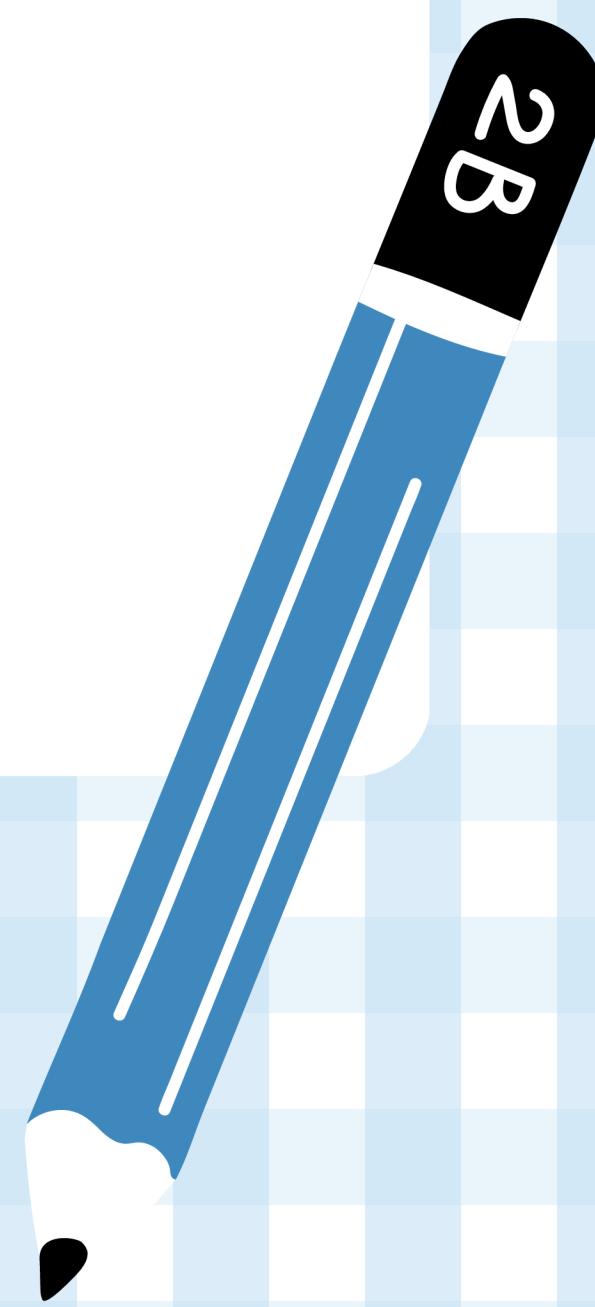




# APPLICATION DEVELOPMENT

By Group 4



# OUR TEAM

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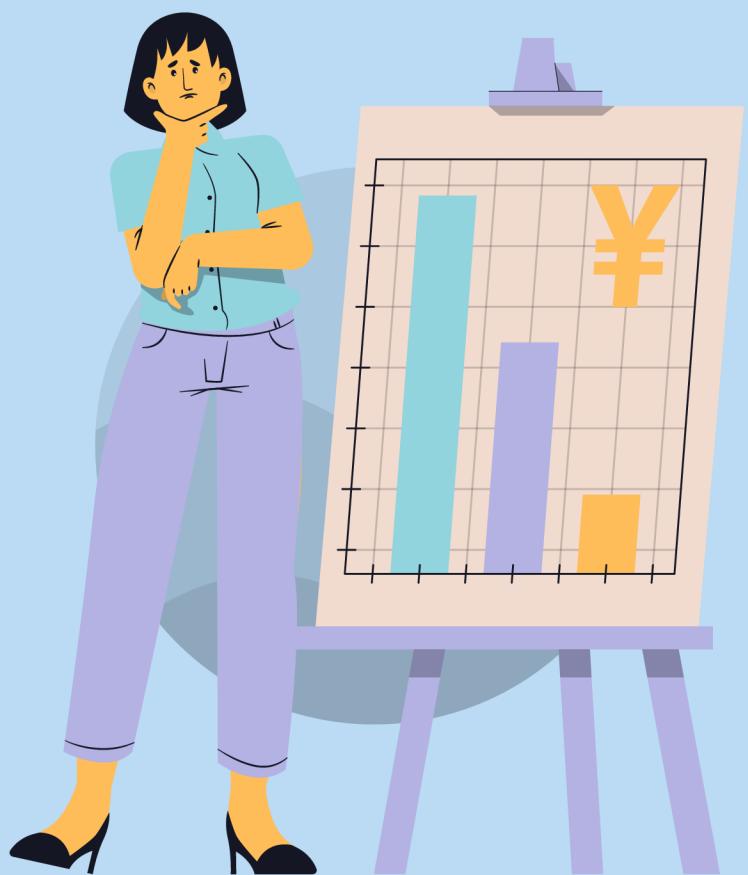
# TABLE OF CONTENTS



- 1 Development Tools and Technologies
- 2 User Requirements Implementation
- 3 Presentation of the Product
- 4 Questions and Answers
- 5 Performance Evaluation

# CAMPUSEXPENSE MANAGER

CampusExpense Manager is a mobile application that supports university students in tracking, managing and optimizing daily expenses, not only that, the application also helps users spend more wisely thanks to its smart features. With an intuitive interface and smart features, the application helps students quickly record expenses, set up budgets, analyze financial habits and receive reminders to maintain savings habits. From there, form the habit of thinking before spending money to buy and invest in the most necessary and reasonable things.



# APPLICATION OBJECTIVES

01

## Track expenses easily

Provides tools to help students record and manage daily expenses quickly and accurately. Categorize expenses by categories such as food, study, entertainment so that students can clearly understand their financial habits.

03

## Simple and easy to use

Designed with a friendly, intuitive interface, suitable for university students. Integrated with quick user guides and support features, making it easy for new users to get acquainted.

02

## Effective personal budgeting

Allows setting up monthly or weekly budgets that suit students' income and needs. Send warnings when spending exceeds the budget to help students adjust in time.

04

## Build sustainable financial habits

Simple and easy to use. Designed with a friendly, intuitive interface, suitable for university students. Integrated with quick user guides and support features, making it easy for new users to get acquainted.



# USER REQUEST



## Track expenses in detail and quickly

Users need a tool that helps to easily and accurately copy daily parameters. Require permission to quickly enter data for common spending options such as housing, tuition, food, entertainment.

## Budget warning when exceeding the focus

The system needs to send notifications when users spend more than the previously set budget. Provide suggestions for spending to avoid wasting too much money on unnecessary entertainment or beauty purposes. This feature helps students adjust spending in a timely manner, avoiding falling into difficult financial situations.

## Intuitive, user-friendly interface

The application must have a simple design, easy to use even for those who are not familiar with technology. Require easy to recognize icons and colors to use the optimized experience.

## Smart expense classification

Expenses need to be automatically classified by category or customized by authorized users. Expense categories should be flexible and student-friendly, such as tuition, food, transportation, etc.

## Clear and useful summary reports

Users require financial summary reports, showing weekly/monthly expenses with illustrative charts. The reports should be easy to understand, helping users to assess their personal financial situation comprehensively.



# SYSTEM INVESTIGATION AND RESEARCH

## System Investigation and Research

During the investigation and research phase, we conducted the following key activities to understand student needs and build a suitable CampusExpense Manager application:

### 1. Analyze the competition

**Popular apps:** Research existing financial management apps like Money Lover, Spendee, and Mint.

**Pros:** Packed with features like spending tracking, budgeting, and financial reporting.

**Cons:** Some apps have complex interfaces or don't meet specific student needs (like simplified features or high cost of use).

### 2. Target User Survey

**Method:** Conducted online survey and small group interviews with 50 university students.

#### Results:

- 85% of students have difficulty tracking and managing their daily expenses.
- 70% want an over-budget alert feature to help maintain reasonable spending habits.
- 65% require a simple, intuitive interface that does not take much time to get used to.
- 50% are interested in summary financial analysis reports to improve spending habits.

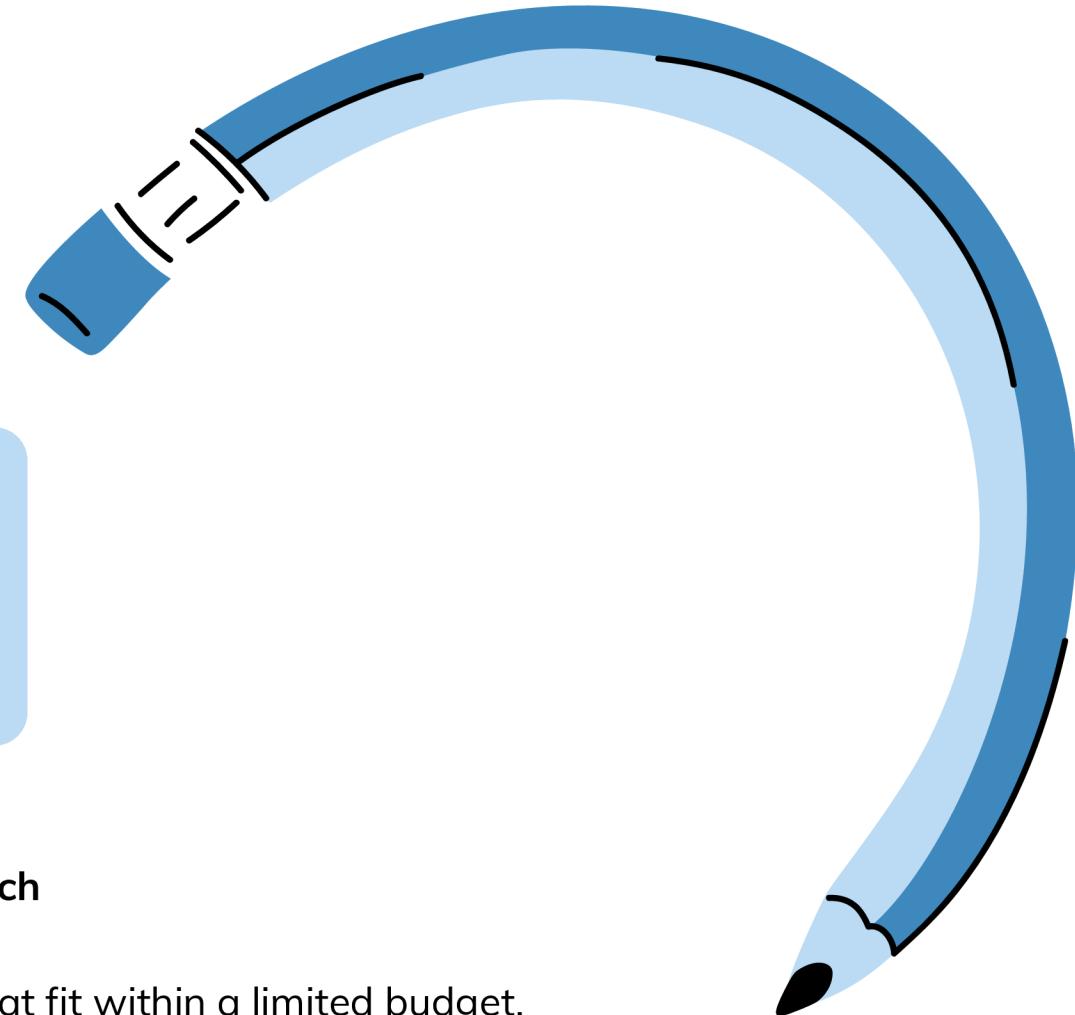
### 3. Insights from Research

#### Students need:

- Easy-to-use tools that fit within a limited budget.
- Flexible features that help them manage their education, living, and entertainment expenses.

