

PERSONAL FINANCE MANAGEMENT SYSTEM

BY

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FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY

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ABSTRACT

The "Personal Finance Management System" is a mobile application designed to help users manage their finances, make informed spending decisions, and plan for a secure financial future. This project addresses the need for better financial literacy by providing tools for budgeting, tracking expenses, saving, and planning for retirement.

The main goal is to create a user-friendly mobile app that not only records and categorizes expenses, but also helps users in creating personalized budgets and offering spending recommendations. The system includes main features such as expense recording, spending guides, retirement planning, and expense analysis.

The project integrates different aspects of personal finance management and follows proven budgeting and financial planning principles to provide users with accurate recommendations.

This project aims to make a significant contribution to financial management by promoting informed spending, budgeting, and retirement planning. Thus, improving financial well-being and contribute to a more financially literate society.

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LIST OF ABBREVIATIONS

<i>SWRC</i>	Social Wellbeing Research Centre
<i>EPF</i>	Employee Provident Fund
<i>OCR</i>	Optical Character Recognition
<i>CFPB</i>	Consumer Financial Protection Bureau

Chapter 1

Introduction

This chapter presents the project inspiration, problem statements, project objectives, project scope, project impact and contribution.

1.1 Project Inspiration

In today's fast-paced world, managing personal finances has become a challenging task as many individuals struggle to organize and manage their financial matters [1]. This project is inspired by the need to develop a solution that simplifies the process of managing personal finances, enabling individuals to make the right financial decisions and achieve their long-term goals.

The primary objective of this project is to create a mobile application that offers comprehensive functionalities to track expenses, set budgets, plan for retirement, and analyze expenses.

By providing personalized financial planning and convenient expense tracking features, the project aims to assist users in managing their finances. The project inspiration is to make personal finance management a simpler, more intuitive, and empowering experience for individuals.

1.2 Problem Statements

There are a lot of financial tracker applications that are available today on the Play Store or App Store. However, some of these applications did not have enough functionalities to effectively help users in managing their finances.

1. Limited Functionality of Existing Financial Tracker Applications:

Many financial tracker applications from Play Store or App Store lack the functionalities necessary for effective financial management. For instance, existing apps such as Monefy [2] and Spending Tracker [3] primarily focus on recording expenses and viewing past expenditures. However, they did not have features to guide users on setting budgets effectively, which is crucial for financial management. By providing budgeting features or spending guides, users can make more informed spending decisions.

2. Absence of features to assists users in expense planning, saving, retirement and planning for long-term financial goals.

Most existing applications, like Wallet [4] and Belanjawanku [5], lack features that assist users in effectively planning expenses, savings, and retirement with long-term financial goals. This limitation is particularly critical in Malaysia, where the formal retirement system covers only about 60 percent of the labor force [6], leaving a significant portion of individuals without sufficient retirement savings. Thus, there is a clear need for a comprehensive financial app that includes retirement planning features. Without sufficient retirement savings, individuals would be more vulnerable to unpredictable events and financial conditions. [7]

3. Absence of Expense Analysis feature.

Many existing applications, including Monefy [2] and Spending Tracker [3], lack features for analyzing users' expenses to provide valuable insights into their spending habits. Without this functionality, users are unable to review their past expenses and track their progress on their financial journey.

1.3 Project Objectives

- 1. To develop a personal finance management system that is able to assist and recommend users in budget setting and spending decisions.**

Apart from expense recording and viewing past expenses, the application will include budgeting functionalities and a spending guide for users.

- 2. To develop a personal finance management system that is able to help users with expenses, saving and retirement planning to achieve their financial goals.**

The application will prepare users for their retirement and promote long-term financial well-being. Features such as retirement calculators and goal-setting functionality will help users to secure their financial future and track their financial goal's progress.

- 3. To develop a personal finance management system that is able to analyze users' expenses and provide valuable insights.**

The application will apply the 50/30/20 budgeting rule to analyze users' spending habits and provide them with recommendations for financial improvement.

1.4 Project Scope

This project's scope is to develop a personal financial mobile application specifically designed to cater to the needs of users in Malaysia. The app will be focused on providing financial management solutions based on the user's location, income, and financial goals. The functionalities of the application include:

1. User Registration and Profile Management:

The app will allow first-time users to register by providing essential information such as age, city of residence, and income. The app will generate a personalized user profile and spending guide based on the information collected.

2. Expense Tracking:

Users can record their expenses easily by inputting the necessary information such as expense amount, category, date, and note.

3. Expense History

Users can view previous expense records in Expense History. Additionally, users have the option to modify and delete their records.

4. Retirement Planning:

Users can create a retirement plan by inputting retirement-related data. The app will use this data to generate a retirement plan, offering users insights into the savings required to achieve their retirement goals.

5. Bill Reminders:

Users can input their monthly bills into the app, enabling it to send reminders for bill payment deadlines. The app will help users stay organized and avoid missing any bill payments.

6. Financial Goal Setting:

Users can set financial goals within the app, specifying a deadline and the desired amount to be saved. The app will calculate the monthly savings required to reach the set financial goals, helping users stay on track.

7. Expense Analysis

The app will analyze the users' expense history based on the 50/30/20 budgeting rule. Then, the app generates insight on users' spending habits. For example, if users exceed their spending on non-essential expenses, the app will recommend users to reduce their spending on the related categories.

Data Storage

To ensure efficient data management, the mobile application will utilize an SQLite database. SQLite was chosen for its lightweight nature, cross-platform compatibility, and efficient data storage and retrieval capabilities. The SQLite database will serve as the storage backend for user data. Furthermore, the database will allow users to access and update their financial information offline. This ensures that users can conveniently manage their finances anytime, regardless of network connectivity.

1.5 Project Impact and Contribution

The development of this personal financial mobile app has the potential to make a meaningful impact on individuals and society. By addressing the problem of inadequate financial literacy and providing practical solutions, the app aims to assist users in making informed financial decisions and improving their overall financial well-being. With features such as spending guide, expense tracking, retirement planning, bill reminders, and expense analysis, the app aims to significantly improve how individuals manage their finances.

