



Group 4

Application Development

# CampusExpense Manager

## OUR MEMBER GROUP



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# Introducing the CampusExpense Manager app.

BudgetWise Solutions is a small development team with limited experience in mobile app development. They have taken on a project to create a mobile application called "CampusExpense Manager," tailored for university students. The goal is to develop an easy-to-use app that helps students manage their expenses effectively while staying within their budgets. The CampusExpense Manager aims to simplify expense tracking for students, whether they are living on or off-campus.

# Identify

## the problem system and requirements

### Problem

- Students have difficulty tracking and remembering their expenses.
- Manually categorizing expenses is time-consuming and error-prone.
- Students do not have effective tools to set up a budget and track progress.
- Difficulty analyzing spending trends to make better financial decisions.
- Students need a simple, convenient solution that can be used anytime, anywhere, even without an internet connection.

### Goal

This app will provide the necessary features to:

- Record detailed expenses.
- Categorize expenses automatically.
- Set up and track budgets.
- Analyze spending trends.
- Receive notifications and alerts.
- Support offline mode.

# Identify the problem system and requirements

## ***Functional Requirements***

- **User Registration & Authentication** – Secure user account creation and login.
- **Expense Tracking** – Add, edit, categorize expenses with details (description, date, amount).
- **Budget Setting** – Set and adjust monthly budgets for expense categories.
- **Expense Overview** – View total spending, remaining budget, and category breakdown.
- **Recurring Expenses** – Automatically track recurring expenses (e.g., rent).
- **Expense Reports** – Generate detailed reports for specific periods.
- **Expense Notifications** – Alerts for approaching or exceeding budget limits.



# Identify the problem system and requirements

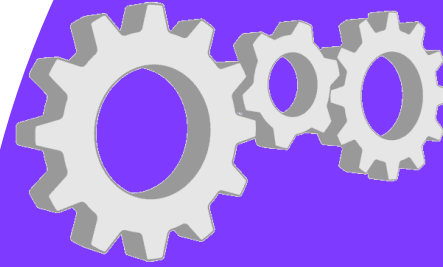


## ***Non-Functional Requirements***

- **Performance** – Smooth and responsive experience.
- **Data Security** – Secure storage and encryption of user data.
- **Usability** – Simple and user-friendly interface, easy to navigate and operate.
- **Scalability** – The system can scale efficiently as the user count grows.
- **Maintainability** – The source code is clear, easy to understand, easy to maintain and upgrade.
- **Compatibility** – Available on Android and iOS.
- **Reliability** – The application works stably, with few errors.
- **Offline Capability** – App should function without an internet connection.
- **Portability** – The application can be easily ported to other platforms, languages, or operating systems in the future.



## Identify the problem system and requirements

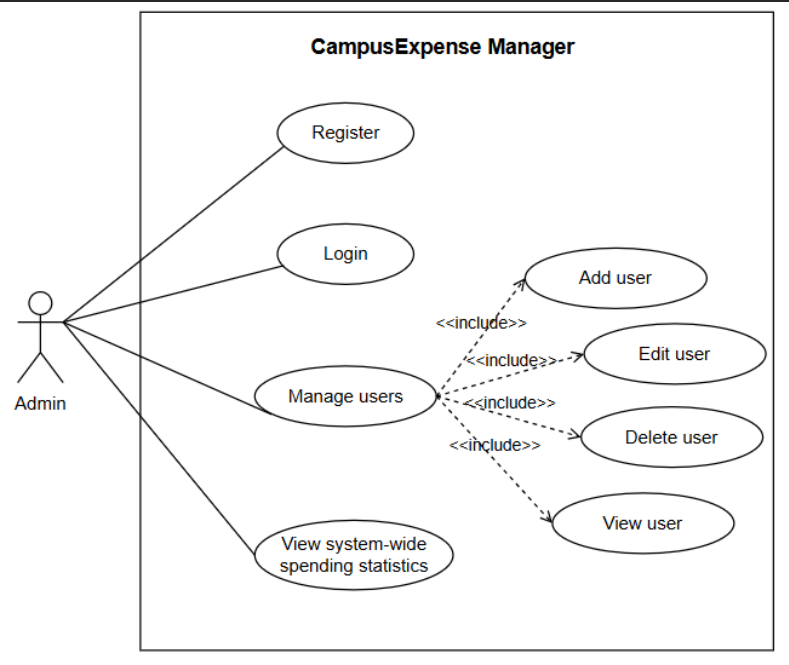


### System Requirements

- **Languages:** Java (Android).
- **Database:** SQLite (local), Firebase or online database developed in the future.
- **Other:** UI/UX libraries, Git.