#### Differentiating factors:

- Focus on students, offering free or low-cost features.
- Simplify the process of use, while still ensuring important functions such as budget alerts, expense categorization, and financial reporting.

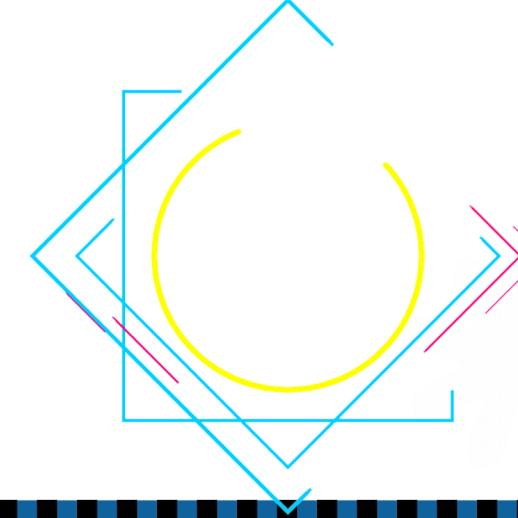


# SCOPE AND CONSTRAINTS OF THE CAMPUS EXPENSE MANAGER PROJECT

## Core Features:

- Track personal expenses by category.
- Set budgets and get alerts when over budget.
- Summary financial reports with charts and figures
- Friendly interface, easy to use, suitable for college students.
- Automatic and customizable expense categorization.

# PROJECT CONSTRAINTS



## Limited budget:

The project development budget is limited, affecting the use of high-end tools and resources.

**Solution:** Focus on using open source tools and taking advantage of free resources.



## Team technical experience:

The development team consists of members with limited experience in mobile application development.

**Solution:**  
Focus on basic features, avoid complicating the design.  
Learn and use beginner-friendly frameworks such as Android Studio and Firebase.



## Limited development time:

The short-term implementation time (6 months) requires focusing on core features first, with advanced features added in later versions.



## Performance and compatibility constraints:

The application must run smoothly on mid-range Android devices popular in the student segment.

**Solution:** Optimize the interface and functionality to ensure good performance without consuming machine resources.



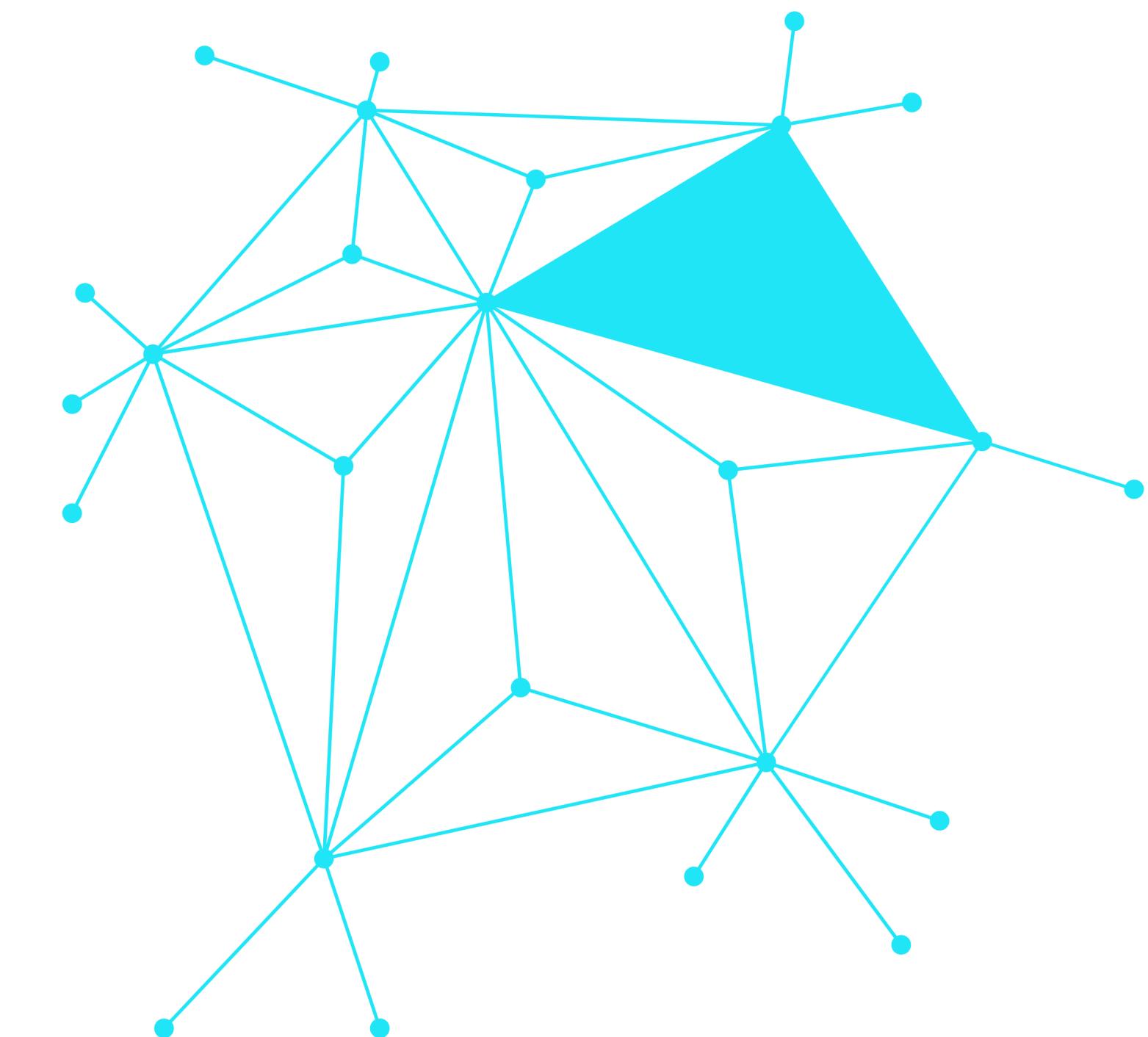
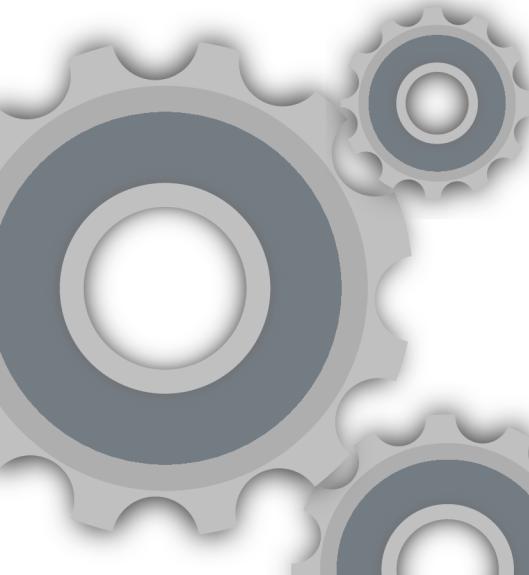
# IMPACT ON DESIGN

- Prioritize simplicity: Design decisions focus on ease of use and user-friendliness.
- Limit advanced functionality: Complex features such as AI integration will be considered in future versions.
- Focus on students: Content and interface are specifically designed to suit student lifestyles and habits.

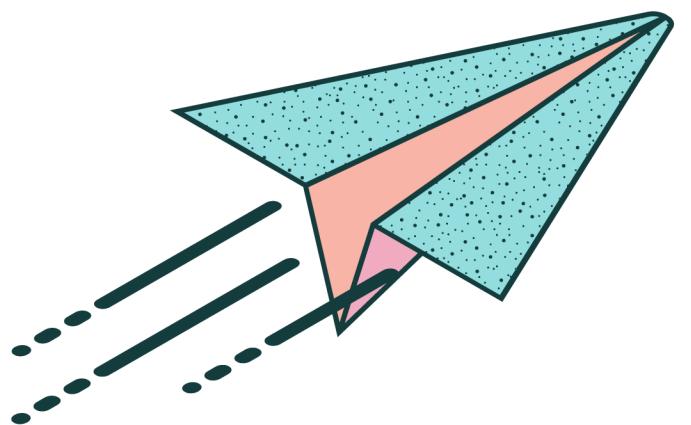


# TOOLS AND TECHNOLOGIES USED IN THE CAMPUS EXPENSE MANAGER PROJECT

- **APPLICATION DEVELOPMENT TECHNOLOGY STACK**
- **TOOL DESIGN INTERFACE**
- **PROJECT MANAGEMENT AND TEAM  
COLLABORATION**
- **TESTING AND DEPLOYMENT TOOLS**



# APPLICATION DEVELOPMENT TECHNOLOGY STACK



## Application Development Platform:

Android Studio: The primary integrated development environment (IDE) used to build Android applications, supporting programming, testing, and deployment.

## Programming Language:

- Java: A popular, stable, and well-suited language for Android applications.
- Kotlin: A modern, readable, error-reducing, and performance-optimized language that is tightly integrated with Android Studio.

## Manage user authentication:

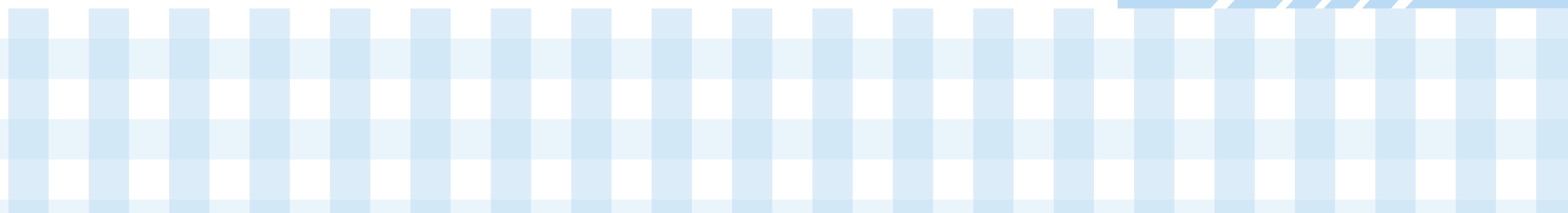
- Firebase Authentication: A tool that supports signing in with email, Google, or other popular authentication methods.

## Database and Storage:

- **Firebase Realtime Database:** Real-time cloud database solution, supporting fast and efficient data synchronization.
- **Firebase Cloud Storage:** Store data files such as financial reports or user settings.

## Supported libraries:

- MPAndroidChart: Visual charting library, supporting vivid display of spending reports.
- Retrofit: Supports API connection to extend application functionality in the future.



# INTERFACE DESIGN TOOLS

01

## **Figma:**

Use to design user interfaces (UI) with intuitive and professional prototypes, helping to optimize user experience (UX).



02

## **Canva:**

Use to create icons, illustrations, and graphic elements needed for the application.