The app's comprehensive functionality and user-friendly interface allow individuals to control their finances efficiently. This project offers practical solutions to personal financial management and the opportunity to enhance financial knowledge and skills.

1.6 Chapter Summary

This report will present the reader with an overview of the project through the following chapters:

Chapter 2: Literature Reviews

This chapter reviews relevant literature and research on personal finance management, including budgeting, expense tracking, retirement planning, and financial goal setting.

Chapter 3: System Methodology

This chapter outlines the methodology used in developing the personal financial mobile app. It covers project development, information gathering, system functionalities, data storage design, system architecture design, hardware and software requirements, and project verification plans.

Chapter 4: System Design

This chapter focuses on the documenting the system architecture, functional module, interface design with procedure elaboration, and data storage design.

Chapter 5: System Testing

This chapter documents the system test plans, followed by the test results to evaluate the achievement of system objectives.

Chapter 6: Discussion

This chapter evaluates whether the project has met its objectives and propose for future improvements.

Chapter 2

Literature Review

This chapter reviews existing systems and papers with different proposed solutions, highlighting the strengths and limitations of these solutions. Other than that, proposed solutions are discussed to overcome those limitations if available.

2.1 Review Existing Financial Application

2.1.1 eExpense: A Smart Approach to Track Everyday Expense

S.A Sabab et al. [8] proposed an application to track expenses on smartphones. This proposed application eliminates the need for user input by using Optical Character Recognition (OCR) to extract textual information. Therefore, this feature allows users to scan bills or receipts to record their expenses. This application also tracks the SMSs from the user's savings accounts to record the user's income.

System Overview

The application is divided into four major parts: debit, credit, balance, and history. The debit part records all the expenditures, and the credit part records all the income.

A. Debit

For debit part, the users can choose to input the data manually or scan the money receipt by using phone camera. The users can change any of the extracted information to change any wrong information before saving the records.

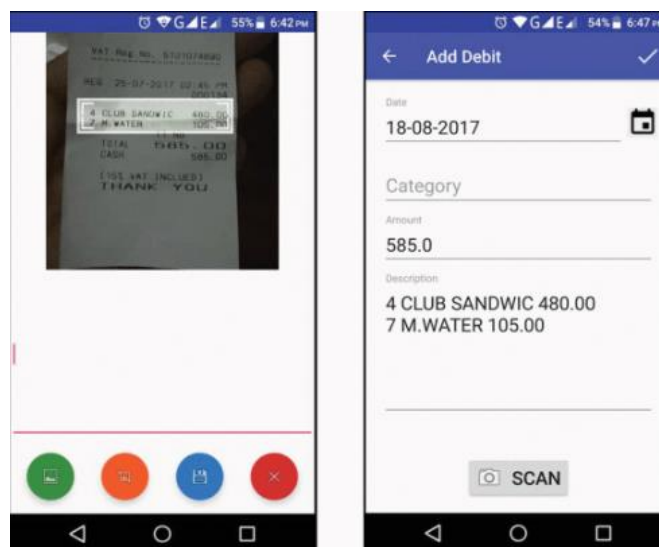


Figure 2.1.1.1 eExpense's Debit [8]

B. Credit

The system will read all the users' message from their phone and detect all the messages from the bank about any transaction of credit and saves the information. The users can choose to manually input their income into the application.

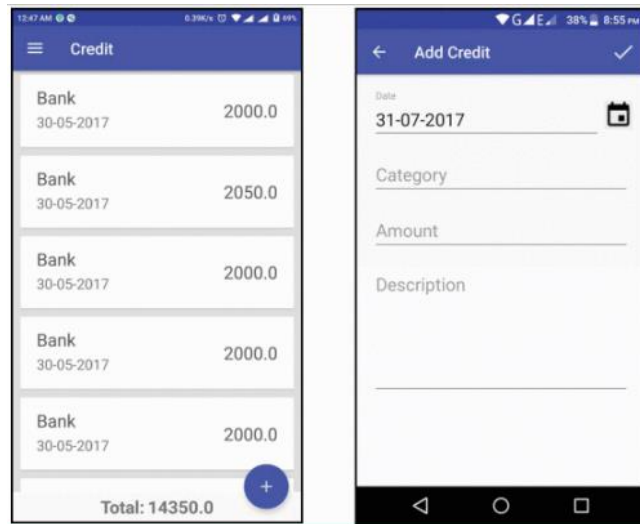


Figure 2.1.1.2 eExpense's Credit [8]

C. Balance

In the 'balance' interface, users can check their debit and credit data, which will be displayed in pie charts as shown in the figure 3 below. The users can choose monthly or yearly balance. The pie chart will show the total estimation from all the categories created by users such as food, groceries, entertainment and so on.

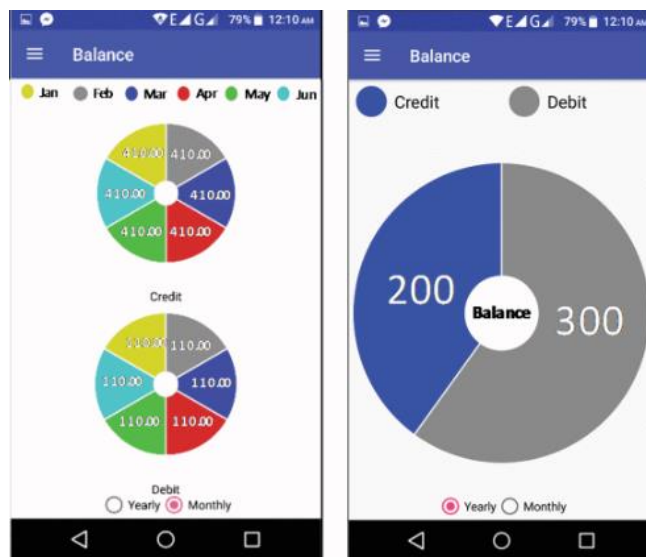


Figure 2.1.1.3 eExpense's Balance [8]

D. History

The users can use the calendar interface to select a date to check the total amount of expense on that date as shown in the figure 4 below. Then, the users can also check the category of expense of that date.