# Identify

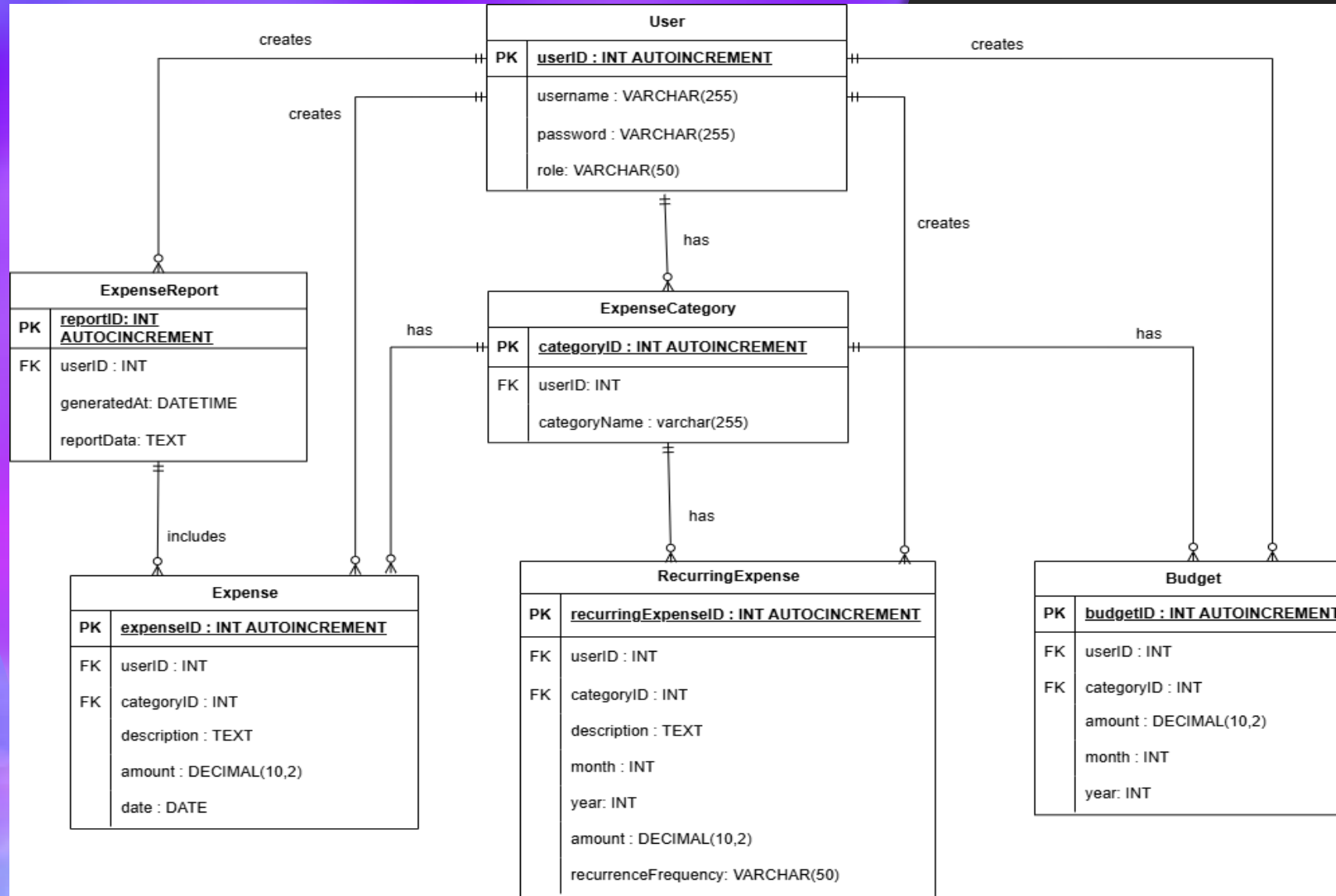
## Use-case diagram





# Identify

## ERD





# Identify stakeholders

## ***Student***

**Role:** Main user of the application.

**Interests:**

- Easy to use application, friendly interface.
- Manage spending results, accurate.
- Secure personal and financial information.
- Stable application, few errors.
- Can use the application anytime, anywhere (offline support).