# PROJECT AND COMMUNITY MANAGEMENT

01

## Trello/Asana:

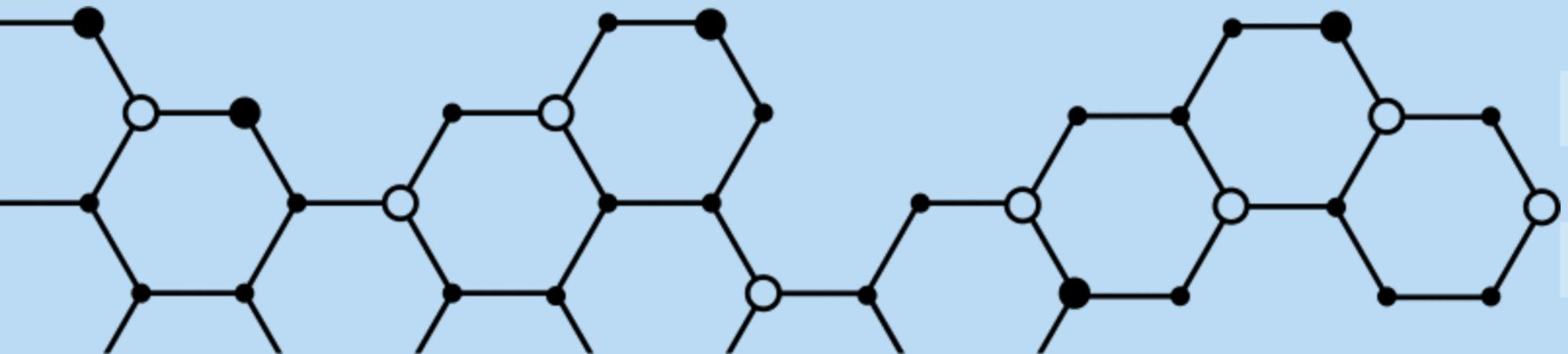
Track work progress, assign tasks, and manage project development processes.



02

## GitHub:

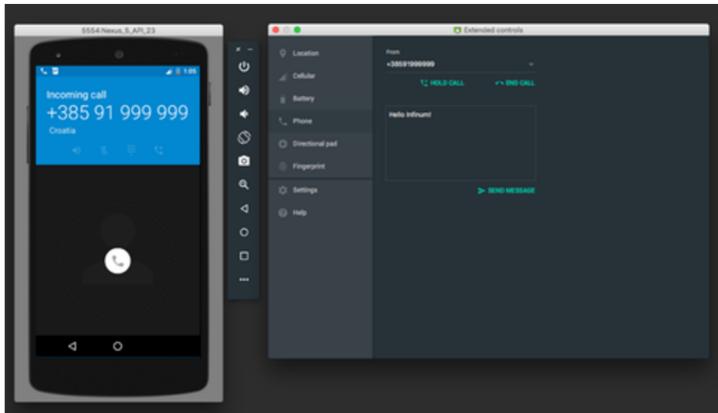
Store source code and manage versions, ensuring effective collaboration between team members.



# DECLARATIVE DEVELOPMENT AND TESTING TOOLS

## Android Emulator:

Test your app on multiple virtual devices with different hardware configurations and Android versions.



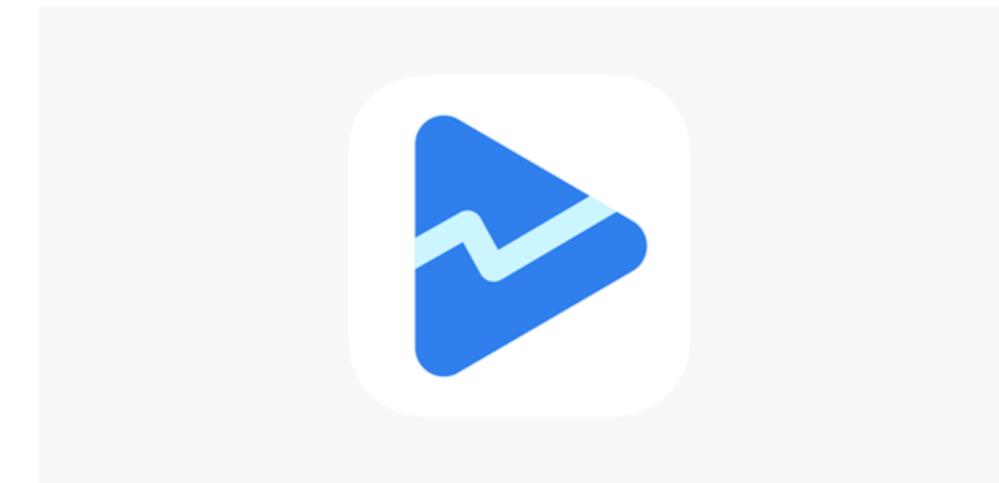
## Firebase Test Lab:

Perform automated testing on multiple devices to ensure functionality and stability.



## Google Play Console:

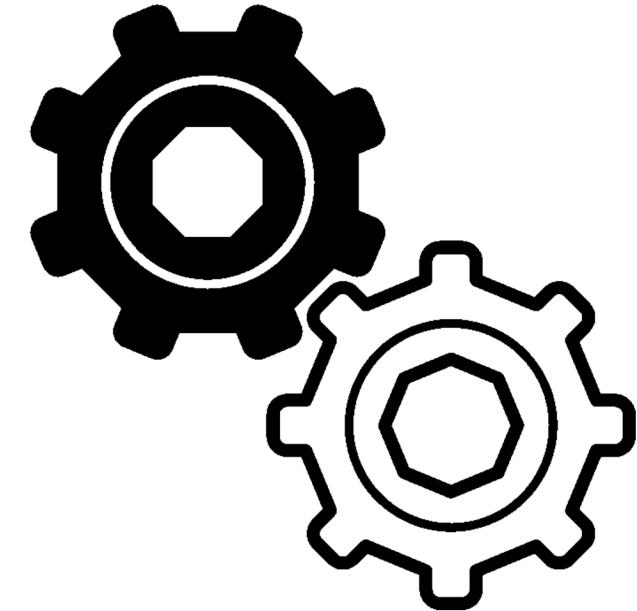
Use to discover apps and track user feedback after declarative development.



# DEVELOPMENT METHODOLOGY

## Agile Development

We chose Agile Development to develop the CampusExpense Manager application, based on its flexibility and adaptability.



### Why Agile?

#### Suitable for small projects and student goals:

- Student projects: With limited resources and frequently changing requirements, Agile allows us to adjust our direction flexibly.
- Focus on the end user: College students – the target audience can continuously provide feedback, helping to optimize the product.

#### Iterative development:

- Break the project into short phases (Sprints) with specific goals.
- Each Sprint creates a testable version of the application, ensuring that we are always getting closer to the finished product.

#### Continuous improvement:

- Agile allows the team to easily make changes based on customer feedback or when new requirements arise.
- This approach helps reduce risk and ensure quality throughout each stage of development.

#### Effective team collaboration:

- Agile encourages frequent communication, helping team members understand their roles and responsibilities.
- Use tools like Trello/Asana to manage work, ensuring everyone is in sync.

# AGILE APPLICATION IN PROJECT

## SPRINT 1

UI/UX Design Basics.

## SPRINT 2

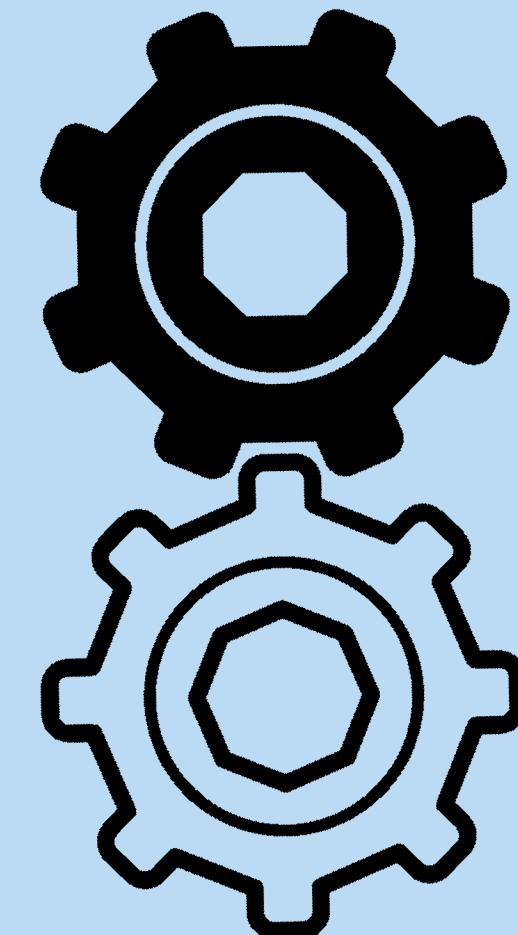
Build Cost Tracking and Expense Classification.

## SPRINT 3

Develop Budget Alerts and Financial Reporting.

## SPRINT 3

Test and Adjust Based on Feedback.



# INITIAL DESIGN AND PROTOTYPING



**Login**

Email

PassWord

Sign in

Don't have an account? [Sign up](#)

Terms of Use | Privacy Policy

Login form with Email and Password input buttons, when the user logs in, the user needs to enter the registered information in this section to log in to the system.

If the user has not registered, he can click on the "register" button to register a user account.

In case he has registered but forgot his password, he can click on the "forgot password" button to create a new password.



**Change Password**

Old PassWord

New PassWord

Confirm New PassWord

Accept

In the Change Password interface, users can recreate a new password that is easier to remember. To make sure they don't lose their password, we have created 2 buttons for users to enter a new password twice in a row before remembering the password.

# INITIAL DESIGN AND PROTOTYPING



**Register**

Enter Email, Password and Confirm Password to register into the system.

If user already has an account, click login to enter information.

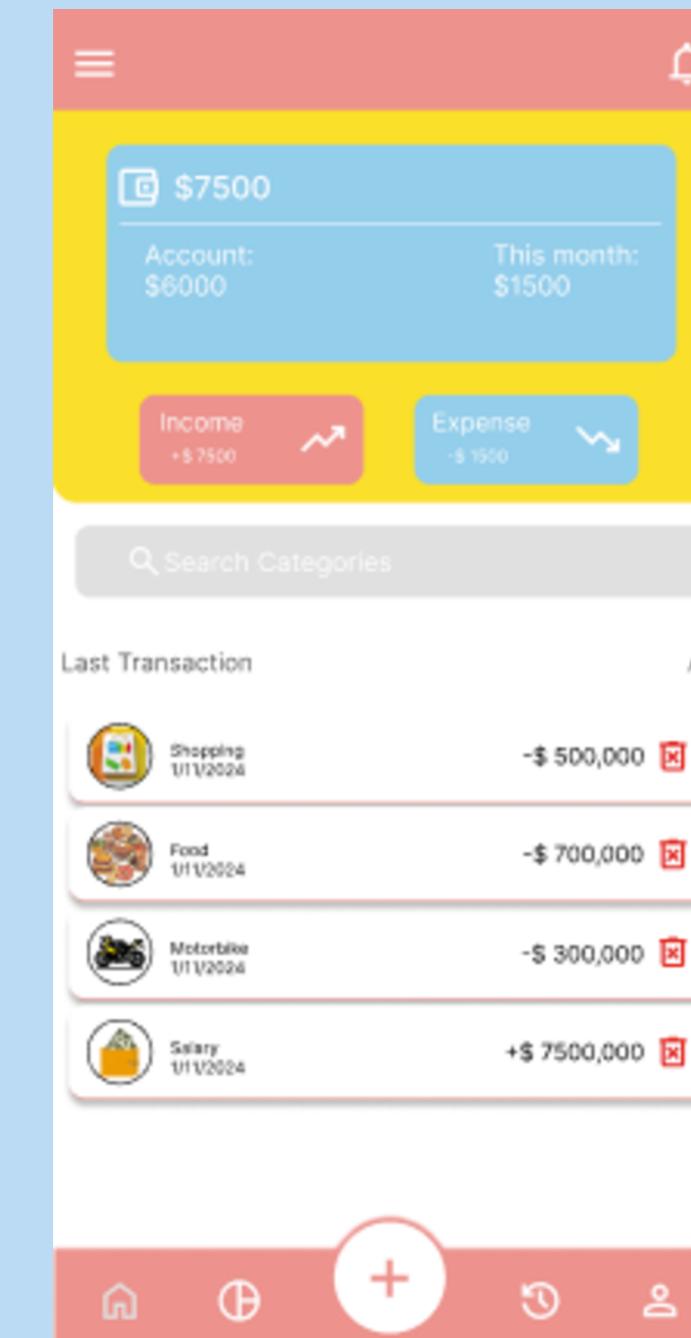
Email

PassWord

Confirm PassWord

**Sign up**

Already have an account? [Sign in](#)



- The home page will include the Expense and Income buttons, above which will be a tab to display the user's information and the user's amount, and including the navigation buttons below.
- When the user clicks on the add button in the middle of the bottom bar, the page will be transferred to the page where transactions can be added.
- When the user clicks on the Income or Expense button, it will be transferred to the Income or Expense page to display the newly added list.
- When the user clicks on the button in the left corner, it will be transferred to the password change interface page.