Figure 2.1.1.4 eExpense's Expense History [8]

Conclusion

In conclusion, eExpense reduced the user input by using Optical Character Recognition (OCR), allowing users to scan their bills or receipts to record their expenses. The application also tracks the user's SMS to record the user's income. However, eExpense lacks essential features to assist users in budgeting, setting financial goals, and planning for retirement. While eExpense simplifies expense recording, it falls short in providing insights and support for users' financial management needs.

Strengths

- eExpense uses OCR to automatically input the expense record into the system when users scan their bills.
- eExpense tracks SMS to record users' income automatically.

Limitations

- eExpense lacks features that help users in budgeting.
- eExpense did not have guidance for users on expenses.
- eExpense did not have the features that enable users to create financial goals and retirement plans.

2.1.2 Wallet: Budget Planner Tracker

Wallet [4] is an expense tracking mobile application available on Google Play. This application provides multiple functions for expense tracking. One of the main features is bank synchronization. This feature allows users to sync their bank with the application. So, all the online banking transactions are automatically recorded into the application. Therefore, this application reduced the need of user input.

System functionalities

- **Manual Input Expense**

This application provides the basic main function that allows users to manually input their expense. They can choose the category and the amount of expense to store into the record.

- **Record**

The application provides multiple options to display the records. For example, expense record for today, this week, this month, this year, and a specific date.

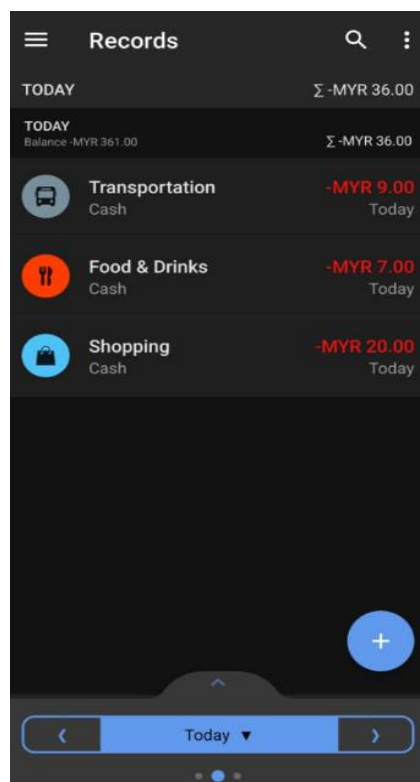


Figure 2.1.2.1 Wallet's Expense Records [4]

- **Budgets**

The budget feature allows users to set their budget for a period for example one week, one month and so on. If users attempt to overspend, the application will alert the users by sending a notification.

- **Goals**

This application allows users to set a financial goal. For example, if users want to save money to buy a phone, they can create a new goal by setting the goal name, target amount and so on. After that, they can click the goal and add the amount of money they have saved. If they have successfully saved up the amount of money, they can set the goal as reached.

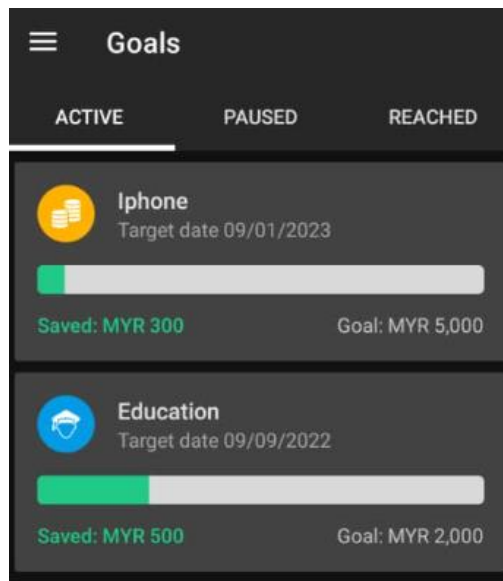


Figure 2.1.2.2 Wallet's Goals [4]

- **Reminder**

This application provides a reminder feature, including budgets, planned payments and debts. This reminder feature aims to remind and control users from overspending on their budget. Besides, it also reminds users about planned payments such as electric bills and rental fees. The application will also remind users to write down their daily expenses at 20:00. Users can turn all these reminders on or off.

- **Statistics**

Wallet processes the expense data and provides users with various insights such as cash flow, cash flow trends, nature of spending, and many more. The figures below show the statistics and insights provided by Wallet:

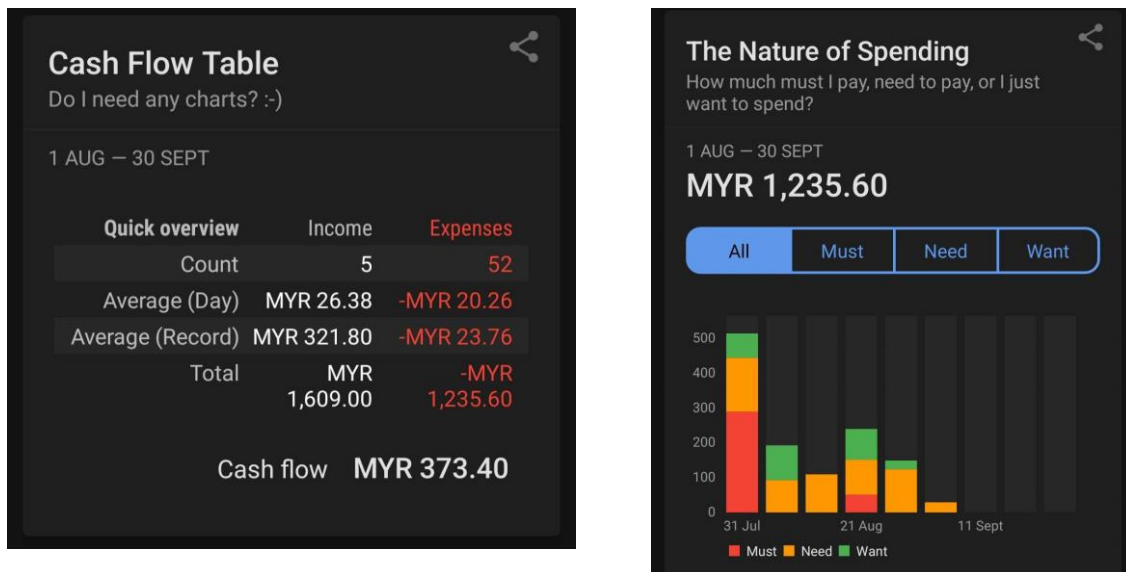


Figure 2.1.2.3 Cash Flow Table and Nature of Spending from Wallet [4]

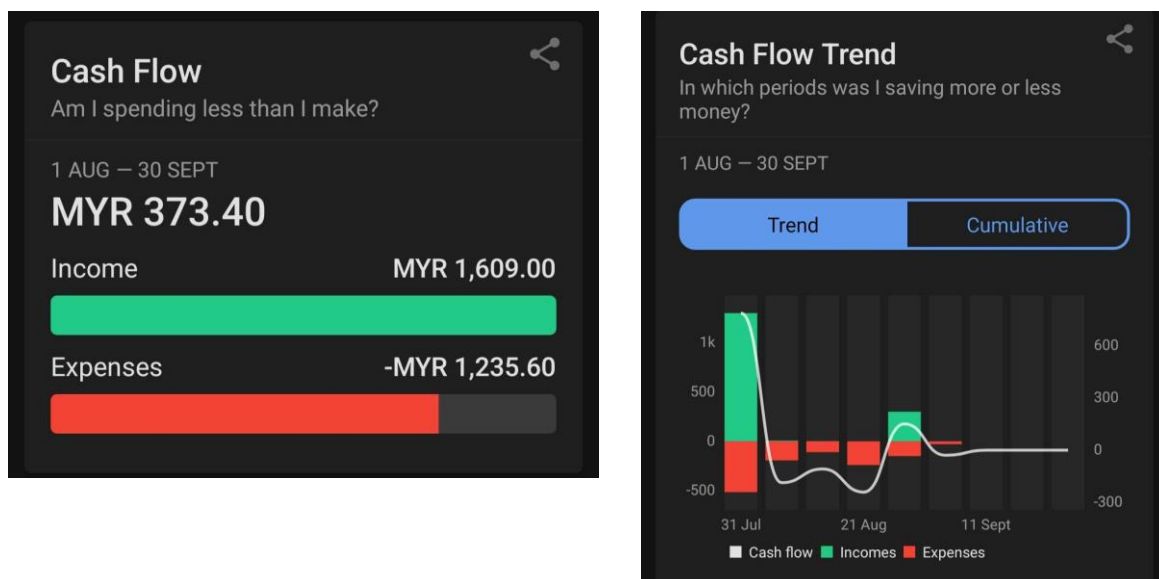


Figure 2.1.2.4 Cash Flow and Cash Flow Trend from Wallet [4]

As shown in the figures above, Wallet provides the feature to efficiently process and analyze users' expense data to generate various statistics and insights.

Conclusion

This application provides many useful functionalities and an interactive user interface to motivate users to use their application and control their expenses.

Strengths

- Multiple useful functionalities for users to manage their finances.
- Bank synchronization to track transactions from the bank.
- Intuitive user-interface.
- Statistics feature to provide insights for the users.

Limitations

- Did not provide a spending guide for users.
- Did not have a retirement planning feature.

2.1.3 Monefy – Budget & Expenses App

Monefy [2] is an expense tracking application that aims to help users achieve their financial goals. This application's main function is to provide users with an easy-to-use interface that allows users to record their expenses.

System functionalities

- **Data Synchronization**

One of the main strengths of this application is it can synchronize data between multiple devices. So, if users have multiple mobile devices, they can share budget and expense tracking with each other. For example, if users add or delete a new record, the changes will be made on all the synchronized devices. However, users must pay the 'premium' to use this feature.

- **Expense Recording**

This application enables users to record their expenses easily.

- **Chart**

Users can check on their previous expenses on a chart shown below in figure 7. Users can see a realistic picture of their expenses and incomes by viewing the chart provided.



Figure 2.1.3.1 Monefy's User Interface [2]

2.3.2 Conclusion

This application offers basic functionalities to help users in managing their finances.

Strengths

- Users can record and view their expenses easily.
- Data synchronization between multiple devices.

Limitations

- Does not provide methods and tips on finance management.
- Limited functionalities.

2.1.4 Spending Tracker

Spending Tracker [3] is another expense tracker application from Play Store. This application allows users to input their expenses into the system easily. All the expense records can be categorized into different categories, such as food, fuel, and so on. Users can create a new category for their expense too.

The application allows users to input their expenses and income into the system. Then, the system will show the total amount of income and expense, as shown in figure 8 below. The users can also add their expenses into the repeating details. For example, users can add their monthly rental fee into the repeating details, so the system automatically adds the transaction to the record every month.



Figure 2.1.4.1 Spending Tracker's User Interface [3]

The application has fundamental expense tracking functions and is similar to Monefy. The application provides basic features such as recording viewing expenses.

2.1.5 Belanjawanku

Belanjawanku [5] is an expense tracking app specifically designed for Malaysian users residing in the Klang Valley and other selected cities across Malaysia. Based on the research by the Social Wellbeing Research Centre (SWRC), Belanjawanku provides users with estimated monthly expenses according to their respective cities.

Belanjawanku not only offers traditional expense recording and tracking, but also provides features such as budget recommendations and guides on financial management.