**Impact:** Continue to use and evaluate the application.

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## ***Development Team - BudgetWise Solutions***

**Role:** Design, program, test, develop declarations and maintain the application.

**Interests:**

- Complete the project on time, within budget.
- Create a quality product that meets the requirements of users and other stakeholders.
- Use appropriate and effective technologies.
- Develop skills and experience.

**Impact:** Directly implement the project.

# 12:30

## Identify stakeholders

### *University/College Administrator*

**Role:** May support student promotion of the app or provide feedback on student needs.

**Interest:**

- The app may help students better manage their finances, reducing financial problems.
- The app may be used as a student support tool.
- The app does not cause security or resolution issues.

**Impact:** Next Price, may support promotion and use of the app within the student community.

# Difficulties in App Development And Alternative Solutions

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**1. Limited Experience:** developers may lack experience, especially with new technologies.

**Solution:**

- Invest time in learning and researching related technologies.
- Seek support from more experienced developers (mentors).
- Use documentation, tutorials, and online communities to solve technical problems.



**2. Limited time and budget:** The project has a 12-week deadline and a limited budget, which can put pressure on the development team

**Solution:**

- Plan carefully and manage time effectively.
- Prioritize the most important features (MVP - Minimum Viable Product).
- Use tools and frameworks that help speed up development.
- Look for cost-effective solutions (e.g., using free or low-cost cloud services).



**3. Changing Requirements:** User or other stakeholder requirements may change during development, making it difficult to manage the project.

**Solution:**

- Use Agile development to easily adapt to changes.
- Communicate regularly with stakeholders to update information and adjust plans when necessary.

# Difficulties in App Development And Alternative Solutions

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**4. Technical Issues:** Unforeseen bugs or technical issues may be encountered during development

**Solution:**

- Perform thorough testing (unit testing, integration testing, user acceptance testing).
- Use debugging and logging tools to find and fix errors.
- Consult experts or the developer community when encountering difficult problems.



**5. Data Security:** Ensuring the safety of users' personal and financial data is a big challenge.

**Solution:**

- Use strong security measures (encryption, authentication, authorization).
- Comply with data privacy regulations (e.g. GDPR).
- Regularly test and update security measures.



**6. Ensure performance:** The application needs to run smoothly and quickly, even with many users and data.

**Solution:**

- Optimize the source code and database.
- Use caching and lazy loading techniques.
- Perform performance testing to detect and fix issues.

# Difficulties in App Development And Alternative Solutions

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**7. Ensuring User Experience (UX):** Designing an intuitive, easy-to-use, user-friendly interface is a challenge, especially for teams that lack UX design experience.

**Solution:**

- Refer to good UI/UX design principles.
- Conduct user research to understand student needs and expectations.
- Test the interface with real users (usability testing) to gather feedback and improve.

## Assessing the main risks of the project, and How to manage risks

### Assessing the main risks of the project

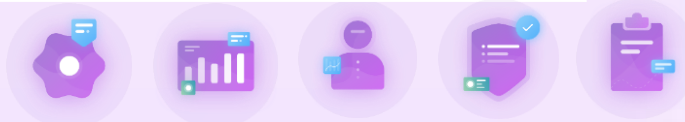
**Data Security:** requiring strong security measures to prevent data breaches and cyberattacks.

**Cross-Platform Compatibility:** Ensuring the app runs smoothly on both Android and iOS

**Limited Development Experience:** The development team has minimal experience in mobile development, which may lead to delays or lower-quality outcomes.

**Budget Constraints:** With limited financial resources, the project must carefully optimize technology, hosting, security, and development costs.

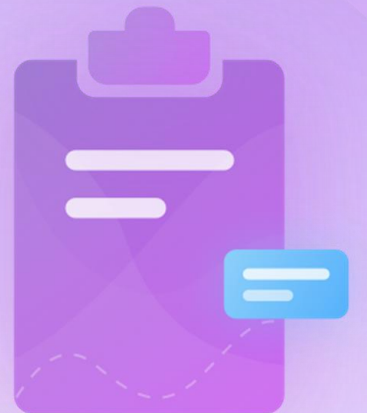
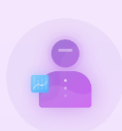
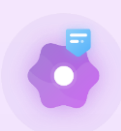
**Application Performance:** The app must maintain high processing speed, stability, and efficiency even when handling large amounts of data and supporting offline functionality.



