CASHFLOW-YOUR MULTIPURPOSE EXPENSE TOOL

MINOR PROJECT REPORT
By

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Under the guidance of

Dr. S. Thenmalar

In partial fulfilment for the Course

of

21CSC203P – ADVANCED PROGRAMMING PRACTICE

in Networking and Communications with specialization in Cloud Computing

FACULTY OF ENGINEERING AND TECHNOLOGY

SCHOOL OF COMPUTING

SRM INSTITUTE OF SCIENCE AND TECHNOLOGY

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BONAFIDE CERTIFICATE

Certified that this minor project report for the course **21CSC203P ADVANCED PROGRAMMING PRACTICE** entitled in **"CashFlow-your multipurpose expense tool"** is the bonafide work of **Lavanya Pakhale(RA2211028010132)** and **Shayan Dey(RA2211028010135)** who carried out the work under my supervision.

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ABSTRACT

In our daily lives, an expense tracker plays a crucial role for individuals, businesses, and organizations, aiding in the management of financial activities. However, the existing systems face challenges marked by the absence of dynamic and insightful features that cater to user customization. This project seeks to address these limitations by introducing a solution focused on enhancing personalization and flexibility in expense tracking. The primary goal is to provide users with a more tailored and efficient experience, moving away from the constraints of current systems. At the core of this innovative solution is the implementation of a dynamic dashboard equipped with user-configurable fields. This approach allows users to personalize their dashboard, thus overcoming the rigidity associated with conventional expense tracking systems. The project's emphasis lies in user empowerment. By enabling users to create and configure their own fields within the dashboard, the system ensures a seamless and adaptable expense tracking experience. This level of flexibility is a departure from the traditional one-size-fits-all approach, offering users the freedom to tailor their financial tracking based on their unique requirements.This project stands as a response to the challenges of limited personalization and flexibility in existing expense tracking systems. Through the introduction of a dynamic and user-configurable dashboard, it aspires to revolutionize the expense tracking experience, making it more intuitive, insightful, and tailored to individual preferences.

ACKNOWLEDGEMENT

We express our heartfelt thanks to our honorable **Vice Chancellor Dr. C. MUTHAMIZHCHELVAN**, for being the beacon in all our endeavors.

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1. INTRODUCTION

1.1 MOTIVATION

Traditional methods of expense tracking typically rely on manual data entry and spreadsheet management, presenting challenges such as time-consuming processes, susceptibility to errors, and a lack of real-time insights. Recognizing the evolving needs of users, there is an increasing demand for digital tools that can streamline financial management. This project emerges as a response to these challenges and aspirations. The primary motivation is to develop an expense tracker that not only simplifies the process of expense management but also introduces innovative features to enhance user engagement and motivation. By incorporating elements that encourage responsible spending, better budgeting practices, and heightened financial awareness, the project aims to provide users with a more efficient and rewarding financial tracking experience.

1.2 OBJECTIVE

The aim of our expense tracker project is to provide a comprehensive and user-friendly platform for efficient expense tracking. Users can seamlessly add, edit, and split expenses, with the flexibility to categorize transactions into default or custom categories. The system supports effective budget management by enabling users to set monthly goals. A currency converter accommodates diverse spending scenarios, allowing handling expenses in various currencies. The user interface, designed for simplicity and visual appeal, ensures easy accessibility to all functionalities. Our objective is to develop an expense tracker that merges practical functionality with user-friendly design, catering to diverse user needs for efficient and personalized financial management.

1.3 PROBLEM STATEMENT

Managing personal finances efficiently is a common challenge faced by individuals, often exacerbated by the lack of intuitive tools. Traditional expense trackers fall short in providing a holistic solution, lacking dynamic visualization, personalized insights, and seamless integration of user-defined categories. Users struggle with limited budgeting options, inadequate subscription tracking, and the absence of goal-oriented features. Additionally, many existing apps encounter import issues, syncing problems, and often require paid subscriptions for essential functionalities. This project aims to address these shortcomings by developing an advanced expense tracker, offering comprehensive financial insights, robust import capabilities, stable syncing, and a subscription-free model, thereby revolutionizing the user experience in personal finance management.

1.4 CHALLENGES

Our project successfully overcame the shortcomings of the existing models and catered to the user demands of a dynamic dashboard, visualizing insightful reports and analysis, category management and manipulation of user defined category templates. However, the expense tracker app faces several challenges, including prioritizing robust data security and privacy measures to safeguard users' financial information. Accurate and real-time currency exchange rates, seamless integration with external platforms, and performance optimization are critical technical challenges.

2. LITERATURE SURVEY

A literature review on the existing systems reveal that many users have expressed concerns regarding comprehensive financial insights and reports.

In particular with regard, Splitwise [1] application provides functionalities like adding, organizing and splitting but does not provide meaningful insights regarding the transactions. The backend (server-side) of Splitwise is typically developed using languages such as Java and Python that does most of the task but visualized insights and user defined templates are absent as of now. The paper authored by Hrithik Gupta and others[4] presents an "Expense tracker" that employs a smart approach to monitor everyday expenses. It highlights user interfaces, data analysis technique. Additionally, the paper by S. Chandini [5] introduces "Online Income and Expense Tracking" that focuses on monitoring both income and expenses. Our proposed model has taken this approach and methodology with few enhancements for personalization. Wallet by BudegtBakers [2] service covers the area of expense tracking, budgeting and insights into financial activities. This, however, provides a subscription-based service for most features.

In response to these identified issues, our expense tracker model is designed to fill these gaps by providing users with a comprehensive dashboard that offers a consolidated financial overview. We address the need for meaningful insights by incorporating dynamic graphs, including pie charts, for a visually rich representation of expenditures. Users can personalize their expense tracking experience by creating and managing their own categories, allowing for a more nuanced breakdown of their financial activities. The system also facilitates effective budget management by enabling users to set monthly budget goals, empowering them to stay within predefined financial limits.

Additionally, the system supports effortless expense sharing, simplifying the process of splitting expenses and providing automated details for increased transparency among users.

To address the diverse spending scenarios of users, we have integrated a currency converter, enabling the handling of expenses in different currencies. This feature adds flexibility and accommodates users who engage in transactions across various currency types. The user interface is thoughtfully designed to be simple, intuitive, and visually appealing, ensuring that all functionalities are easily accessible to users with varying levels of technical expertise.

Our expense tracker model aims to overcome the limitations identified in existing systems by providing a comprehensive and user-friendly platform. Through dynamic visualizations, personalized categorization, goal-oriented budgeting, subscription mastery, and currency conversion, our model strives to offer a holistic solution that caters to the diverse needs of users for efficient and personalized financial management.

3. SYSTEM DESIGN

3.1 BLOCK DIAGRAM

The expense tracker app follows a comprehensive methodology for user interaction and financial management. Users begin by logging in with credentials, initiating a secure authentication process. Upon login, a dynamic dashboard provides a holistic financial overview through insightful charts and metrics. Users can effortlessly add expenses, specifying amount, category, and date, with the option to customize categories. Similarly, income entries are recorded with details like source and notes. The app facilitates expense splits among multiple individuals, customizable for each user. Recurring subscriptions for regular expenses are managed. Users can set financial goals, track progress, and customize categories for a personalized experience. The app maintains a detailed history of expenses and incomes, enabling user-friendly management. Graphical reports and analytics offer valuable insights into spending patterns, income trends, and financial health. Currency settings cater to global users, allowing for accurate tracking and conversion. User preferences, including currency and notifications, are configurable in settings. This ensures a seamless, secure, and personalized financial tracking experience.

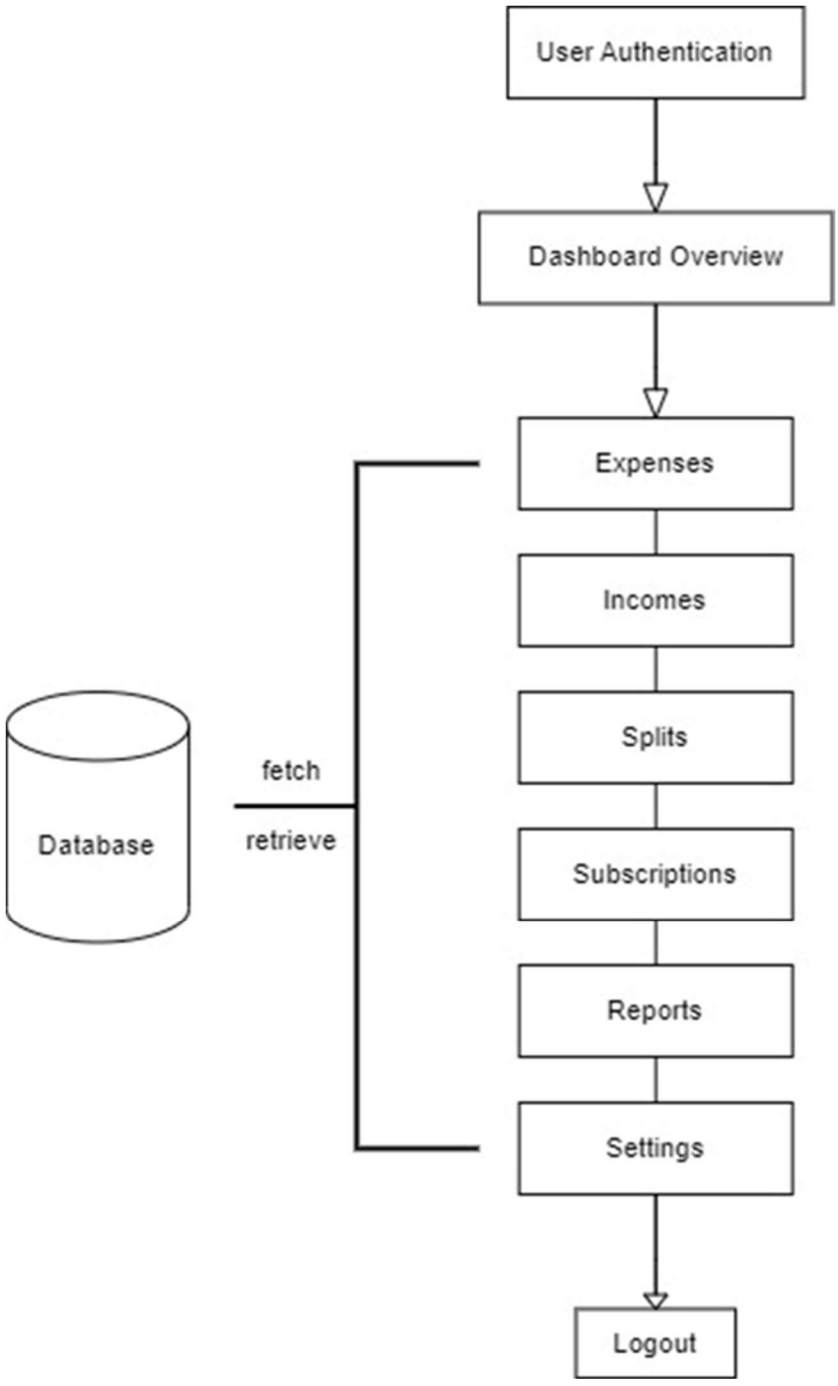


Fig 1. Block diagram of project model

3.2 MODULE DESCRIPTION

3.2.1 USER AUTHENTICATION-LOGIN/SIGN UP

This represents the main application interface for an expense tracker. It creates a JFrame with a title "Expense Tracker" and dimensions 800x700. The interface includes buttons for "Login" and "Sign Up" displayed over a background image. The buttons trigger the opening of respective login and signup forms, facilitating user authentication and entry into the expense tracker application. The application employs Swing for the graphical user interface and integrates actions using ActionListeners for seamless navigation between login and signup functionalities.