System Functionalities

- **Spending Guide**

Based on the research by the SWRC, Belanjawanku generates a personalized spending guide and budget for each user according to their city, marital status, mode of transport and other factors. Figure 2.1.5.1 below shows the suggested minimum monthly expenses for each category.



Figure 2.1.5.1 Belanjawanku's Spending Guide [5]

- **Tips and Guidance**

Belanjawanku provides various tips on financial management such as budget planning, spending and saving strategies, car affordability and so on.



Figure 2.1.5.2 Belanjawanku's Tips and Guidance [5]

Conclusion

In short, Belanjawanku provides Malaysian users with personalized spending guide, budgeting features, and valuable financial management tips. Besides, Belanjawanku's user-friendly interface enables users to record and track their expenses easily.

Strengths

- Generate personalized spending guide for users in Malaysia.
- Provide tips on financial management.

Limitations

- Did not have the option for users to modify their spending guide and budgets.
- Did not have a feature to help users in retirement planning.

2.1.6 Comparison Among the Reviewed System

Existing Systems	Spending guide/Budget	Retirement Plan	Financial Goals	Expense Analysis
Wallet [4]	×	×	✓	✓
Monefy [2]	×	×	×	×
Spending Tracker [3]	×	×	×	×
eExpense [7]	×	×	×	×
Belanjawanku [5]	✓	×	×	×

Table 2.1 Comparison Among the Reviewed System.

By referring to the table 2.1, among the reviewed systems, only Belanjawanku offers personalized spending guides for each user. All reviewed systems did not have a feature that provides retirement plan. All reviewed system, except for Wallet, did not have a feature that allows users to create financial goals. Lastly, except Wallet, all the existing systems did not provide analysis and insights into users' expenses.

2.2 Review Existing Techniques for Financial Management

2.2.1 The 50/30/20 Budgeting Method

This article stated that the cost of living has become higher and higher in Malaysia, which is the biggest concern of most Malaysians. This article believes that the lack of financial planning is the biggest problem behind the concern. [9]

Therefore, this article introduced an easy method for budgeting, the 50/30/20 method. This method is a basic rule that divides our monthly income into three expense categories: 50% needs, 30% wants, and 20% savings.

- Needs – 50%

This is the fixed expenses that we cannot avoid, such as room rental, electric bill, internet subscription etc. The article stated that if our needs exceed 50%, we should check our expenses again. For example, we can downgrade the internet subscription or reduce the usage of electricity.

- Wants – 30%

Wants are non-essential expenses which are not necessarily needed. For example, entertainment, clothes shopping, eating out etc. Therefore, by following the 50/30/20 rule, we can still enjoy our life.

- Savings – 20%

The remaining 20% is the saving that can help us to achieve our financial goal. By saving 20% of our monthly income, we can build a solid savings plan such as an emergency fund and financial plan.

50/30/20 Budget Calculator

Enter your monthly net income:

How much you should budget, according to the 50/30/20 rule:

Needs	Wants	Savings
RM1000	RM600	RM400

Figure 2.2.1.1 Budget Calculator [9]

As shown in figure 2.2.1.1 above, if our monthly income is RM2000, we can spend RM1000 on needs, RM600 on wants and RM400 on savings. The 50/30/20 rule is a simple yet efficient method to budget our expenses.

2.2.2 Great Eastern's Retirement Plan Calculator

Great Eastern offers a retirement plan calculator [10] to envision and prepare users for retirement. The calculator is easy to use by filling in the gender, age, expected retirement age, the number of years of income required after retirement, desired retirement lifestyle, future expenses and existing provisions when retiring.

Input:

The screenshot shows the input section of the Great Eastern Retirement Plan Calculator. It includes the following fields and options:

- Your details:** Radio buttons for "Male" (selected) and "Female".
- How old are you?:** A slider from 18 to 70 with a value of 22.
- At what age do you plan to retire?:** A slider from 18 to 70 with a value of 60.
- How many years of income do you require during retirement?:** A slider from 18 to 99 with a value of 25.
- What is your desired retirement lifestyle?:** Three radio buttons: "Modest", "Comfortable", and "Premier" (selected).
- Your future expenses (at today's prices) RM:** A text input field with the value "8,000" per month.
- Your existing provision when you retire (at today's prices) RM:** A text input field with the value "0".
- Buttons:** A red "Calculate" button and a "Reset calculation" link.

Figure 2.2.2.1 Great Eastern's Retirement Plan Calculator [10]

Result:

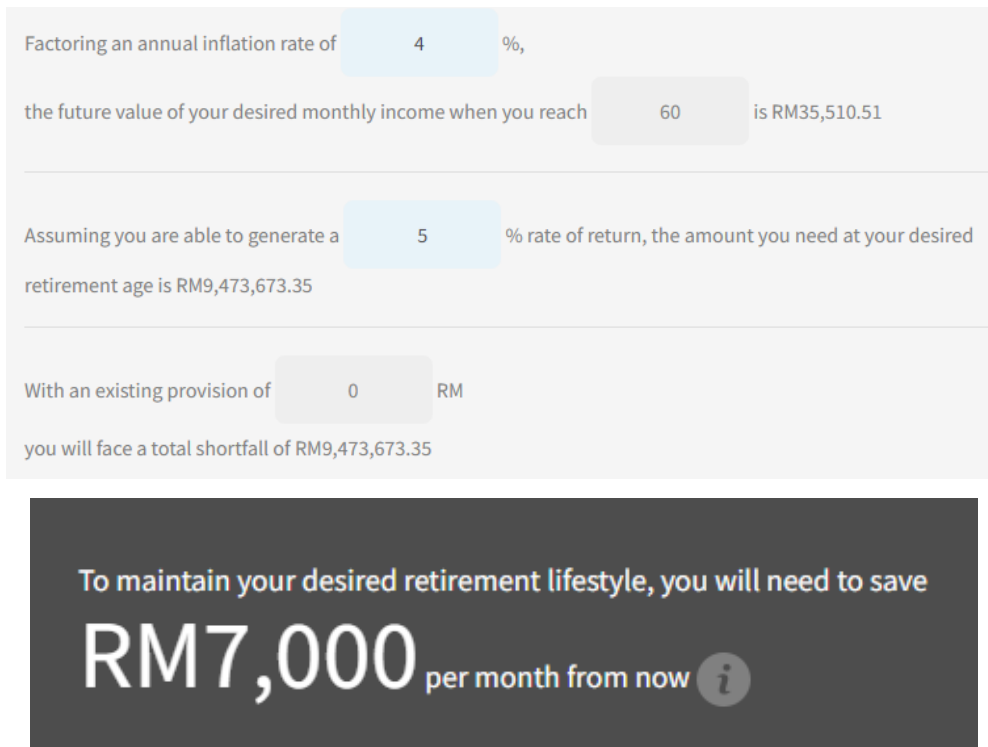


Figure 2.2.2.2 Great Eastern's Retirement Result [10]

The calculator allows users to input their annual inflation rate and investment rate of return for more accurate calculations.

In conclusion, Great Eastern offers a quick and easy way for users to calculate their retirement plan. The result includes the monthly income needed to retire at the desired age and the total amount needed to achieve the retirement goal.

2.2.3 OCBC's Retirement Goal Calculator

OCBC offers a straightforward retirement plan calculator. [11] Users can calculate retirement plans by entering their current age, expected retirement age, life expectancy, monthly expenses, and yearly one-time expenses.

Input:

Your Retirement Plan

Understanding your retirement

What is your current age?	AGE	22
When do you plan to retire?	AGE	60
When do you wish your retirement fund to last till?	AGE	85
How much do you expect to spend when you retire?		
Monthly expenses Such as food, utilities and transport	RM	6,000
Yearly one-time expenses Such as holiday trips, devices & home upgrades	RM	10,000

Figure 2.2.3.1 OCBC's Retirement Plan Calculator [11]

Result:

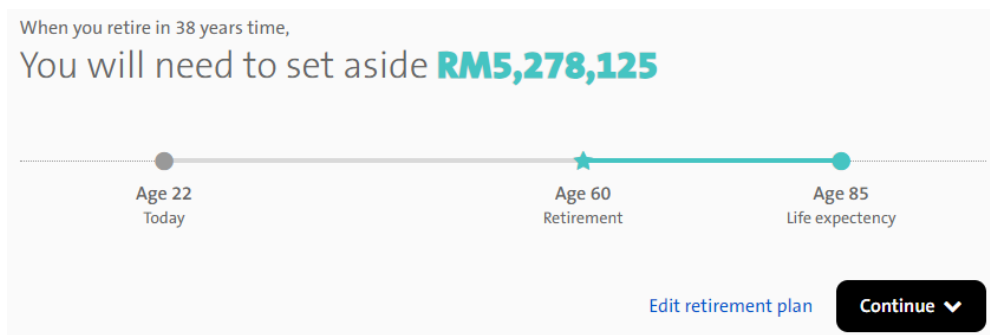


Figure 2.2.3.2 OCBC's Retirement Result [11]

Additionally, OCBC allows users to input information including current savings amount, current investment, endowment, property investment and employee provident fund (EPF) for more accurate calculations.

Input:

What you have today

Assets set aside for retirement	AMOUNT	ESTIMATED PROFIT RATE
Cash Cash in your savings account/-i and fixed deposits/-i	RM	3.00 % p.a.
Investment Current market value of your unit trusts/-i, shares and etc	RM	5.0 % p.a.
Endowment Value of certificate upon maturity	RM	Can't remember?
Property investment Properties you currently own		
<input type="checkbox"/> When I retire, I intend to SELL the property		
<input type="checkbox"/> When I retire, I intend to RENT out the property		
Employee Provident Fund (EPF) Disclaimer Employee and employer contribution		
Current balance	RM	6.38 % p.a.
Monthly contribution Total amount from employee & employer contributions	RM	

Figure 2.2.3.3 OCBC's Additional Input [11]

Result:

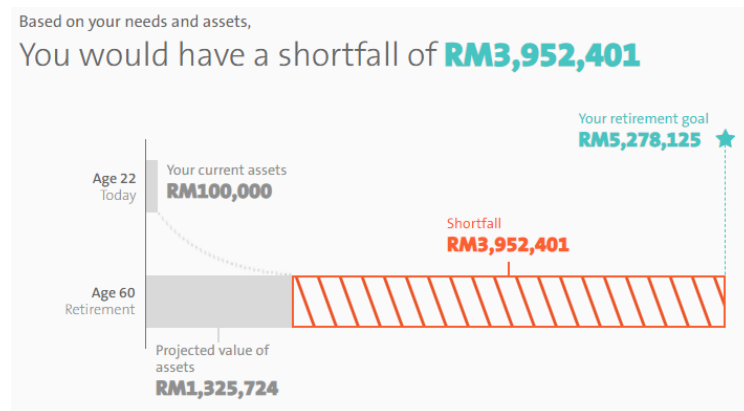


Figure 2.2.3.4 OCBC's Additional Retirement Result [11]

In conclusion, OCBC offers a straightforward approach for users to calculate their retirement plan, taking into consideration endowments, property investments, and the Employee Provident Fund (EPF).

2.3 Findings and Outcomes Summary

Existing Financial Application Summarization

Based on the reviewed existing financial applications, most of them like eExpense [8], Monefy [2], and Spending Tracker [3] offer interactive user interfaces for users to record their expenses easily. However, one common limitation among these applications is the absence of features that properly guide users in managing their budgets. These applications focus on expense tracking without offering budgeting assistance.

Belanjawanku [5] is the only application reviewed that targets Malaysia-selected cities to provide users with an estimated minimum monthly budget for different types of expenses based on the SWRC. This feature helps users to plan personal and family budgeting and prepares users for any unexpected events.