Start

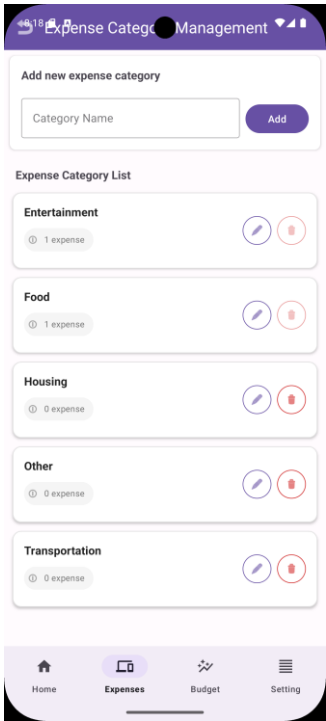
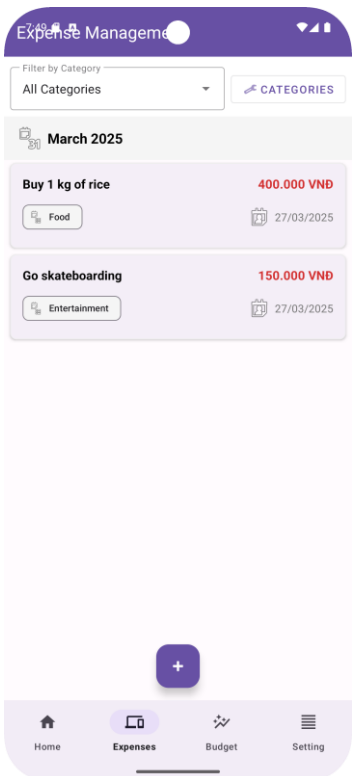
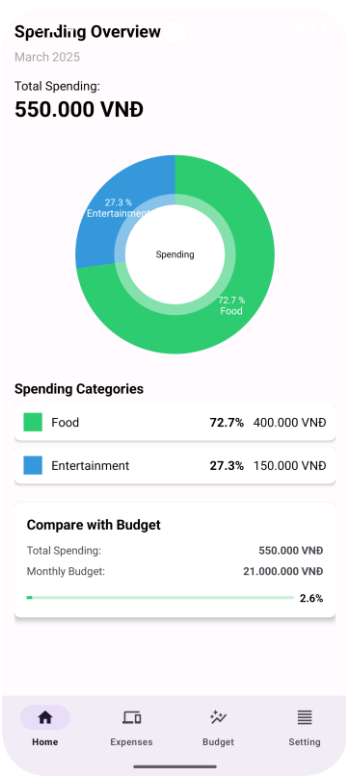
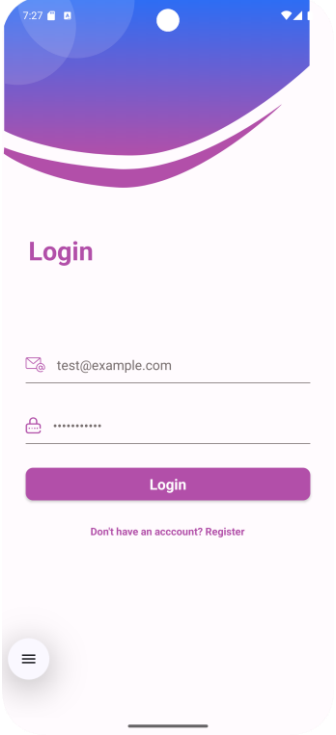
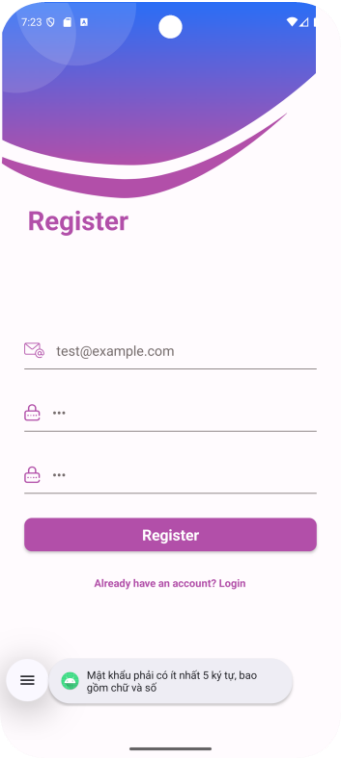
## Assessing the main risks of the project, and How to manage risks