# INITIAL DESIGN AND PROTOTYPING



## Add Transaction

Description \_\_\_\_\_

Amount \_\_\_\_\_

Date \_\_\_\_\_

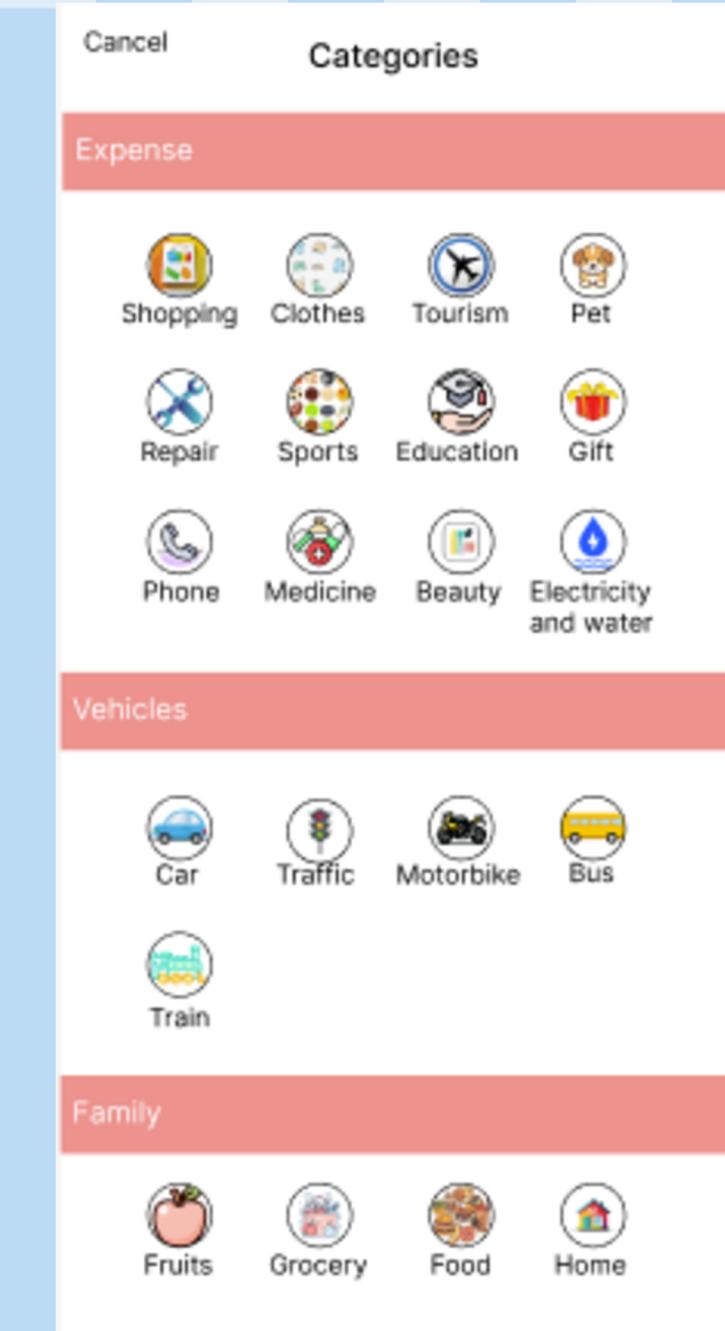
Food

Expense  Income

**Add Transaction**

Home    

- The Add Transaction page will include information buttons such as: Description, Amount, Date, Category List Item, Income and Expense radios and the add transaction button.
- When the user fills in the information then selects Expense and presses the add transaction button, the transaction will be added to the Expense page. The same goes for Income.
- The page will also have navigation buttons below for interaction.



- This classification page will show the types that the system has.