Wallet [4] is a unique financial application that provides various features to help users in financial management. One of the features is the expense processing system, which provides users with various insights into their previous expenses. This feature enables users to gain an understanding of their spending patterns. For instance, in Figure 2.1.2.3 above, the nature of spending statistics categorized users' expenses into 3 categories: Must, Need, and Want.

Retirement planning is one of the most important aspects of financial management, including in Malaysia. However, all the reviewed applications do not have a retirement planning feature. The COVID-19 pandemic has led to significant withdrawals from retirement savings in Malaysia, exacerbating an existing pension crisis. [11] Thus, a retirement planning feature is more important than ever.

Existing Technique on Financial Management Summarization

The 50/30/20 budgeting rule [9] is a well-known financial management technique. It is a simple yet effective method of managing budget.

The reviewed retirement plan calculators show a similar approach to help users calculate their retirement needs, including the total savings required for retirement and the monthly savings needed, offering users valuable insights into their retirement planning.

Chapter 3

System Methodology

3.1 Project Development

In this project, an iterative and incremental development approach is applied. This approach integrates each functionality into the system with every iteration, promoting flexibility and delivering a functional system more frequently.

3.1.2 Tools Involved in System Development

Several tools are used to develop the Personal Finance Management System. The hardware used during the development is a computer and an Android phone. The computer is used to run Android Studio to bring the application to life. While the Android phone is used to test and debug the application. The specifications are as follows:

1. Computer

Model	Asus VG259QM
Processor	Intel Core i5-10400F
Operating System	Windows 11 64-bit
Memory	32.0GB
Storage	194GB SSD

Table 3.1.2.1 Computer Specifications

2. Android Phone

Model	Samsung Galaxy A52s 5G
Processor	Octa-Core
Memory	8.0GB
Storage	256.00GB
Android Version	13

Table 3.1.2.2 Android Phone Specifications

The software involved in development is Android Studio. To manage the offline database, the DB Browser for SQLite is used.

3.2 Information Gathering

One of the most important features of this project is a personalized spending guide for every user according to their cities in Malaysia and household categories. The information can be collected based on the Malaysia Social Wellbeing Research Centre (SWRC) website to generate an estimated monthly budget for users.



Figure 3.2.1 Estimated Monthly Budget from SWRC

To generate an estimated categorical expense, the information can be collected based on the Malaysia Social Wellbeing Research Centre (SWRC) website as well. For example:

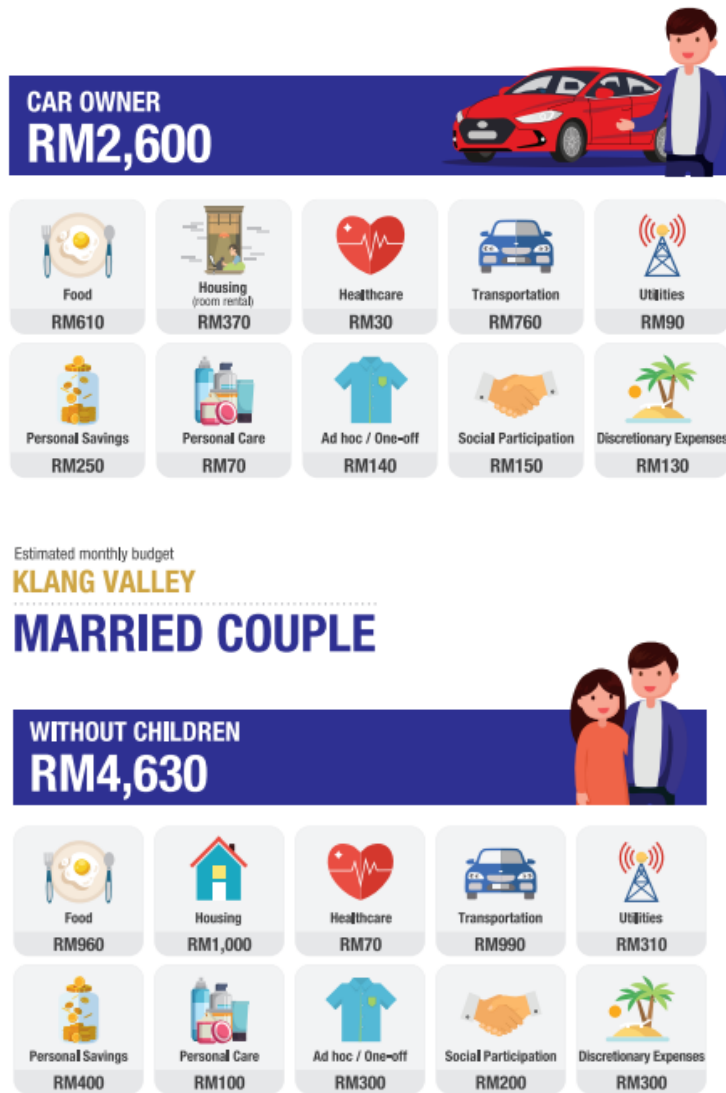


Figure 3.2.2 Estimated Categorical Expenses from SWRC

3.3 System Functionalities



Figure 3.3 System Functionalities Use Case Diagram

Figure 3.3 shows the use case diagram for the personal finance management system, which contains seven functionalities: Personalized Spending Guide, Add Expense, View Expense History, Set Bill Reminders, Create Financial Goal, Create Retirement Plan and Expense Analysis.

These features work together to effectively assist users in managing their finances.