<b>Data Security</b>	Password encryption
<b>Improving Development Skills</b>	Follows the Agile model, conducts regular code reviews, and provides mentorship to enhance the developers' expertise.
<b>Budget Optimization</b>	Uses SQLite for offline data storage and Firebase for online synchronization to minimize costs. Leverages open-source tools to reduce development expenses.
<b>Performance Optimization</b>	Implements database query optimizations, caching, and ensures the application functions efficiently even in offline mode.

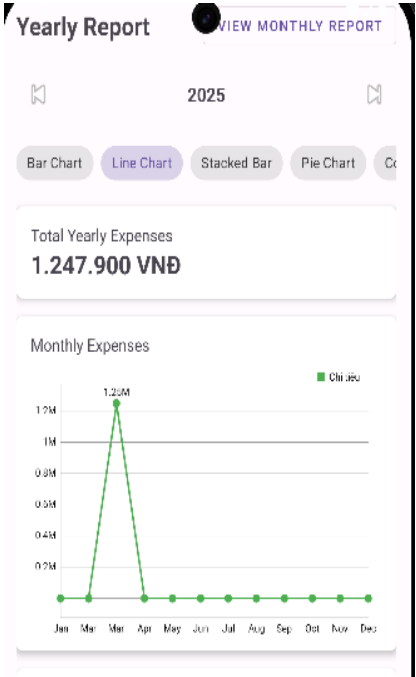
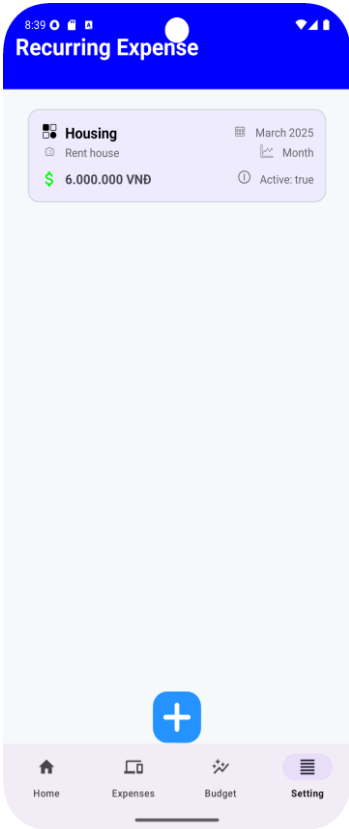
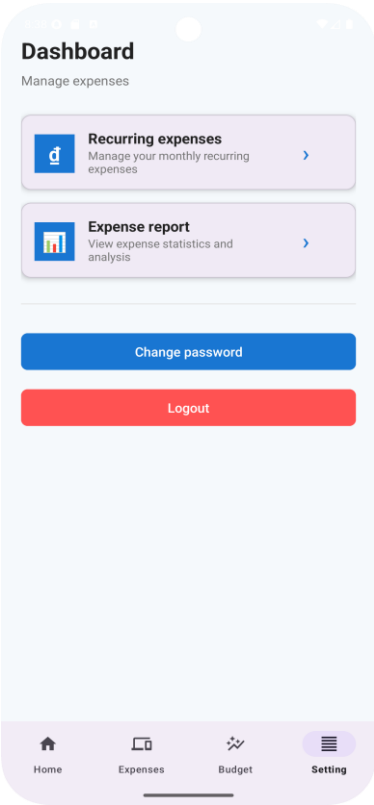
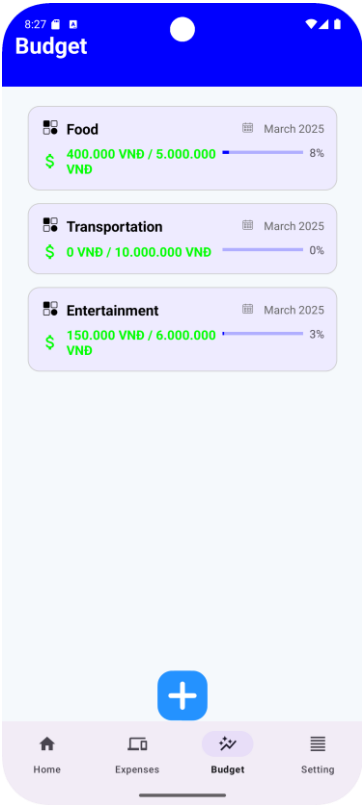