**dinh van dong**

First Name

dong

Last Name

dinh van

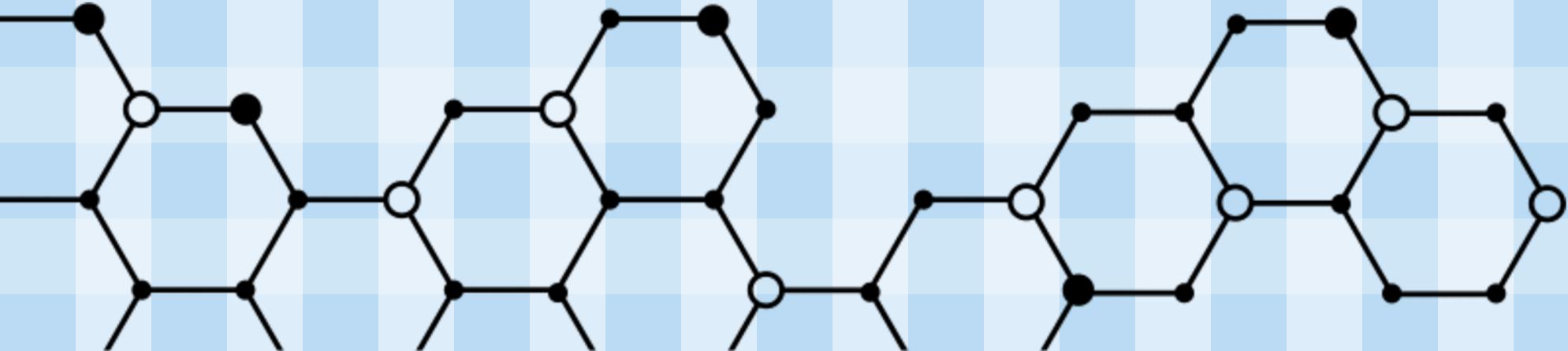
Full Name

dinh van dong

Email

dinhvandong@gmail.com

**Logout**



**Change Password**

**dinhvandong@gmail.com**

Current Password

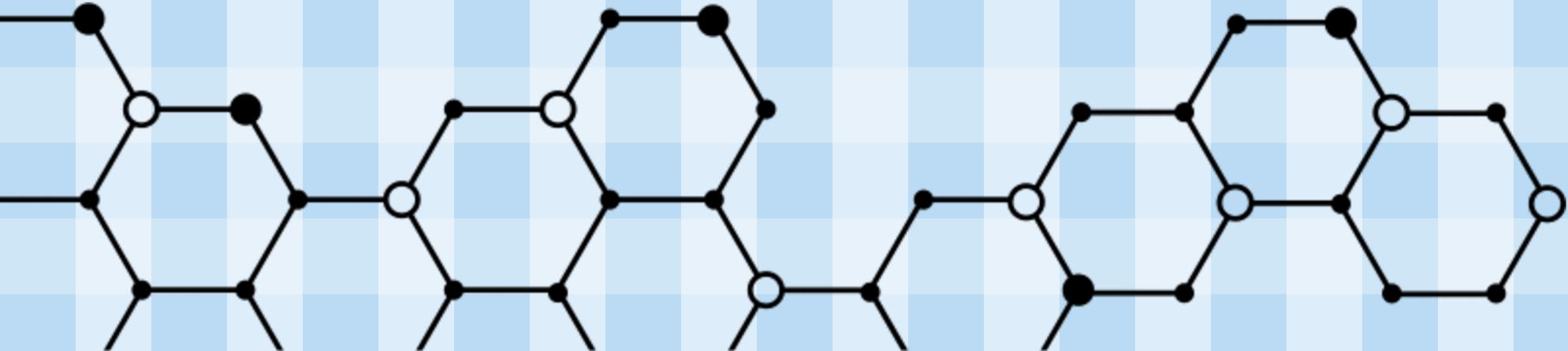
New Password

Confirm New Password

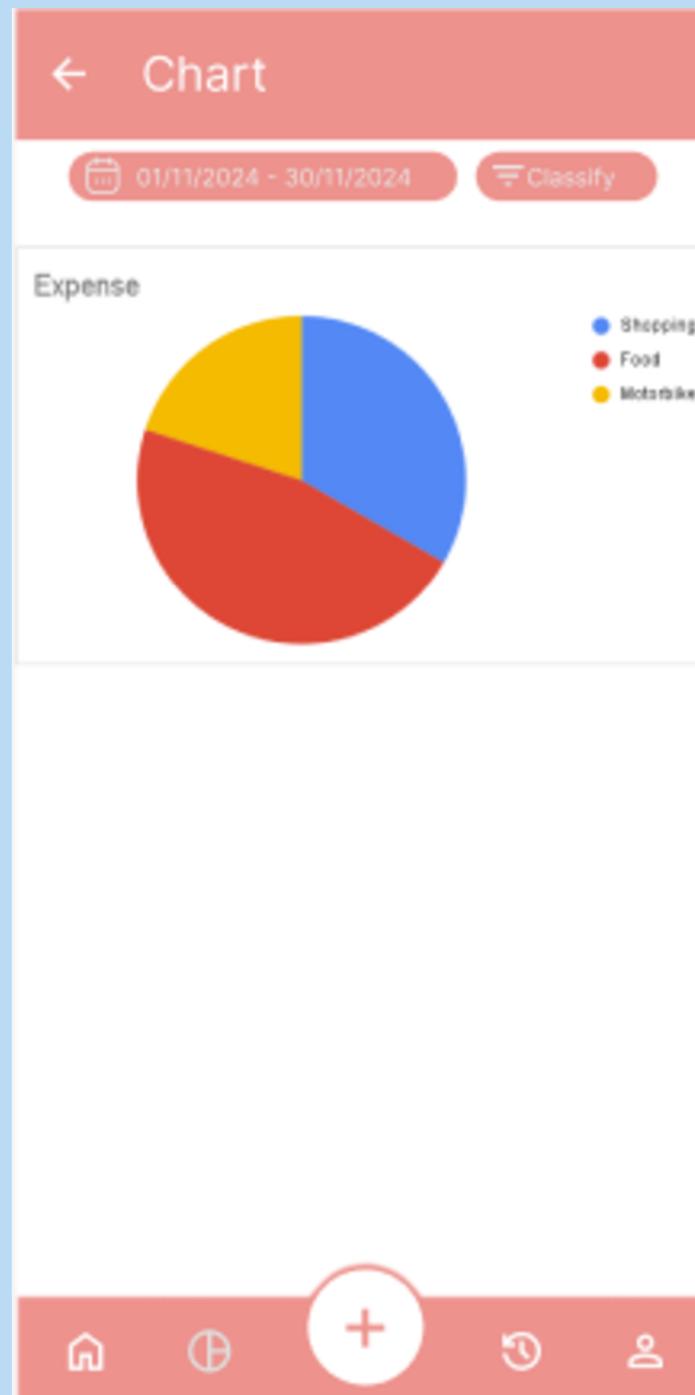
**Change Password**



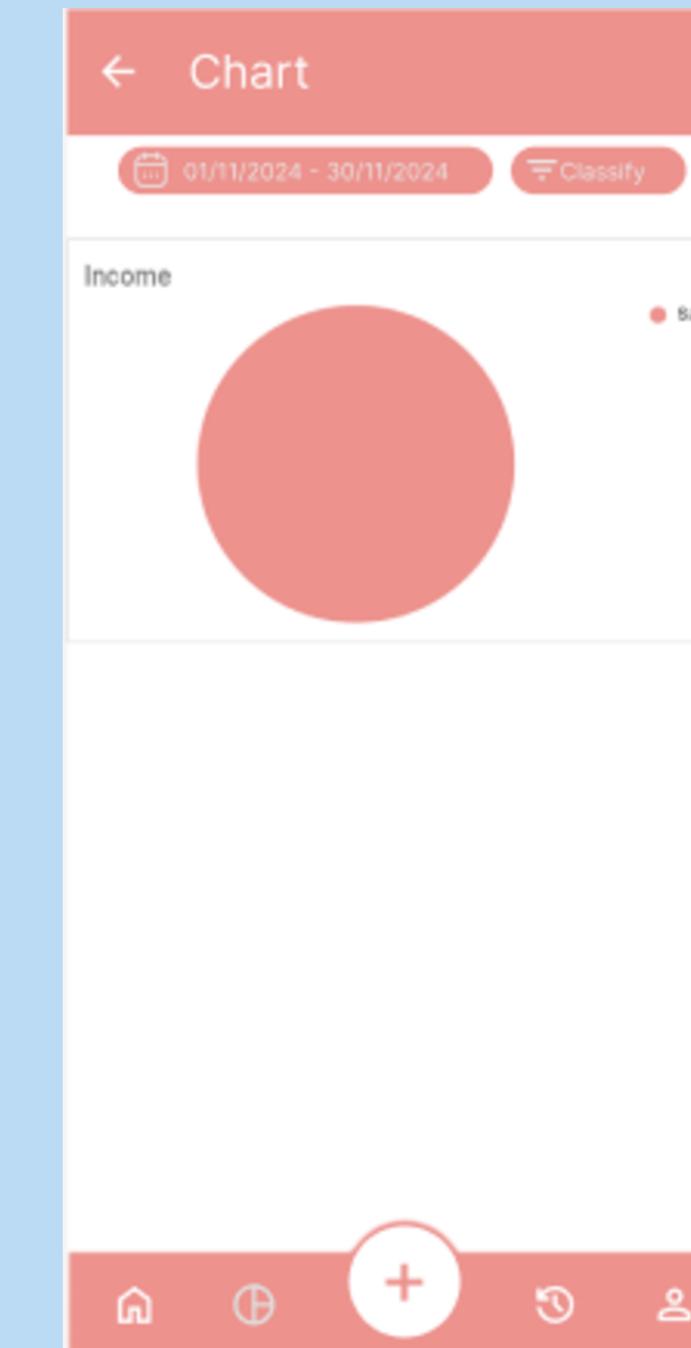
- The password change page includes the following inputs: old password, new password and confirm new password.
- When the user changes the password, they just need to enter the old password, then enter the new password and confirm, then click the change password button and the password will be changed.



# INITIAL DESIGN AND PROTOTYPING



- The chart page will display the income and expense report as a pie chart for easier tracking.



- The chart page will display the income and expense report as a pie chart for easier tracking.

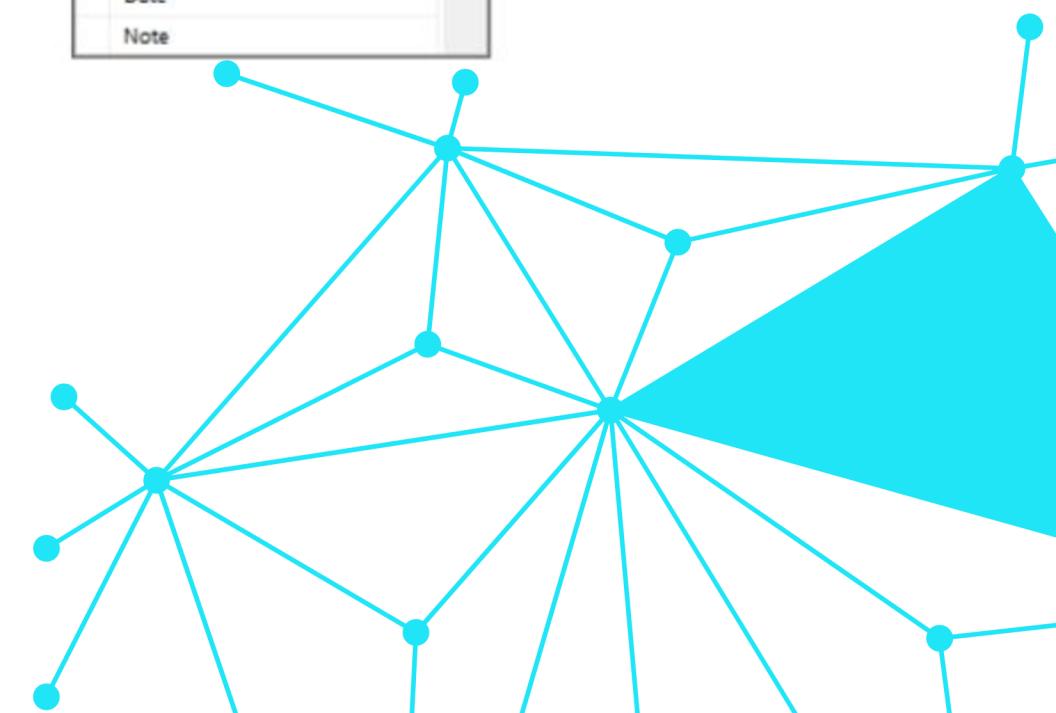
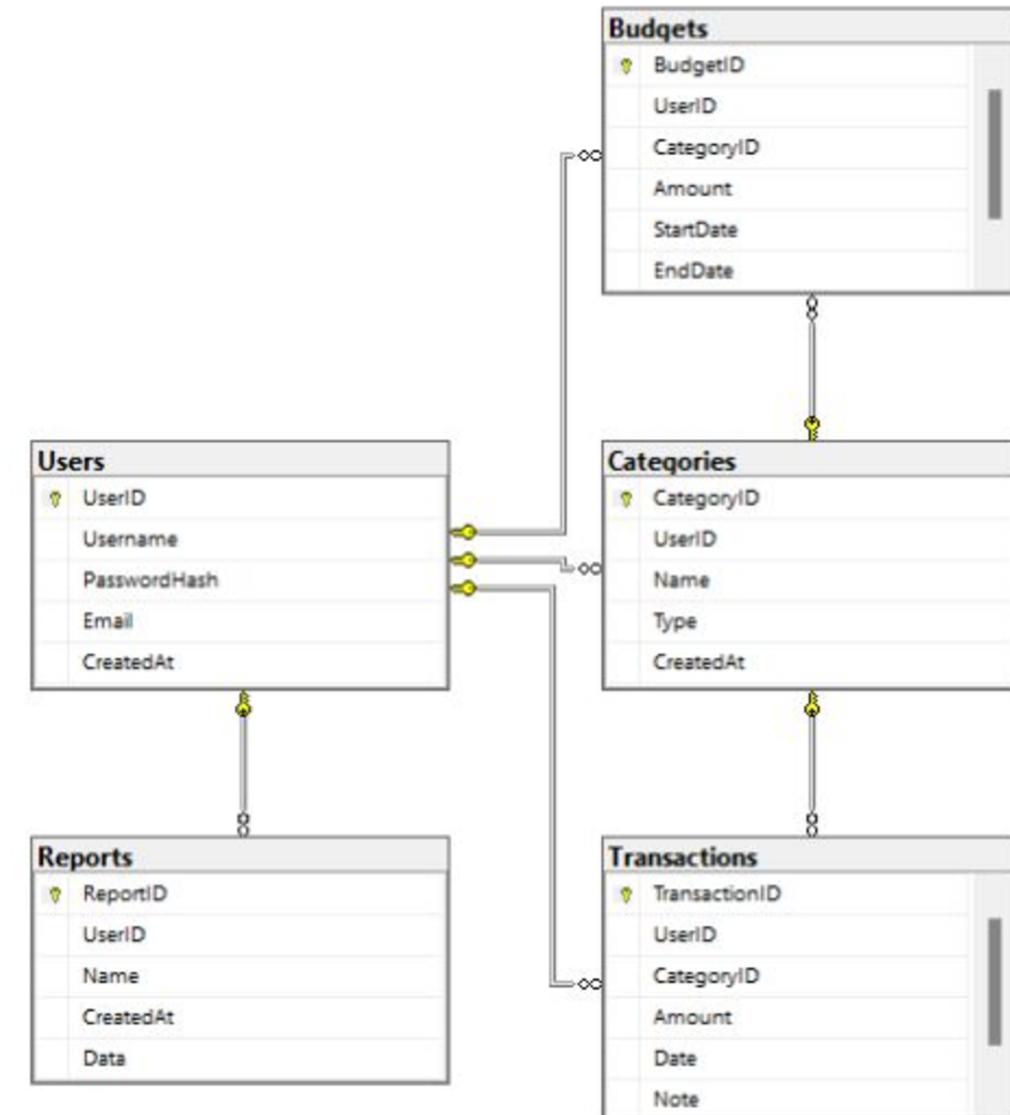
# USER INTERFACE (UI) DESIGN

**The UI will be designed to be simple and easy to use, focusing on the main functions such as:**

- Login screen: Form to enter username, password, orange and black.
- Dashboard: Display summary of budget, transactions, reports.
- Budget management: Budget list, add/edit/delete.
- Transaction management: Transaction history, add/edit transactions.
- Report: Select report type, view or download.