3.2.2 DASHBOARD OVERVIEW

The interface utilizes Java Swing for the GUI components and **JFreeChart** for creating pie charts. This feature presents a concise financial overview in the expense tracker app, offering dynamically updated visuals for expenses and incomes categorized by 3, 7, 14, or 30 days. The user can track financial activities efficiently, with insights into expense and income summaries, category-wise spending, and notifications for expense splits, goals, and subscriptions. The class interacts with a MySQL database to fetch real-time financial data, providing users with a user-friendly and informative dashboard experience.

3.2.3 EXPENSES

It creates a graphical panel allowing users to input and save expense details such as name, amount, and category. The panel dynamically displays existing expenses, incorporating a JTextArea for a clear presentation. The code uses Java Swing for the graphical user interface. It employs SQL

queries to interact with a MySQL database, saving and retrieving expense data. Additionally, the module updates related panels like "OverviewPanel" and "ReportsPanel" upon expense data modification, ensuring synchronized and real-time insights.

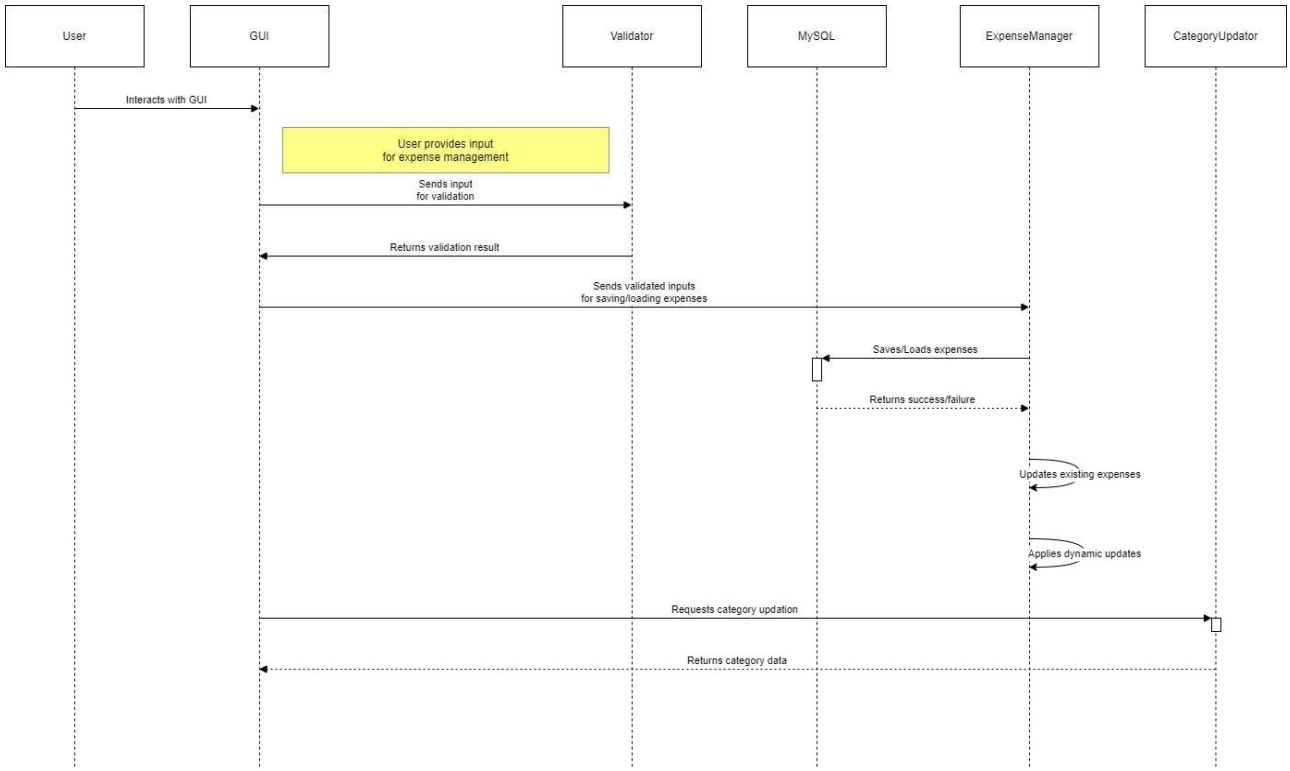


Fig 2. Sequence diagram of Expense panel

3.2.4 INCOMES

It provides a graphical panel for users to input and save income details, including name, amount, and category. The panel dynamically displays existing incomes using a JTextArea for clear presentation. The code utilizes Java Swing for the graphical user interface and SQL queries to interact with a MySQL database for saving and retrieving income data. The module updates related panels like "OverviewPanel" and "ReportsPanel" upon income data modification, ensuring synchronized and real-time financial insights.

3.2.5 SPLITS

It enables users to create and manage shared expense splits, inputting details like split name, amount, description, and recipients. The class interacts with a MySQL database, updating related panels such as notifications and expense reports. This collaborative expense tracking feature enhances user efficiency in managing shared expenses, providing a real-time display of existing splits. The graphical interface includes input fields, date selection, and a dynamic display of splits for a seamless user experience.

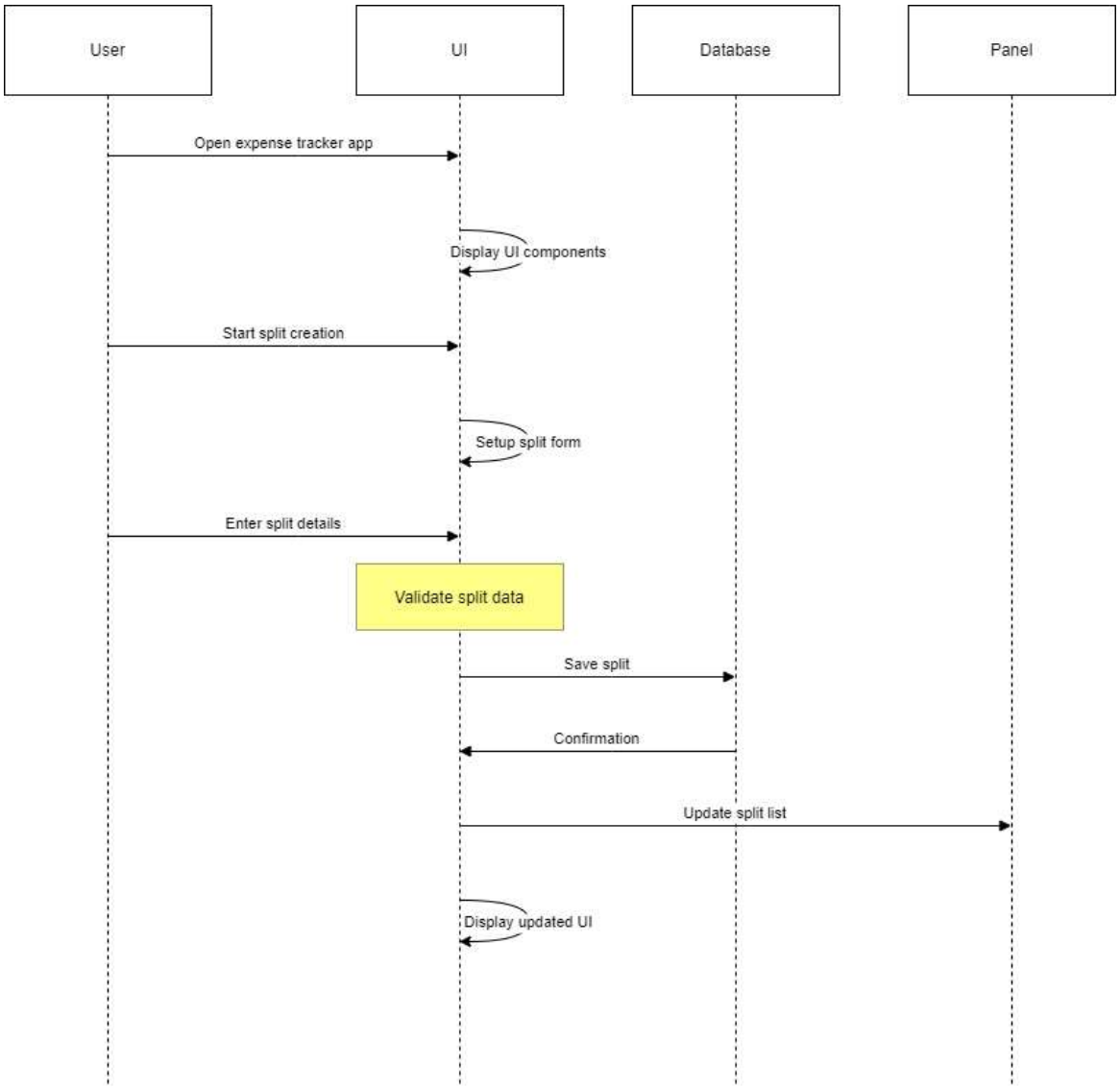


Fig 3. Sequence diagram for initiating splits

3.2.6 SUBSCRIPTIONS

It offers a graphical panel for users to input and save subscription details, including name, amount, recurring type, start date, and end date. The panel dynamically displays existing subscriptions using a JTextArea for clear presentation. The code utilizes Java Swing for the graphical user interface, SQL queries to interact with a MySQL database, and incorporates date-related functionality with JDateChooser. The module updates related panels like "SubscriptionNotificationPanel," "OverviewPanel," "ReportsPanel," "ExpensePanel," "CategoryWisePieChartPanel," and "ExpenseIncomePieChartPanel" upon subscription data modification, ensuring synchronized and real-time financial insights.