# Demo App.



# Demo App.



# Development Process (SDLC - Scrum)

**Initialization:** March 11 - 18: Get user requirements. Then synthesize and define the application's functions and requirements.

Sprint	Duration	Activity	Details
Sprint 1	March 19 - March 21	Product Backlog	Listed necessary features: Prioritized based on business value and technical complexity.
		Sprint Planning (March 19)	Defined the goal: Complete basic Expense, Budget, and Setting features. Broke down tasks and estimated time for each.
		Daily Scrum (March 20)	<ul style="list-style-type: none"><li>- Minh: Completed architecture design, supporting Giang with database integration.</li><li>- Giang: Designed the Expense interface, coding add/edit/delete logic, facing database connection issues.</li><li>- Son: Designed the database, supporting Giang. No obstacles.</li><li>- My: Designed the interface, started coding the Setting module, Testing.</li></ul>
		Sprint Review (March 21)	Product demo, Minh provided feedback:Expense feature not working.Budget logic does not handle incorrect inputs.UI needs improvement.

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# Development Process (SDLC - Scrum)

Sprint	Duration	Activity	Details
		Sprint Retrospective (March 21)	<ul style="list-style-type: none"><li>✔ Completed architecture design and basic UI.</li><li>✔ Maintained a positive working attitude and followed the initial plan.</li><li>✗ Lack of alignment on workflows and Git usage, causing conflicts.</li><li>✗ Ineffective communication among team members, infrequent updates.</li><li>✗ Some features not meeting expectations (Expense not working, Budget missing input validation).</li><li>💡 Improve communication: Team members need to be more proactive.</li><li>💡 Provide timely support: Prioritize quick meetings when issues arise instead of solving them alone.</li><li>💡 Ensure thorough testing before Sprint Review: Each feature must be tested to avoid basic errors.</li></ul>
Sprint 2	March 21 - March 26	Focus on	Recurring Expenses and Reports. Feedback from Sprint 1 was used to improve the product.
Sprint 3	March 26 - March 29	Focus on	Enhancing Annual Reports, Charts, and Auto-Redirection after Registration. This sprint was added to address feedback from the instructor.



## difficulties, solutions

Challenge	Solution
<b>Communication</b>	Initial difficulties in exchanging information were resolved by using a shared group chat and holding direct meetings when necessary.
<b>Code Management</b>	The team faced challenges in version control, which were addressed by adopting Git and implementing a structured branching/merging process.
<b>Requirement Changes</b>	Feedback from the instructor required additional features, and user contributions highlighted the need for improved UI. The team adapted flexibly and incorporated these changes in Sprint 3.

# Minh

## Challenge

- Structuring the project to manage system functionalities
- Initially functions are prone to conflict when merging branches

## Solution

- Applied the MVVM architecture to facilitate system management, upgrades, and maintenance.

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# My

## Challenge

- Lack of understanding of technology

## Solution

- Learn through reference materials
- Discuss with team members

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# Sơn

## Challenge

- Design usecase diagram of functions for 2 roles admin and student

## Solution

- Focus on 1 role, Student. Because this is the main actor of the project, to focus on supporting student financial management.

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# Giang

## Challenge

- Lack of experience in app development, not proficient in feature development, easy to be behind schedule

## Solution

- Focus on the Expense role, access more project development support tools and coordinate with the development team at each stage

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Hmptt.



# CONCLUSION

The CampusExpense Manager project aims to deliver an effective, secure, and user-friendly expense management application for students. By selecting the appropriate technologies such as Java, Flutter, SQLite, and Firebase and adopting the Agile development approach, the project can minimize risks, optimize costs, and maintain a structured development process. Effective risk management ensures that the application meets high-quality standards and successfully addresses the real needs of users.

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