## Design reasons:

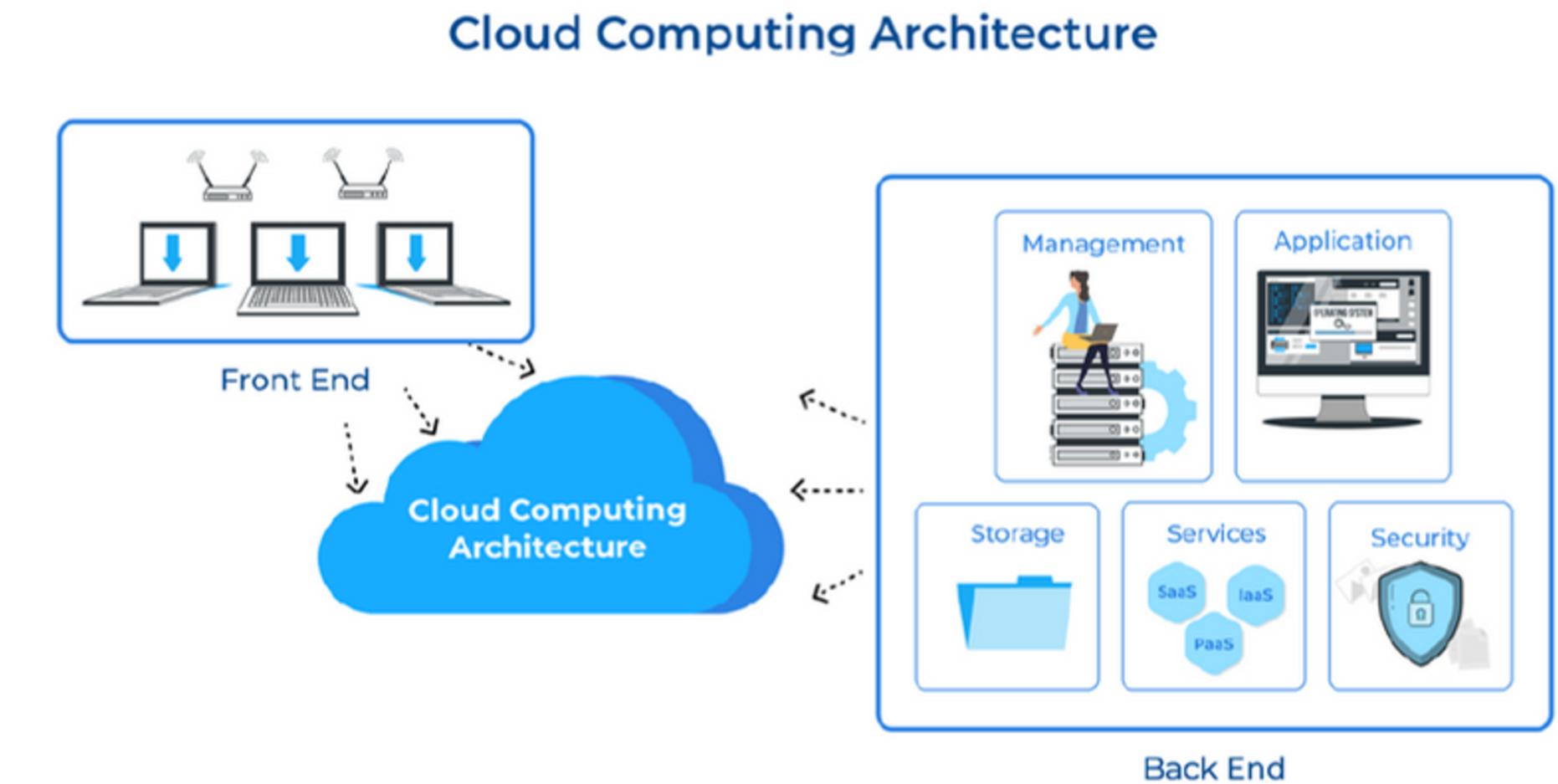
- Simple, intuitive: Optimize operations for users.
- Consistency: Use consistent colors and layouts.
- Clear display: Easy-to-understand charts and figures in the report section.



# BACKEND ARCHITECTURE

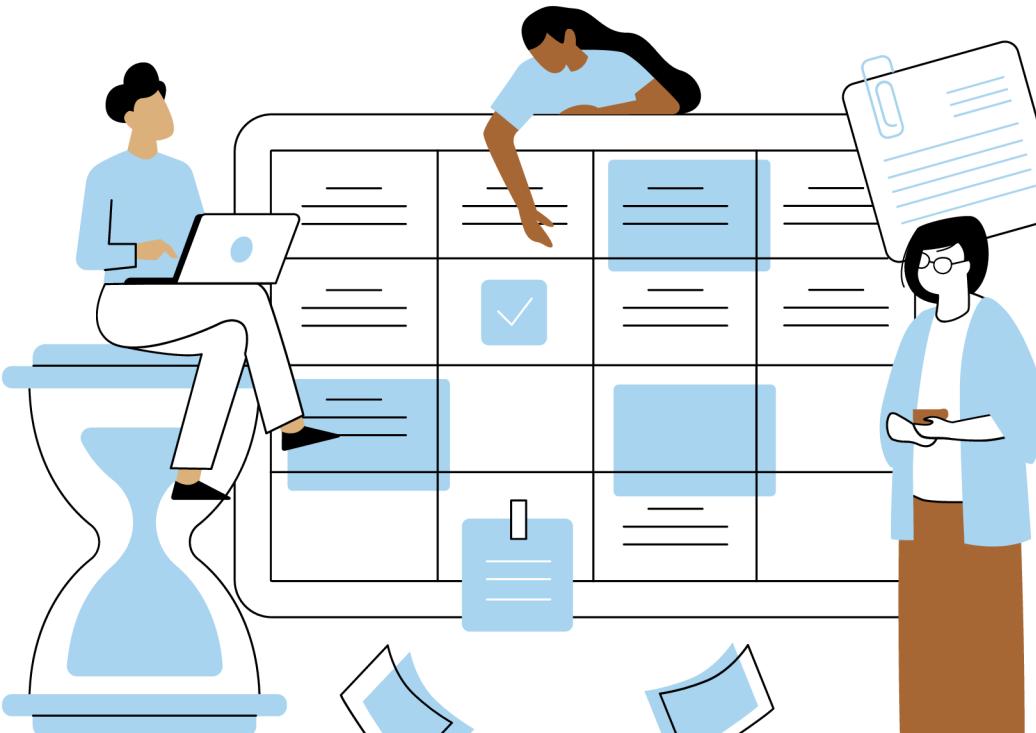
**Backend Choice:** Firebase was chosen as the backend, providing user data storage, authentication, and seamless data sync through services like Firebase Authentication, Firestore, and Realtime Database.

**Scalability Support:** Firebase ensures flexible scalability, with Realtime Database and Firestore automatically adapting as users increase, maintaining consistent performance.



# EXPENSE MANAGEMENT:

- **RECORD EXPENSES: QUICKLY RECORD DAILY SPENDING FOR REAL-TIME TRACKING.**
- **SELECT A CATEGORY: CHOOSE FROM FOOD, TRANSPORTATION, OR MEDICINE FOR ORGANIZED TRACKING.**
- **VIEW SUMMARY: GET DAILY, WEEKLY, AND MONTHLY REPORTS TO KEEP A CLEAR BUDGET IN CHECK AND AVOID OVERSPENDING.**



# DATA MANAGEMENT AND SECURITY

01

## Data Management

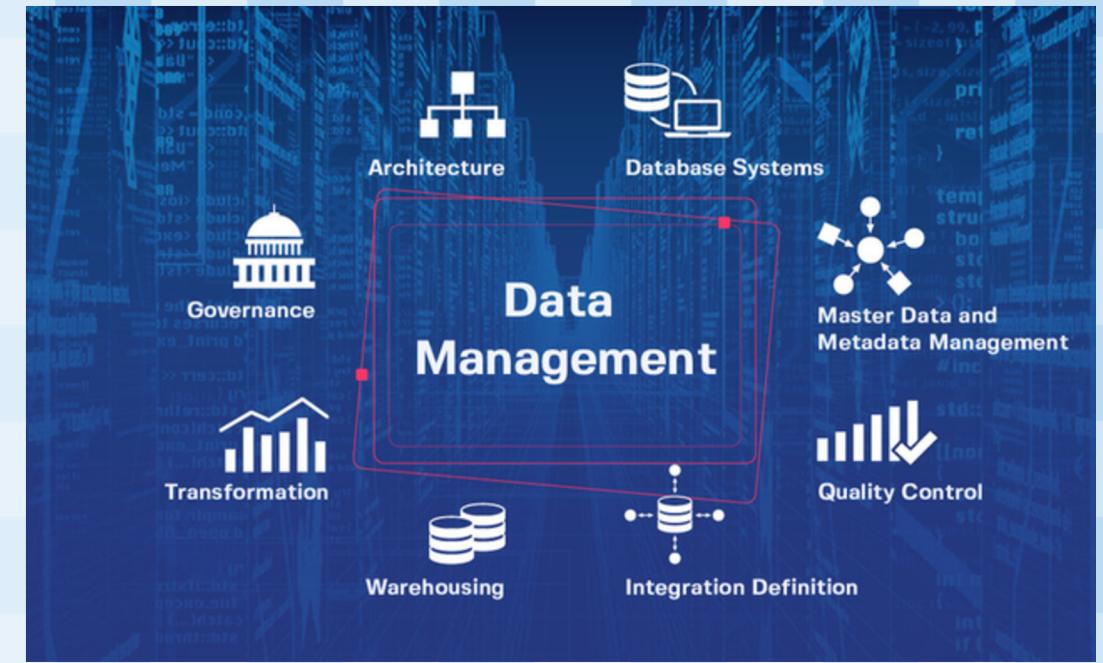
Cloud Firestore: NoSQL data storage, runtime synchronization.

Result Management: Split data into collections/documents, easy to scale.

02

## Password Data

- Authentication: Secure login via email, Google, Facebook, phone number.
- Security Rules: Access Control, Protect Sensitive Data.
- End-to-End Encryption: Data is encrypted in transit and at rest.



# USER TESTING AND APPLICATION IMPROVEMENT



## User Testing

Test Group: Students.

Test Features: Record Expenses, Create Categories, View Reports.

## Received Feedback

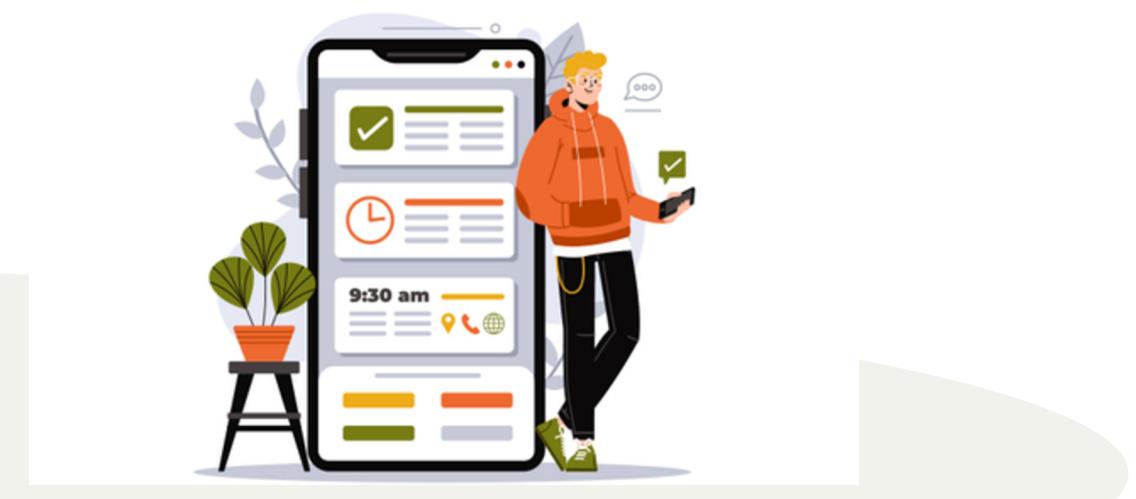
**Advantages:** Friendly interface, easy to use.