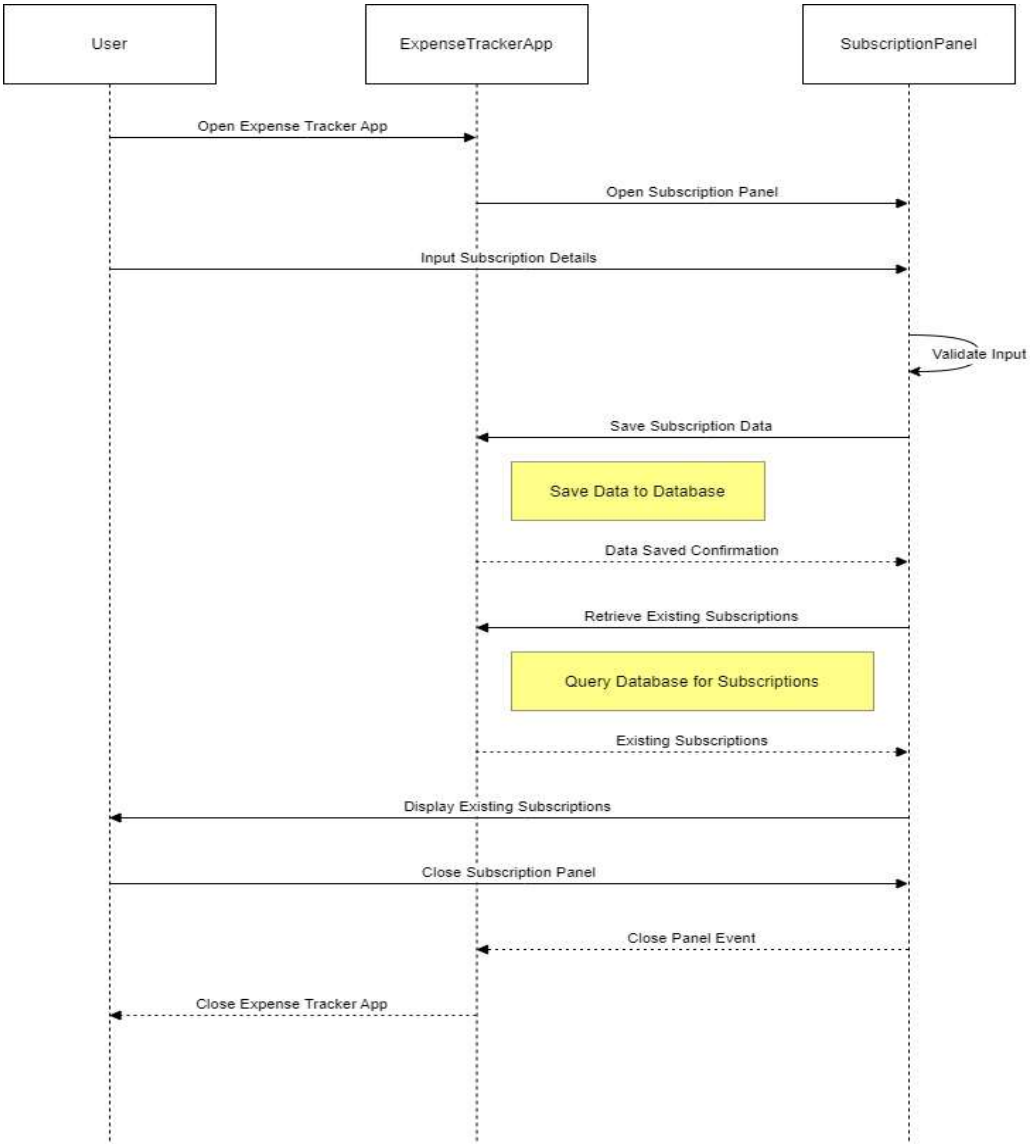


Fig 4. Sequence diagram for subscriptions

3.2.7 REPORTS

The Reports Panel , utilizing **JFreeChart** and Java Swing, generates graphical reports for the last 30 days of incomes and expenses, providing insights into financial trends. It displays two stacked bar charts for expense and income tracking, showcasing category-wise expenditure and income over time. The data, fetched from a MySQL database, is dynamically updated, offering users an interactive and visual representation of their financial activities. The class enhances the analytical capabilities of the expense tracker app by presenting detailed and visually appealing reports.

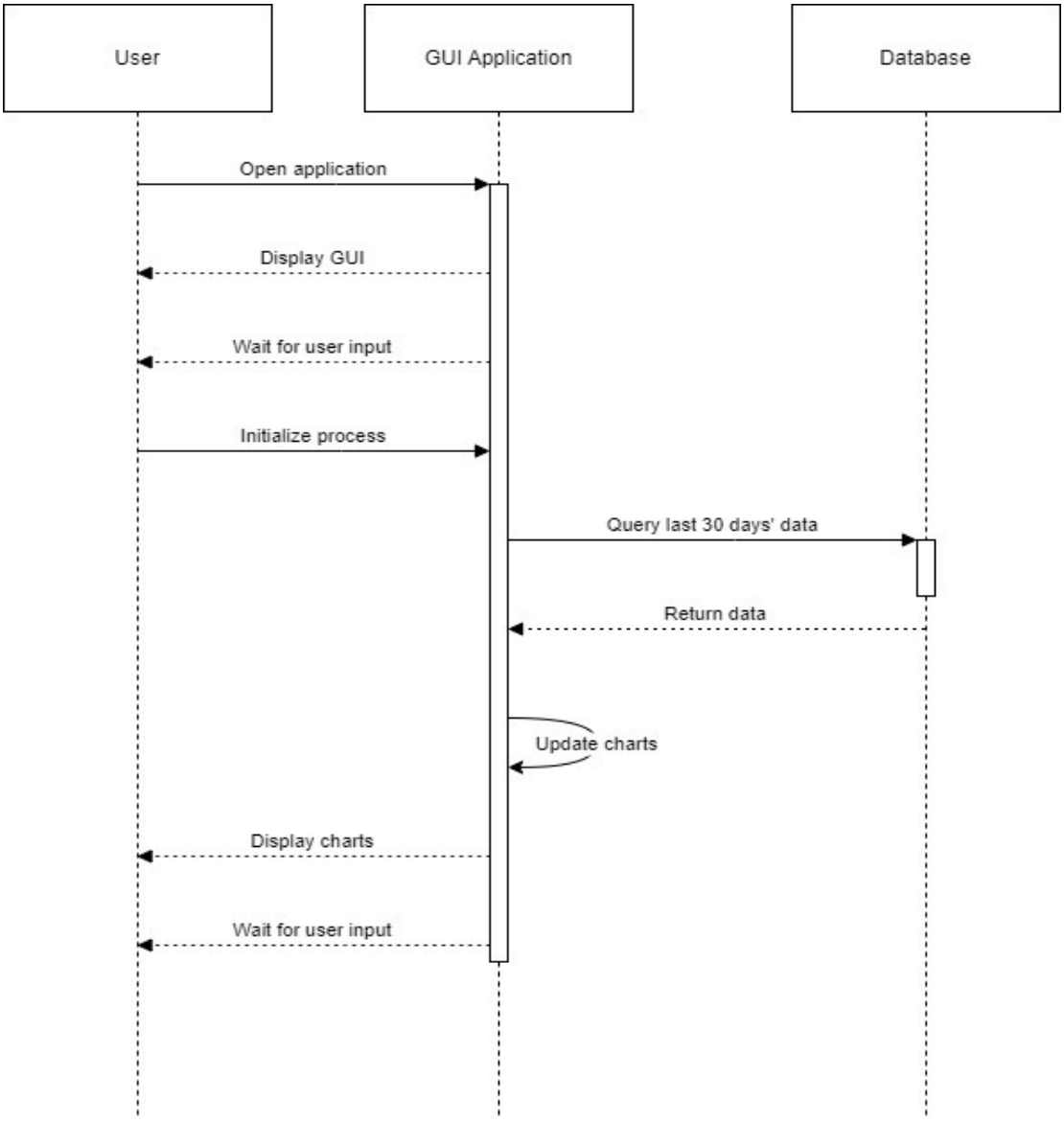


Fig 5. Sequence diagram for Reports panel

3.2.8 SETTINGS

This panel serves as a user interface module for managing personal finance settings. Users can add or remove expense and income categories, set financial goals, and select their preferred currency. The panel interacts with a MySQL database to store and retrieve user-specific data, such as category information and financial goals. Additionally, it facilitates currency conversion, updating existing amounts based on changes in the user's chosen currency. The dynamic user interface ensures real-time updates across the application in response to changes in settings.

- **USER-DEFINED CATEGORIES**

This facilitates the addition and removal of user-defined expense and income categories. It incorporates buttons and input fields to dynamically update the category lists, enhancing customization. The backend interaction with a MySQL database ensures persistent storage of user-defined categories.

- **CURRENCY-CONVERSION**

This allows users to set their preferred currency from options like INR, USD, and EURO. It utilizes a MySQL database to store user currency preferences. The class also provides a mechanism for currency conversion, updating existing expense, income, and goal amounts based on the selected currency, thus enabling a seamless multi-currency experience for the user.

- **GOAL -SETTING**

This allows users to set financial goals. The user interface provides options to input and submit a goal amount, which is then stored in the database. The `saveGoal` method manages the saving of this information, checking for existing goals and updating or creating entries accordingly. The associated currency setting is also updated based on user preferences.

