participant	Amount Paid (₹)	Share (₹)	Net Balance (₹)
Rahul	900	500	+400
Priya	600	500	+100
Amit	0	500	-500

V. LIMITATIONS AND FUTURE SCOPE:

A. Limitations

- Manual data entry may cause calculation errors.
- Internet access may be required to use the application.
- Direct UPI payment integration may not be available.



- Data security and privacy must be maintained.
- Multi-currency support may be limited.

B. Future Scope

- Integrate UPI for direct payments.
- Add receipt scanning using OCR technology.
- Support multiple currencies.
- Provide expense reports using charts and graphs.
- Develop Android and iOS applications.
- Add payment reminders and enhanced security features.

VI. CONCLUSION

This paper presents a design for a Split Bill Application that organizes shared expenses, calculates participant shares, and displays net balances. The proposed workflow includes group management, expense recording, configurable split rules, balance summaries, and settlement records. An illustrative example shows how net balances can be used to identify repayments between participants. The application may reduce the effort required for manual calculations, but that benefit must be confirmed through implementation and testing. Future work should focus on validating the calculations, evaluating usability, protecting users' information, and documenting clear terms of use that accurately describe the system.

ACKNOWLEDGMENT

We would like to express our sincere gratitude to our project guide and faculty members of the Department of Information Technology for their valuable guidance, continuous support, and encouragement throughout the preparation of our research paper titled "Design and Development of a Split Bill Application for Group Expense Management."

We are thankful to our college for providing us with the necessary resources and an opportunity to explore this topic. We also acknowledge the research papers, online resources, and technical documentation that helped us understand shared expense management systems and the methods used to divide bills efficiently.

Finally, we would like to thank our family and friends for their encouragement and support throughout this work. Their motivation helped us complete the preparation of this research paper.

REFERENCES

1. Velmurugan, A., Mayan, A. J., Niranjana, P., & Richard Francis. (2020). Expense Manager Application. *International Journal of Engineering Research and Technology (IJERT)*, 9(6), 1123–1127.
2. Harish Kumar, M., Shree Harini, G. P., & Thenmullai, D. (2022). Application for Tracking Personal Expense. *International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)*, 10(4), 2451–2456.
3. Maulian, R. F., & Juwono, R. (2023). Android-Based Mobile Application Development Expensify: Personal Expense Manager. *Journal of Mobile Computing and Application Development*, 5(1), 18–26.
4. Flutter Documentation. (2026). Flutter SDK Documentation. Retrieved from <https://docs.flutter.dev>
5. Android Developers. (2026). Android Developer Documentation. Retrieved from <https://developer.android.com/docs>