**Disadvantages:** Button location is not optimized, complicated operations.

## Improve Usability

**Adjust Button Location:** Move "Add Expense" and "View Report" to more accessible locations.

**Simplify Process:** Optimize expense entry, reduce number of steps.



# CHALLENGES FACED

## Technical:

- Data sync issues (latency, inaccuracy) resolved by optimizing Firebase Realtime Database.

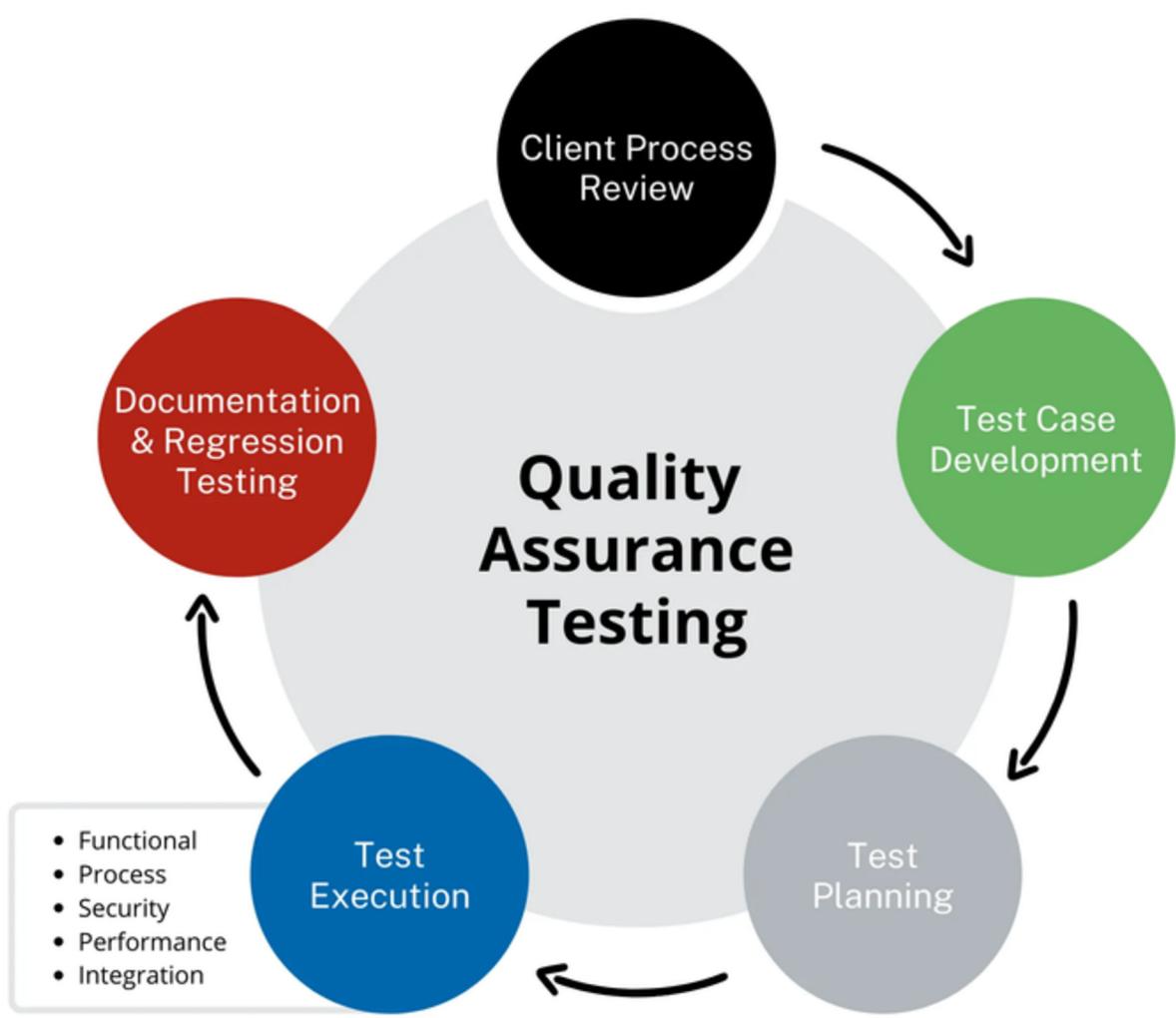


## Time Constraints:

- Short deadlines managed by prioritizing core features and using Agile sprints.



# QUALITY ASSURANCE AND TESTING



- **Functionality Testing:** Verified core features like expense recording, category creation, and report viewing to meet user requirements.
- **Usability Testing:** Optimized button placement and data entry based on user feedback for better user experience.
- **Results:** Achieved high reliability, stable features, and an intuitive interface rated user-friendly.



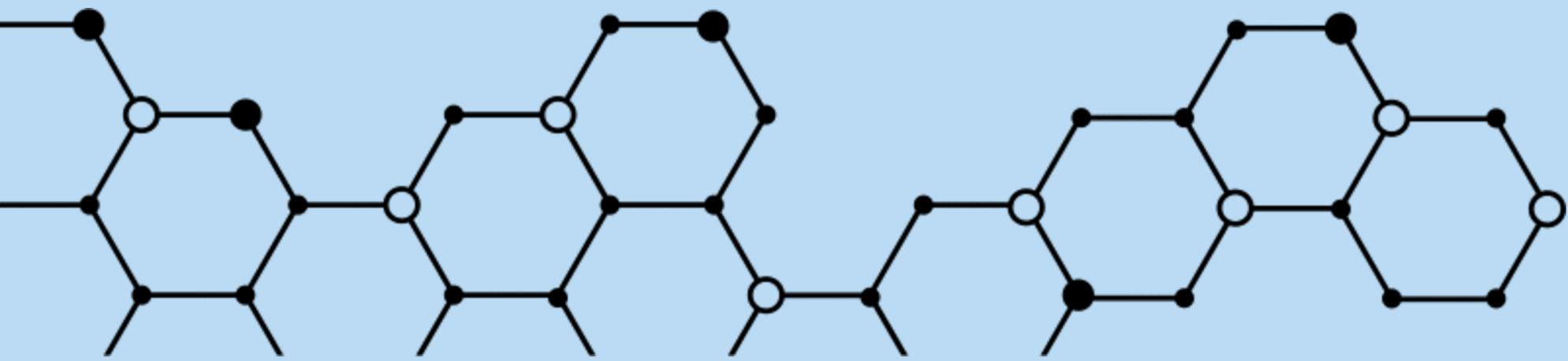
# RISK MANAGEMENT

## Risks identified:

- **Limited mobile experience:** The team's lack of experience in mobile app development could affect the progress and quality of the product.
- **Scope expansion:** Adding new features could exceed the project's capabilities and time.

## Risk mitigation strategies:

- **Training and support:** The team took courses and consulted documents to improve their mobile development skills.
- **Core feature prioritization:** We limited the project scope, focusing on the most important features and gradually completed the secondary features later.



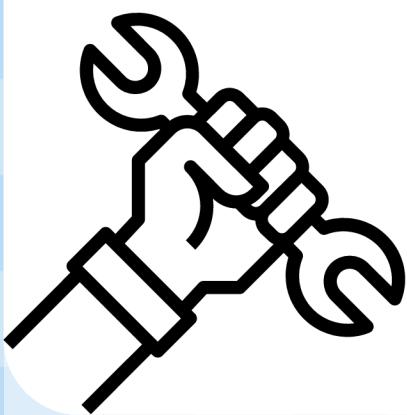
# PROJECT MANAGEMENT AND COLLABORATION

## Collaboration tools:

GitHub: Used to manage source code, track progress, and coordinate between team members through pull requests and issues.

## Collaboration strategies:

- Regular team meetings: Hold weekly online meetings to discuss progress, resolve issues, and update work.
- Clear job assignment: Each member has a specific role, helping to optimize workflow and increase collaboration efficiency.



# PERFORMANCE EVALUATION CRITERIA

- **User satisfaction and functionality:**

The application basically meets the basic needs of users, can classify the source of money and the source of money as well as store the user's financial information.

- **User satisfaction:**

We have created small surveys in the application, users are quite satisfied and enjoy the notification functions of the application when users exceed the initial spending budget.

- **Overall application quality:**

The application has quite good stability, we have tested it many times and have not detected any serious errors.

The response speed and smoothness of the application are also quite good.



# SUMMARY OF MEETING USER REQUIREMENTS

The application fully meets user needs with key features:

**Expense Recording:** Tracks daily expenses by category (e.g., Food, Transportation, Medicine).

**Budget Warning:** Alerts users when spending exceeds set budgets.

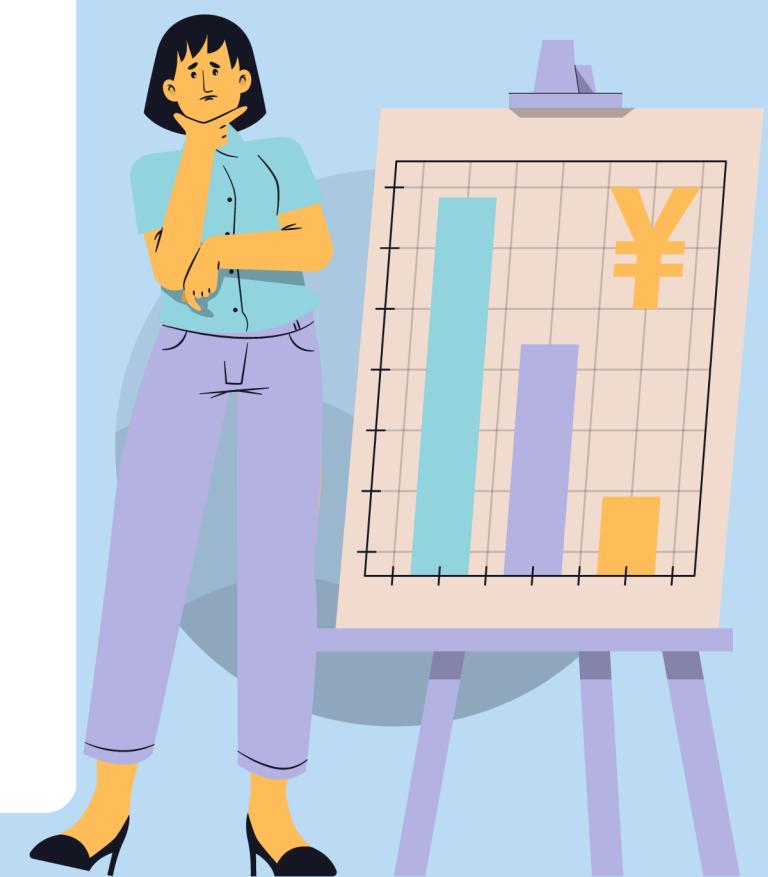
**Friendly Interface:** Simple, user-friendly design with clear buttons and intuitive data entry.

**Overview Report:** Provides daily/monthly expense reports with charts for easy tracking.

# QUESTIONS AND ANSWERS



Survey Question	Response
How clear were the initial user requirements for the CampusExpense Manager app?	Neutral
What specific requirements were difficult to understand or implement?	Specific requirements related to recurring expenses were difficult to understand.
What were the main challenges you faced during the implementation phase?	Time constraints and technical difficulties.
How did you overcome these challenges?	Worked extra hours and sought help from senior developers. More detailed initial planning could have mitigated some of these challenges.