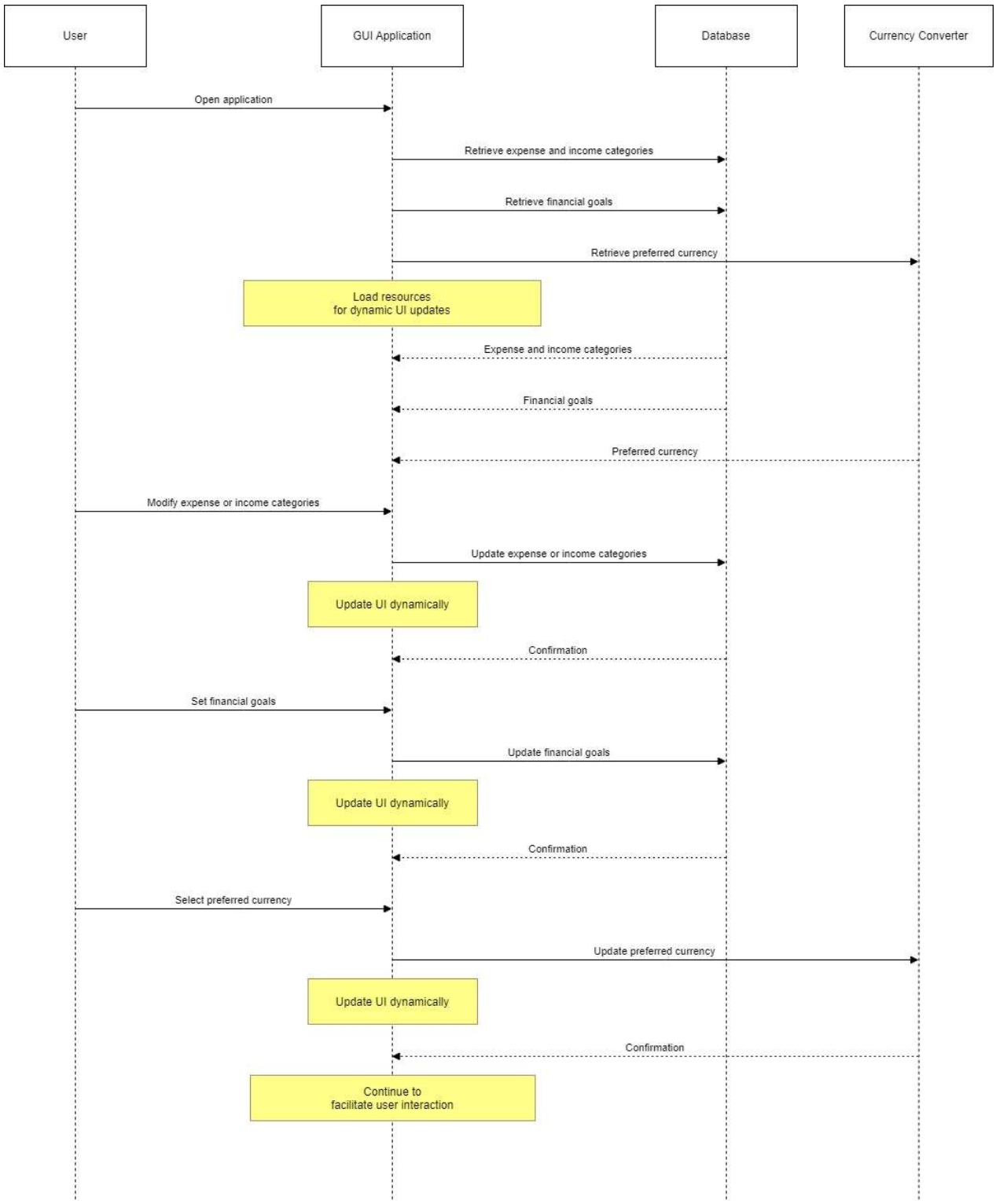


Fig 6. Sequence diagram for Settings panel including user-defined categories, currency-conversion and setting goals

4. REQUIREMENT ANALYSIS

4.1. Introduction:

- Background: Develop a Java-based expense tracker using Swing for the GUI and MySQL for data storage, aiming to provide users with an intuitive platform for managing and monitoring their financial activities.
- Objectives:
- Create a secure user authentication system.
- Develop a user-friendly dashboard for a comprehensive financial overview.
- Implement features for expense and income tracking, budget setting, and notification systems.

4.2. User Requirements:

- User Authentication:
- Implement secure user authentication to ensure private access to financial data.
- User Dashboard:
- Create an insightful dashboard with JFreeCharts for visual representation of income, expenses, and savings.

4.3. Functional Requirements:

- Expense Logging:
- Users should log daily expenses, specifying category, amount, and date.
- Income Tracking:
- Include a feature for users to input and track income sources.
- Category Management:
- Allow users to categorize expenses for organization and analysis.
- Budget Setting:
- Implement a budgeting feature for users to set spending limits.
- Notification System:
- Provide reminders or notifications for upcoming bills or budget overruns.

4.4. Non-functional Requirements:

- Security:
- Ensure data security through encryption and secure authentication methods.
- Performance:
- Design the system to be responsive, capable of handling a reasonable amount of data without lag.
- Scalability:
- Optimize the application for scalability with an increasing number of users and data.
- User Interface:
- Develop an intuitive and aesthetically pleasing UI for an enhanced user experience.

4.5. Technical Requirements:

- Programming Language:
- Develop the project using Java.
- Database:
- Use MySQL for reliable and secure data storage.
- Frameworks/Libraries:
- Utilize JFreeCharts for chart generation and JCalendar for date picker fields.
- Employ MySQL Connector for seamless database connectivity.
- Compatibility:
- Ensure compatibility with various operating systems and devices.

5. IMPLEMENTATION

1. **User Management:**
    - User Registration and Authentication: Implemented a secure system for user registration, ensuring that users can create accounts with encrypted credentials. Authentication mechanisms, such as password hashing, enhance security.
    - Profile Management: Users can securely log in and manage their profiles. This includes updating personal information, changing passwords, and maintaining a personalized experience within the application.

2. **Dashboard and Visualization:**
    - Intuitive Dashboard: Developed a user-friendly dashboard providing a comprehensive financial overview. The dashboard includes key metrics, charts, and quick access buttons for seamless navigation.
    - JFreeCharts Integration: Integrated JFreeCharts library to create visually appealing and interactive charts. These charts offer dynamic representations of expense and income data, enhancing user understanding.

3. **Settings Panel:**
    - Expense and Income Category Management: Users can customize their expense and income categories, tailoring the system to their financial habits. This feature enables personalized tracking and reporting.
    - Goal Setting: Introduced a goal-setting feature allowing users to define financial objectives. The system provides insights into progress, motivating users to achieve their financial targets.
    - Currency Management: Implemented support for multiple currencies,

offering users the flexibility to manage expenses and incomes in their preferred currency. Real-time conversion ensures accurate representation of financial data. Users can update their preferred currency in real-time, reflecting changes throughout the application. Currency-related operations are seamlessly integrated into the user interface.

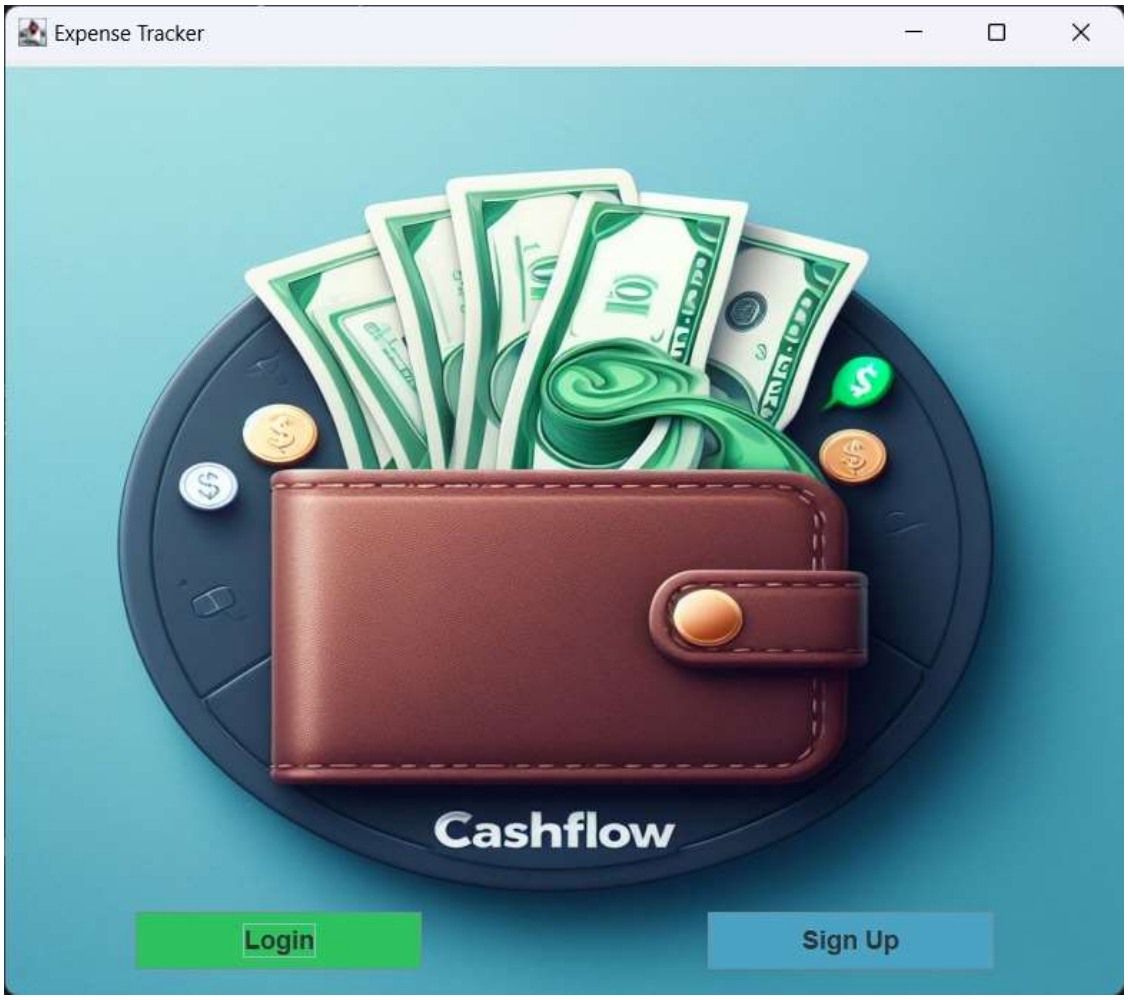
4. **Reports and Analytics:**
    - Comprehensive Reports: Introduced a Reports section with customizable charts and graphs, providing in-depth insights into financial trends. Users can analyze spending patterns, income sources, and overall financial health over specific timeframes.
    - Trend Analysis: The system enables users to track and understand their financial trends, supporting informed decision-making and financial planning.

5. **Real-Time Updates:**
    - Real-Time Financial Activities: Enabled real-time updates on financial activities, ensuring that users receive immediate feedback on transactions and dashboard metrics.

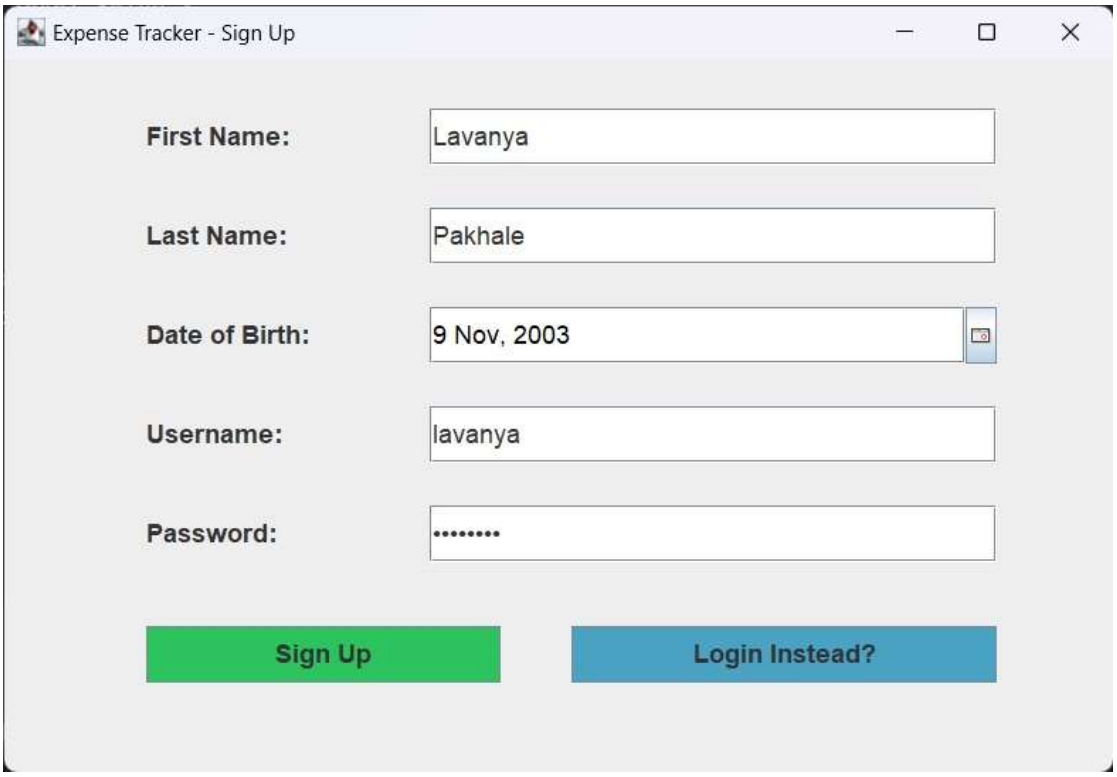
6. EXPERIMENTAL RESULTS

GRAPHIC USER INTERFACE:

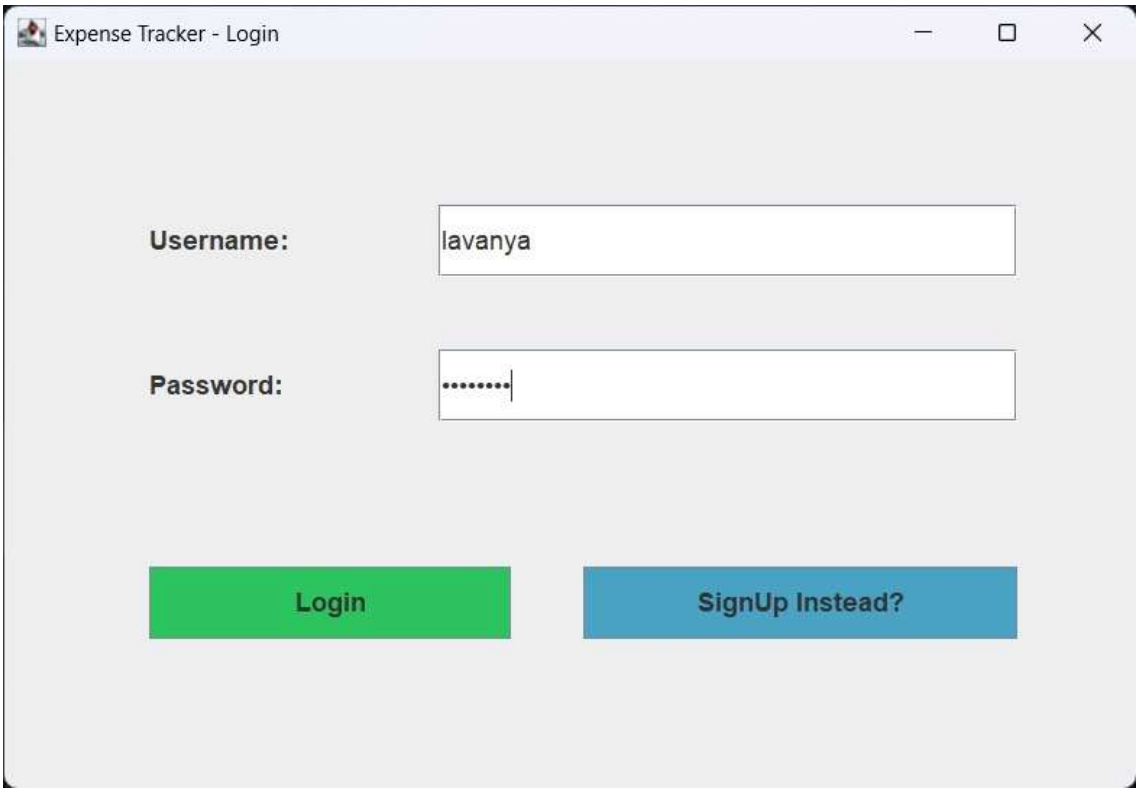
Startup interface:



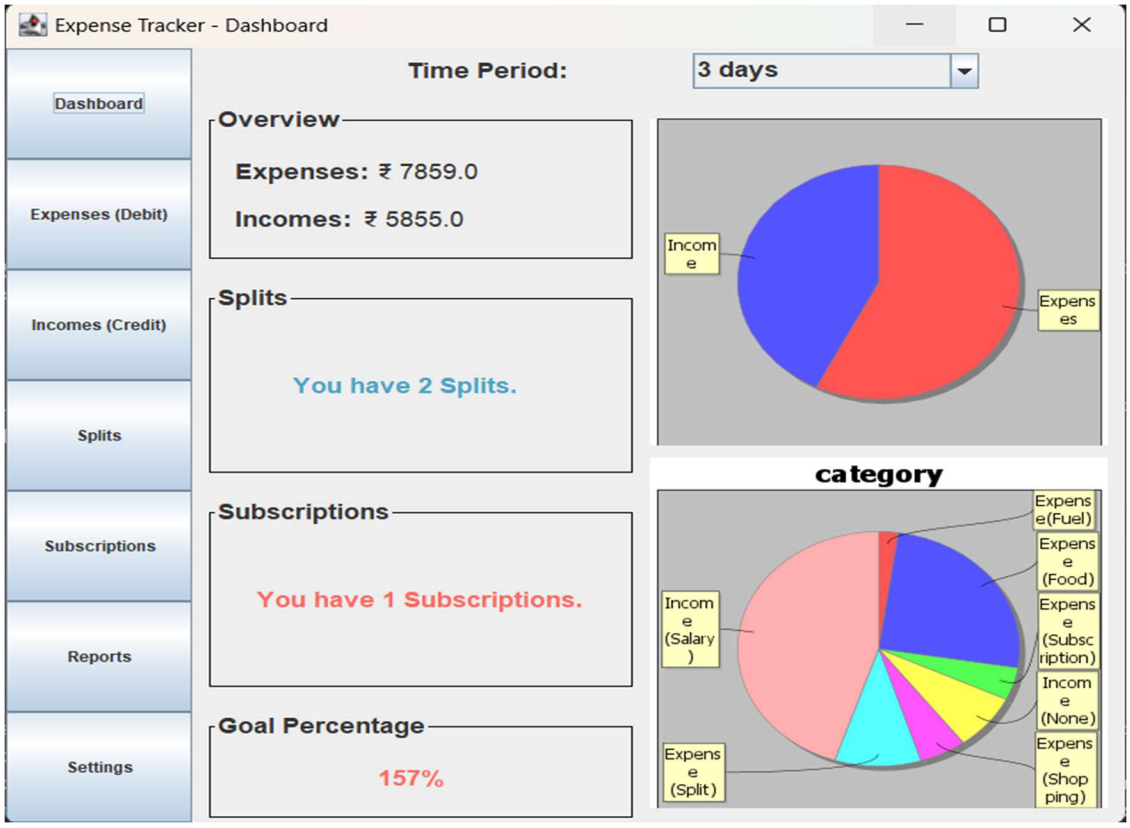
User Signup interface:



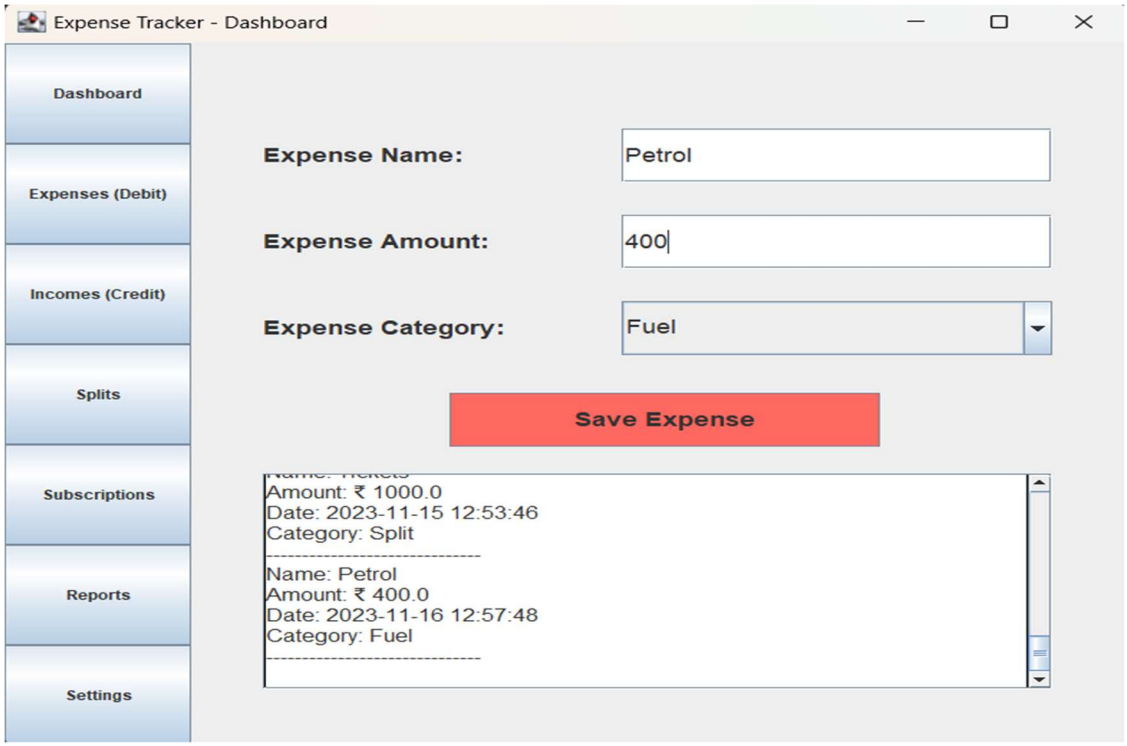
User Login interface:



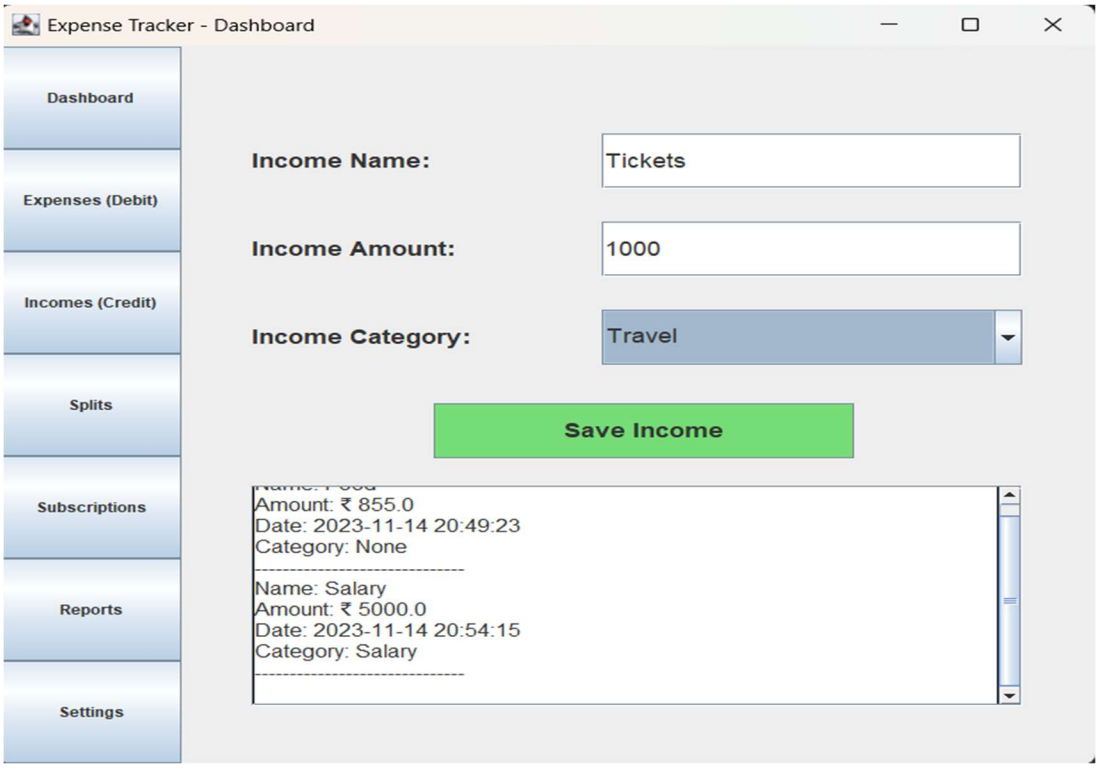
Dashboard Overview:



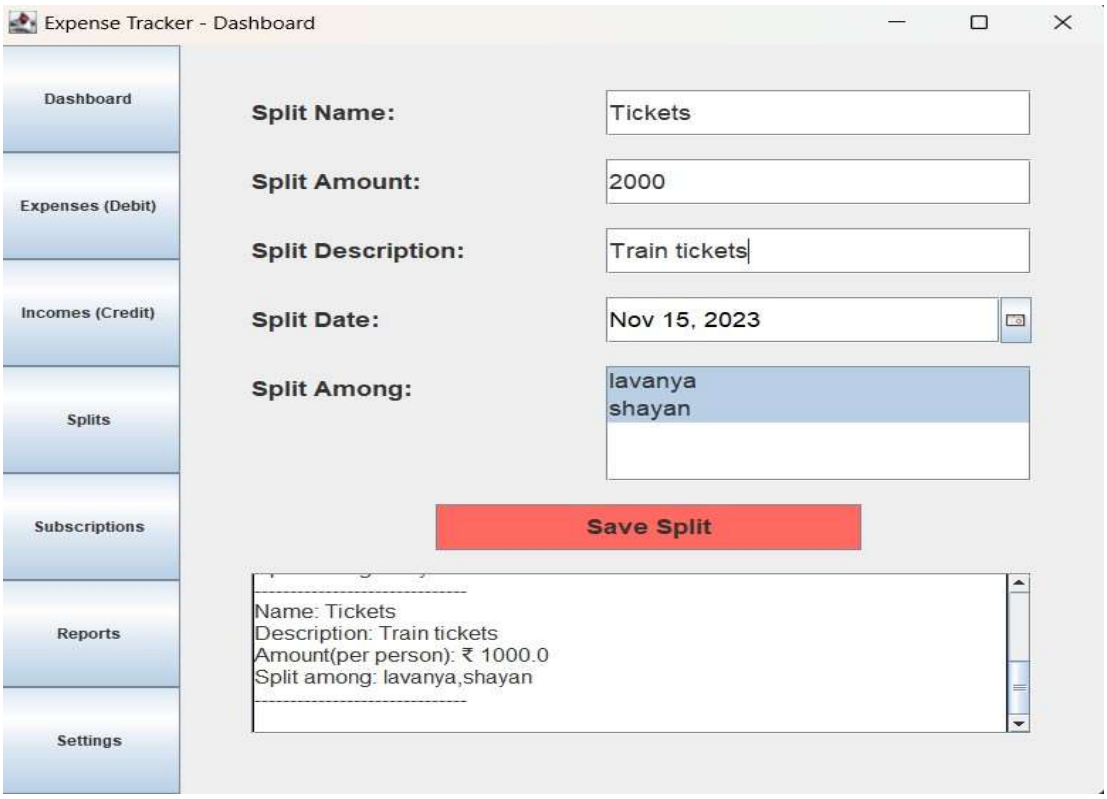
Expenses Panel:



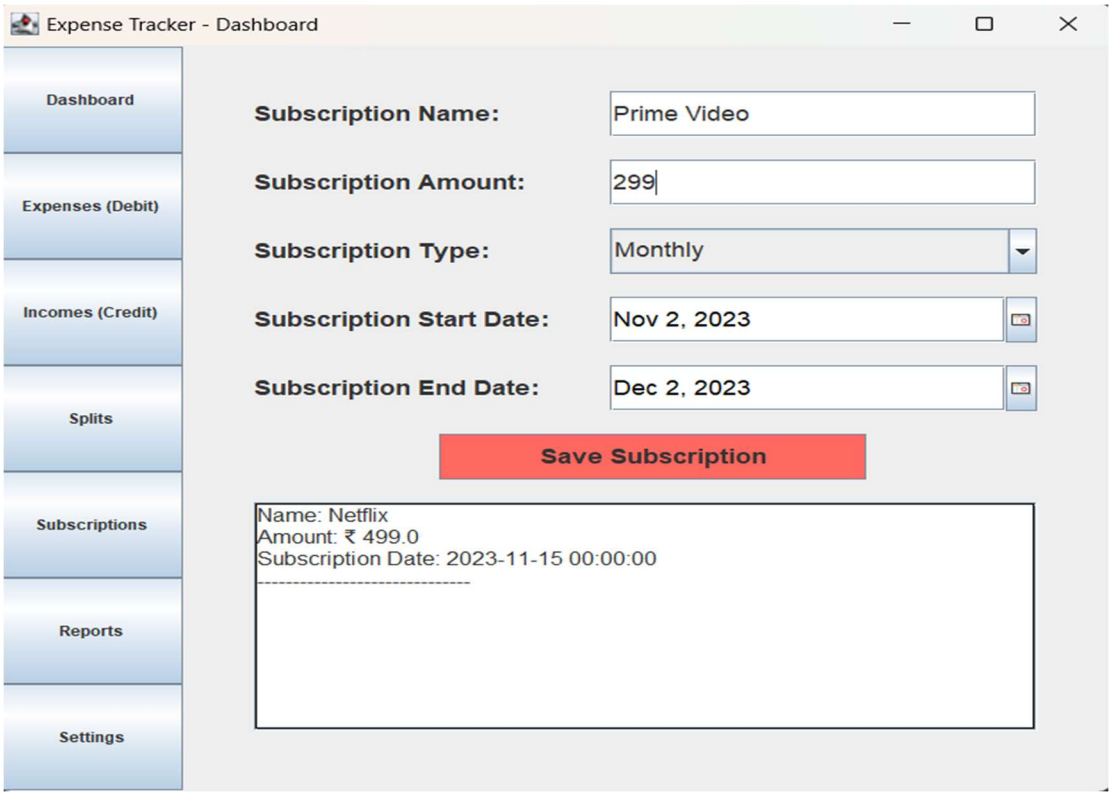
Incomes panel:



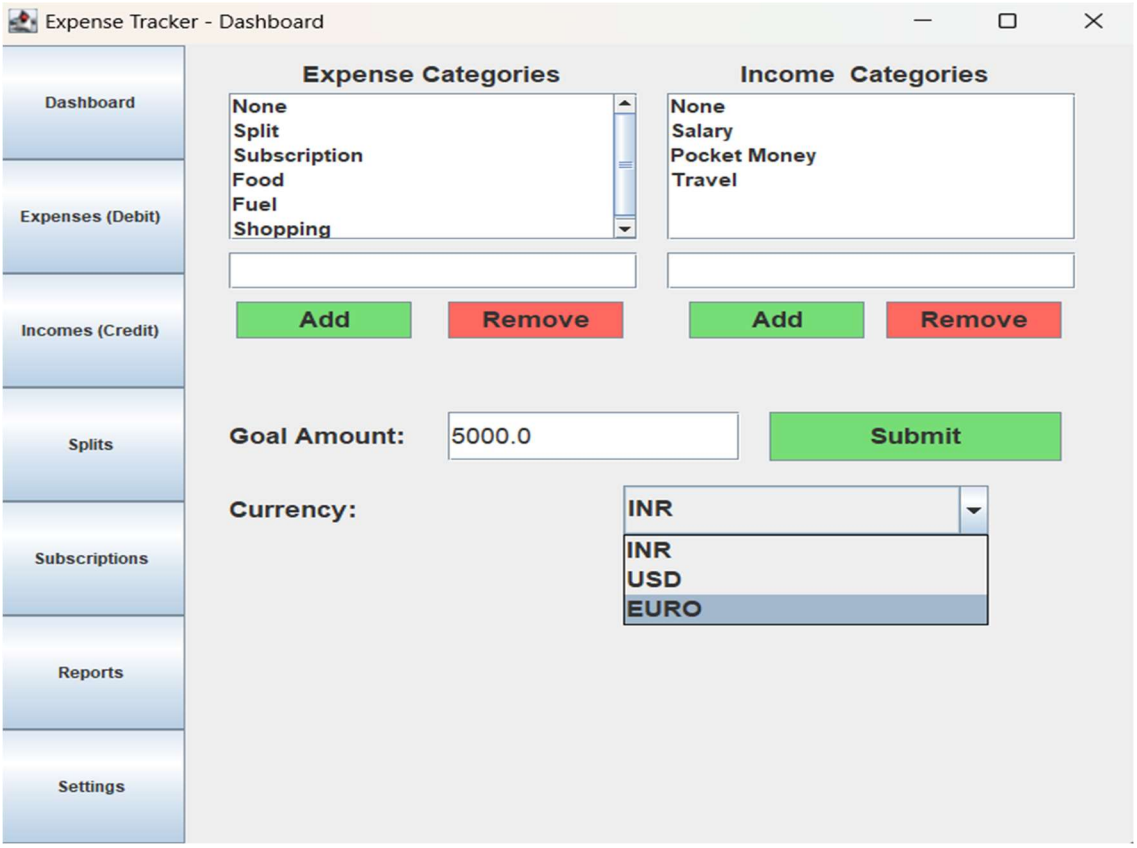
Splits panel:



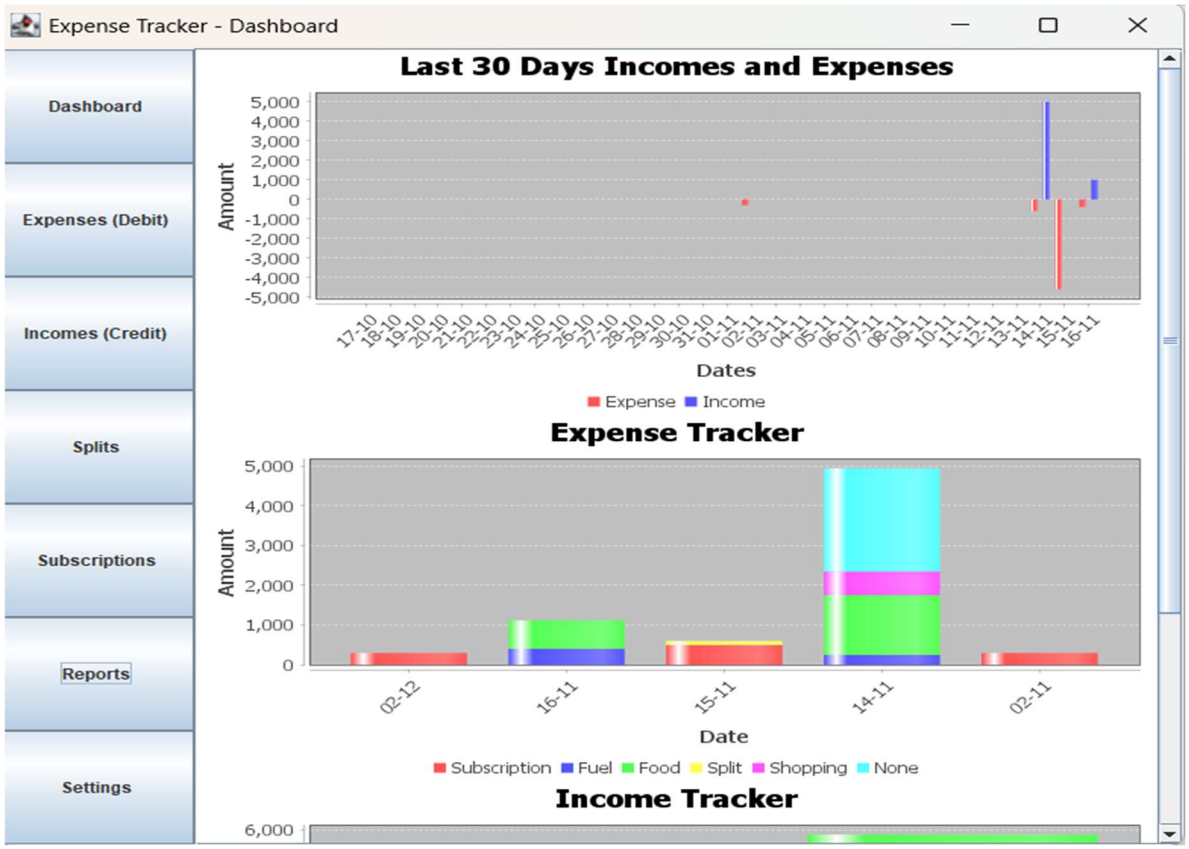
Subscriptions Panel:



Settings panel:



Reports Panel:



DATABASE:

Table for users:

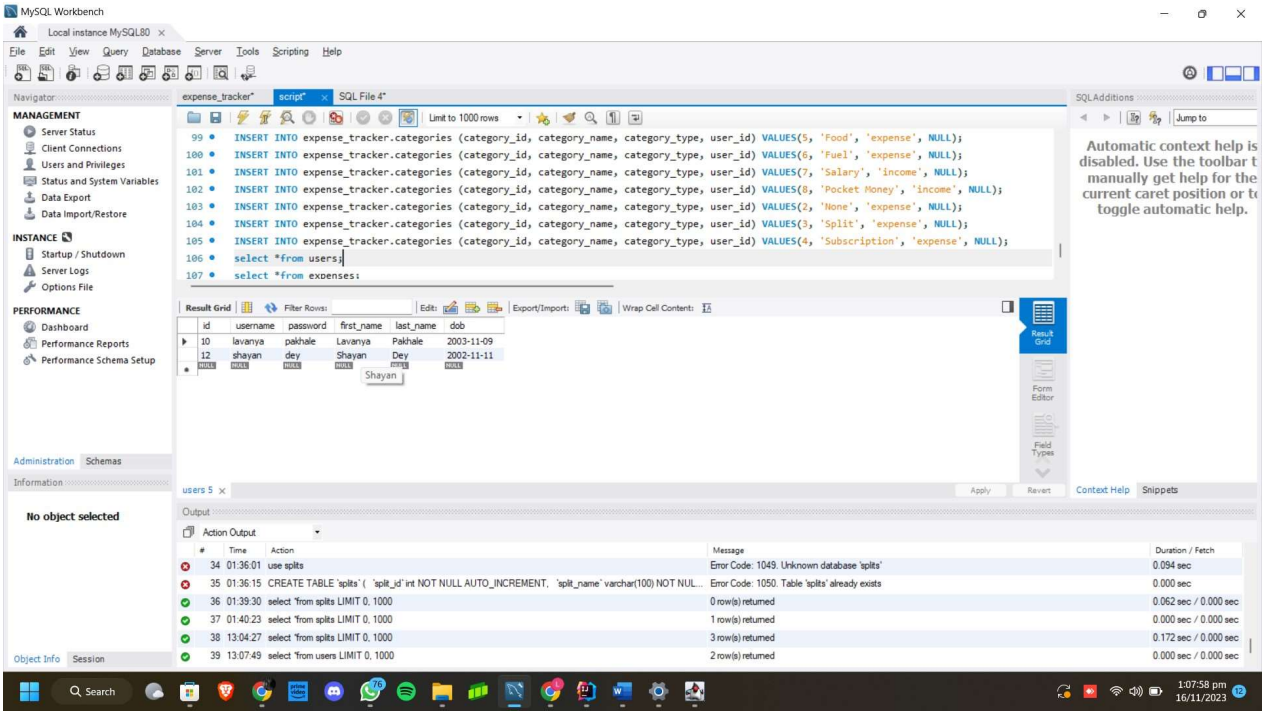


Table for expenses:

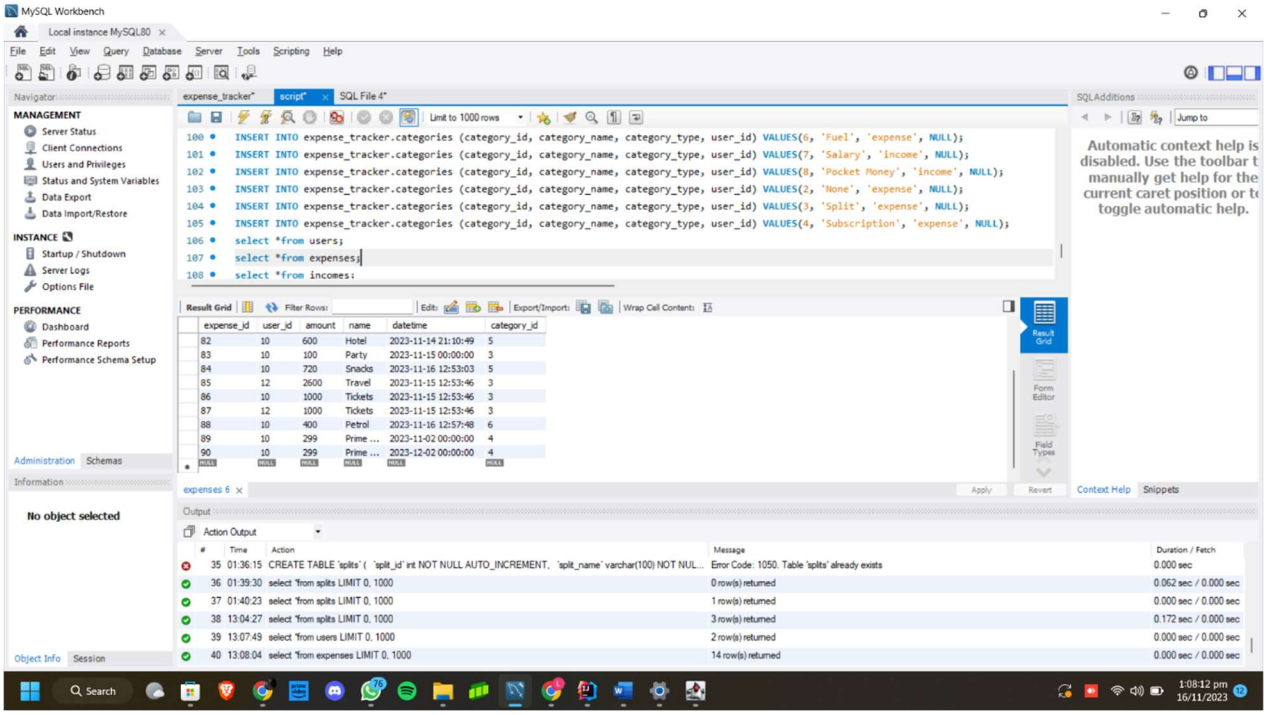


Table for incomes:

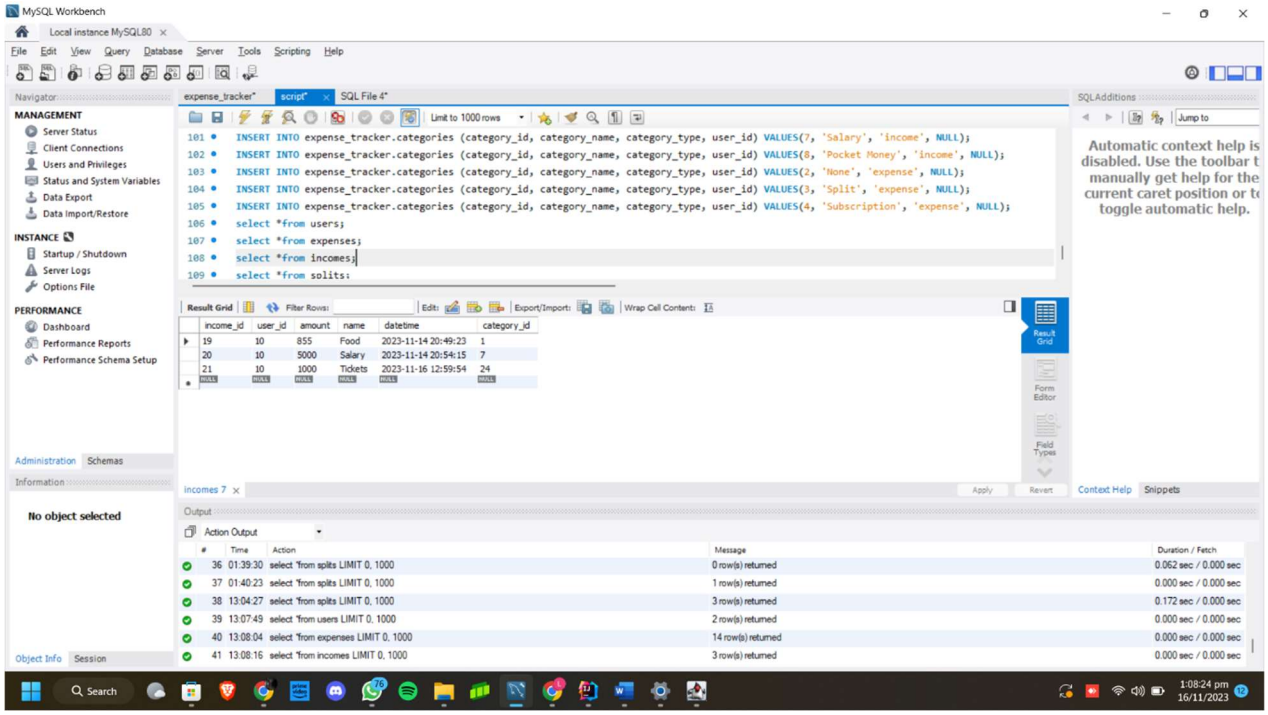
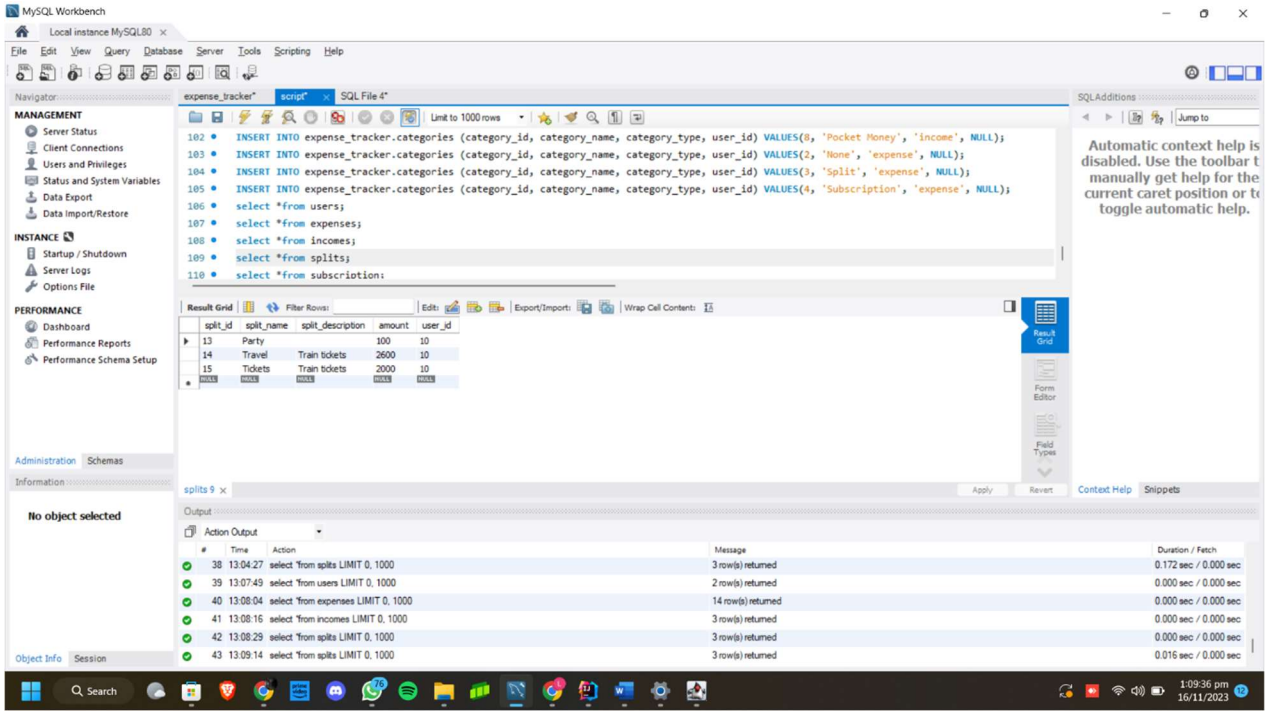


Table for splits:



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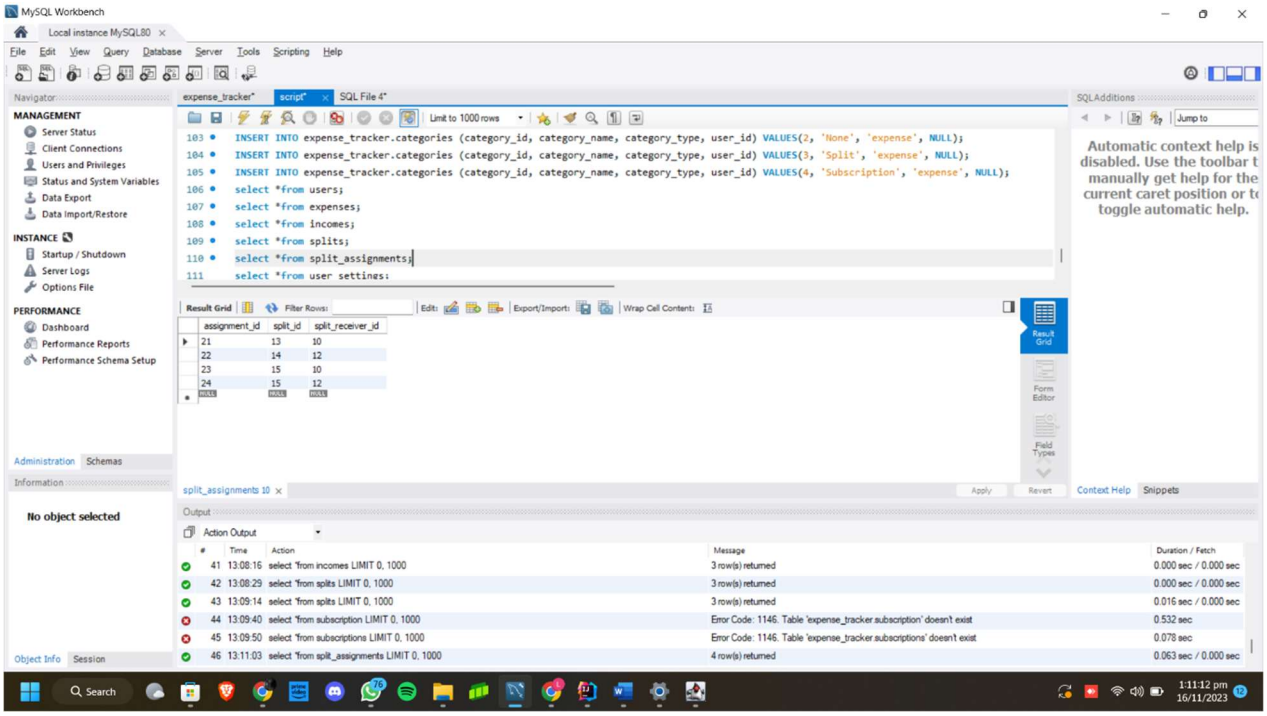
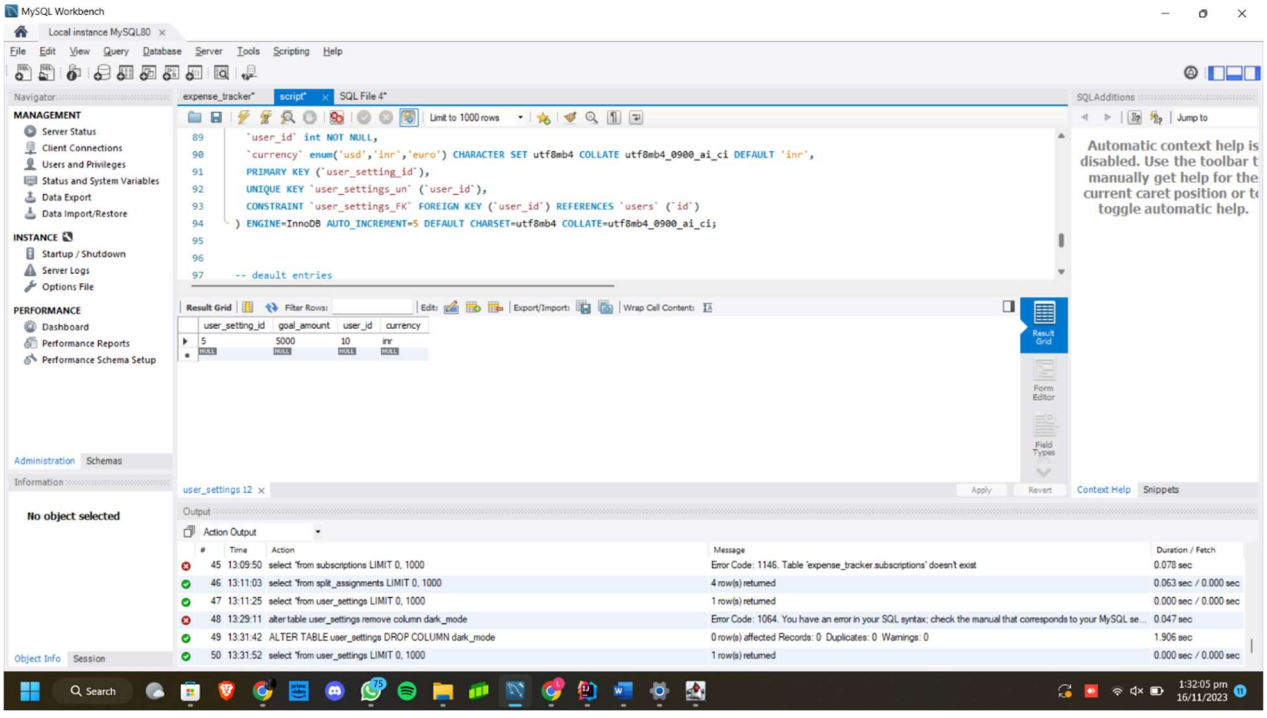


Table for user settings:



7. CONCLUSION

The proposed model, "CashFlow - multipurpose expense tool," has effectively addressed the limitations of existing models by offering a dynamic dashboard, comprehensive visualization of reports and analyses, efficient category management, and the flexibility to manipulate user-defined category templates. The system aligns with user demands for a more interactive and personalized financial management experience.

Looking ahead, numerous opportunities for future enhancements can further elevate the tool's capabilities. Firstly, the integration of AI-driven insights could enable personalized budgeting suggestions based on individual spending patterns. This would enhance the tool's ability to provide tailored financial guidance to users. Moreover, incorporating cross-platform compatibility would extend accessibility, allowing users to manage their finances seamlessly across various devices.

The integration of Optical Character Recognition (OCR) technology stands as another promising avenue for improvement. OCR can be employed to recognize and extract text from digital images, including scanned documents and images of receipts. This feature would streamline data entry by automatically capturing relevant information from receipts and documents, enhancing user convenience.

Furthermore, the application's potential could be expanded by incorporating machine learning algorithms. These algorithms could analyze historical user data to generate intelligent spending recommendations. By identifying trends and patterns, the system could offer valuable insights into optimizing financial habits, ultimately contributing to better financial decision-making.

In conclusion, the future development of the "CashFlow - multipurpose expense tool" holds significant promise. The integration of AI-driven insights, cross-platform compatibility, OCR technology, and machine learning algorithms could collectively contribute to an even more sophisticated and user-centric financial management experience, providing users with enhanced tools for budgeting, analysis, and personalized financial guidance.

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