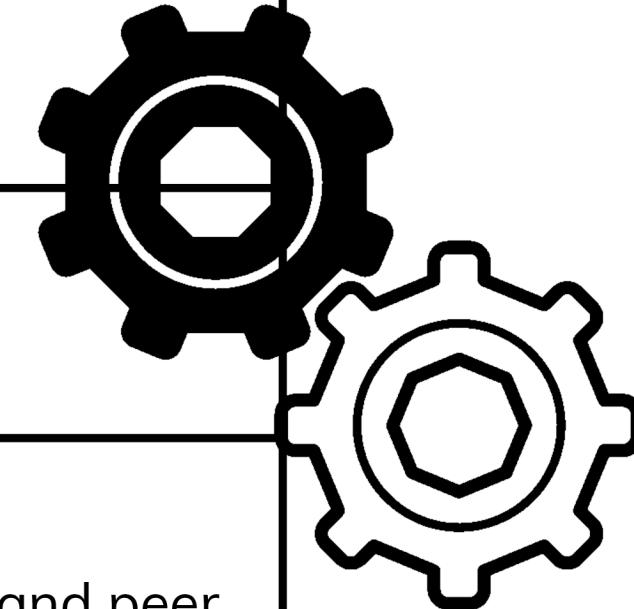
# QUESTIONS AND ANSWERS

Survey Question	Response
Did you encounter any issues with the development tools (e.g., Android Studio, Xcode, Firebase, Microsoft Project)?	Yes
If yes, please describe the issues and how they were resolved.	Faced issues with Android Studio crashing frequently. Resolved by updating the software and increasing system resources. Regular maintenance and updates of tools should be scheduled to prevent such issues.
How effective was the communication and collaboration within the team?	Effective
What could be improved to enhance team collaboration?	Scheduling regular check-ins and using more structured communication channels and regular update meetings would help.



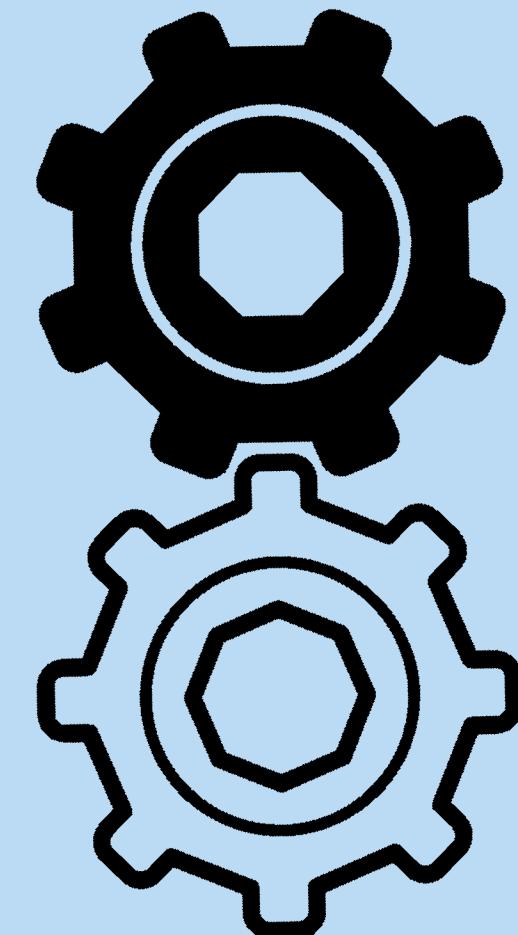
# QUESTIONS AND ANSWERS

Survey Question	Response
Were there any significant bugs or issues discovered during testing?	Yes
If yes, please describe the issues and how they were resolved.	Significant bugs related to budget calculation were discovered. Resolved through thorough debugging and peer reviews. The testing process was thorough but could benefit from automated testing tools.
Was the testing process thorough and effective in identifying issues?	Yes
If no, what could be improved in the testing process?	Allocating more time for the testing phase and incorporating automated testing would enhance efficiency.
What was your overall experience with the project?	Neutral



# QUESTIONS AND ANSWERS

Survey Question	Response
Were you able to meet the project deadlines?	No
If no, what were the reasons for the delays?	Missed deadlines due to technical difficulties and unclear requirements. Better initial planning and clearer requirements would help in meeting deadlines.
How was user feedback collected during the development process?	Surveys and direct feedback.
How was this feedback used to improve the application?	This feedback was used to refine the user interface and improve the expense tracking feature. Regular collection and analysis of user feedback throughout the project are recommended.
What are your suggestions for improving the project development process in the future?	Suggested improvements include better requirement documentation and more resources for testing.



# CRITERIA FOR ASSESSMENT

## CRITERIA FOR ASSESSMENT

Measured through user feedback surveys, app store ratings, and retention rates. Engagement metrics include daily active users and session duration.

## APP PERFORMANCE METRICS

Response times are tracked to ensure quick load times for features. Stability is assessed by monitoring crash reports and error logs.

## FULFILLMENT OF USER REQUIREMENTS

Each requirement is evaluated against user stories to confirm implementation and functionality.

# USER REQUEST



## Track expenses in detail and quickly

Users need a tool that helps to easily and accurately copy daily parameters. Require permission to quickly enter data for common spending options such as housing, tuition, food, entertainment.

## Budget warning when exceeding the focus

The system needs to send notifications when users spend more than the previously set budget. Provide suggestions for spending to avoid wasting too much money on unnecessary entertainment or beauty purposes. This feature helps students adjust spending in a timely manner, avoiding falling into difficult financial situations.

## Intuitive, user-friendly interface

The application must have a simple design, easy to use even for those who are not familiar with technology. Require easy to recognize icons and colors to use the optimized experience.

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Expenses need to be automatically classified by category or customized by authorized users. Expense categories should be flexible and student-friendly, such as tuition, food, transportation, etc.

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Users require financial summary reports, showing weekly/monthly expenses with illustrative charts. The reports should be easy to understand, helping users to assess their personal financial situation comprehensively.



# SYSTEM INVESTIGATION AND RESEARCH

## System Investigation and Research

During the investigation and research phase, we conducted the following key activities to understand student needs and build a suitable CampusExpense Manager application:

### 1. Analyze the competition

**Popular apps:** Research existing financial management apps like Money Lover, Spendee, and Mint.

**Pros:** Packed with features like spending tracking, budgeting, and financial reporting.

**Cons:** Some apps have complex interfaces or don't meet specific student needs (like simplified features or high cost of use).

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**Method:** Conducted online survey and small group interviews with 50 university students.

#### Results:

- 85% of students have difficulty tracking and managing their daily expenses.
- 70% want an over-budget alert feature to help maintain reasonable spending habits.
- 65% require a simple, intuitive interface that does not take much time to get used to.
- 50% are interested in summary financial analysis reports to improve spending habits.

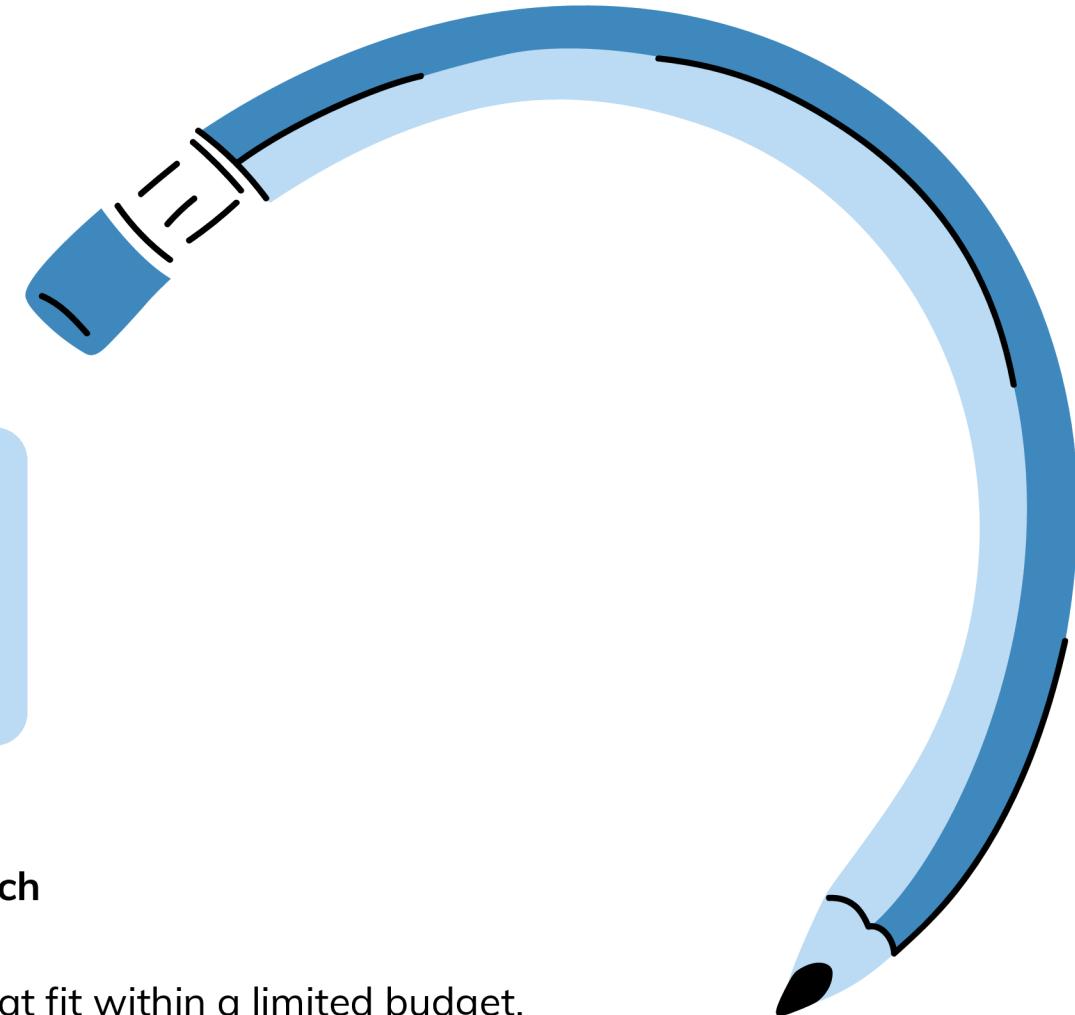
### 3. Insights from Research

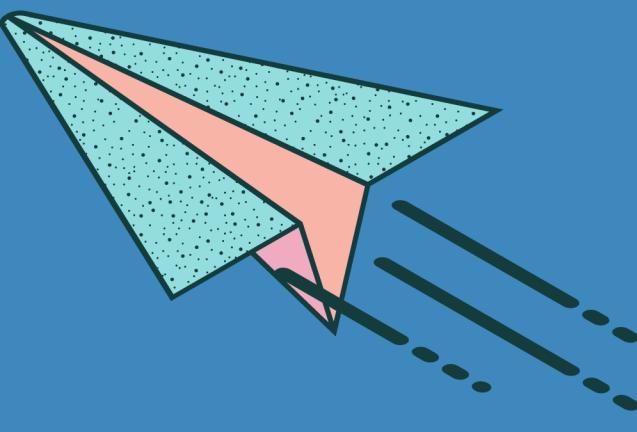
#### Students need:

- Easy-to-use tools that fit within a limited budget.
- Flexible features that help them manage their education, living, and entertainment expenses.

#### Differentiating factors:

- Focus on students, offering free or low-cost features.
- Simplify the process of use, while still ensuring important functions such as budget alerts, expense categorization, and financial reporting.





# THANK YOU FOR LISTENING!!