3.3.1 Design of User Registration and Profile Management

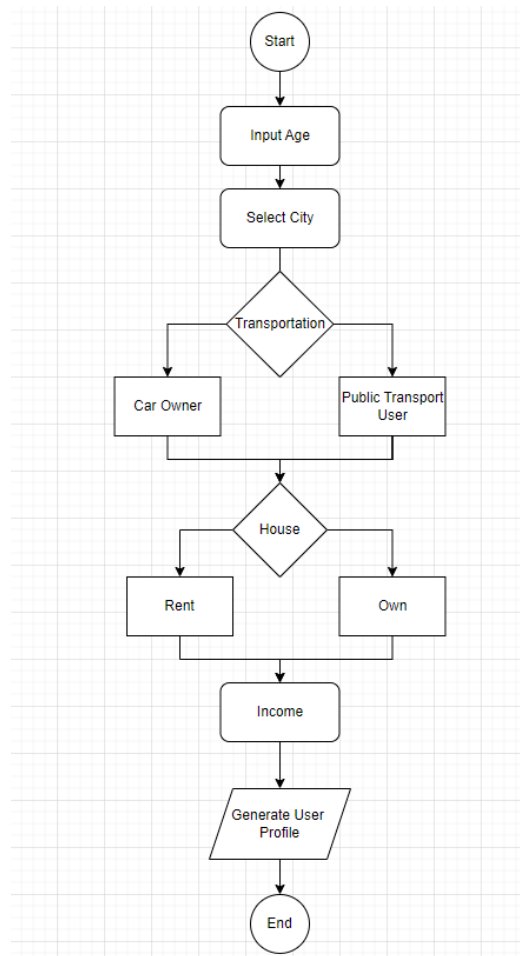


Figure 3.3.1 User Registration and Profile Management Flowchart

For new users, they will be prompted to provide essential information. Based on the information collected, the system automatically breaks down the user's expenses budget by referencing the estimated monthly budget for their specific city. This breakdown helps users better understand how their income should be allocated across various expense categories. Users have the option to modify the budget allocation. If users wish to modify their account information, the system will recalculate the spending guide based on the new information. Figure 3.3.1 above shows the step-by-step process for a first-time user to input essential information into the system. The process begins with the user entering their age and selecting their city of residence from the available options in Malaysia. The user then specifies whether they own a car or use public transport and their housing status (renting or owning). Lastly, the user inputs their income into the system. Once all the necessary information is collected, the app generates a personalized profile for each user.

3.3.2 Design of Personalized Spending Guide

After users have successfully created their account, a personalized spending guide will be automatically generated according to the account details. The spending guide includes an estimated monthly budget and estimated budgets for various expense categories. These expense categories include:

- Food
- Transportation
- Housing
- Utilities
- Savings
- Lifestyle
- Personal Care
- Ad Hoc
- Health Care
- Discretionary
- Childcare.

The budgets are formulated using data from the Social Wellbeing Research Center's (SWRC) research.

In addition to viewing the generated budgets, users have the option to modify the budgets according to their preferences.

3.3.3 Design of Expense Recording

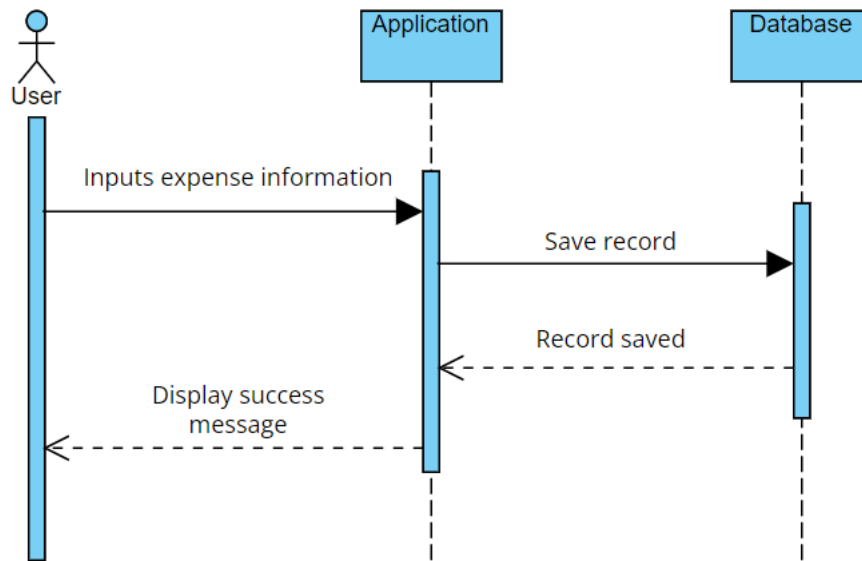


Figure 3.3.2 Expense Tracking Sequence Diagram

Figure 3.3.2 above shows the process of recording expenses within the personal financial mobile app. Firstly, users input their expense details using the feature, including:

- Amount
- Category
- Description
- Date

Once users confirm the entered details, the information is saved into the database. Then, a summary of the recorded expense data is presented to the users. This data will then be used by other features, including Expense Analysis and Expense History.

3.3.4 Design of Expense History

The Expense History feature allows users to review and modify their past expense records. To ensure that users are able to search for specific expenses easily, the feature includes a calendar for sorting the data by date.

Additionally, users are able to modify or delete records as needed.

Lastly, a pie chart shown below is presented to categorize the total spending based on different expense categories.

Figure 3.3.3 below shows the design of the pie chart:

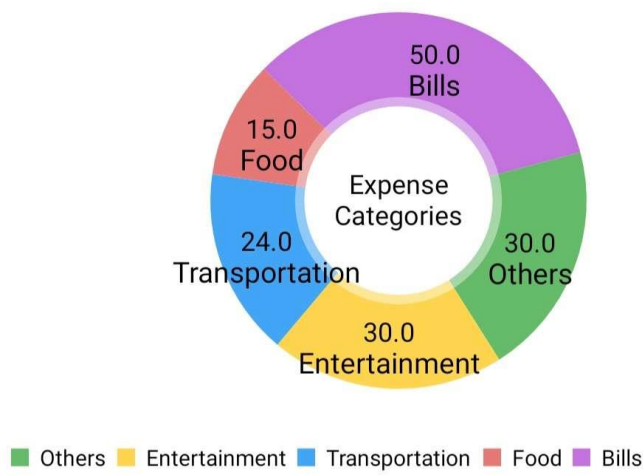


Figure 3.3.3 Expense History's Pie Chart

3.3.5 Design of Bill Reminders

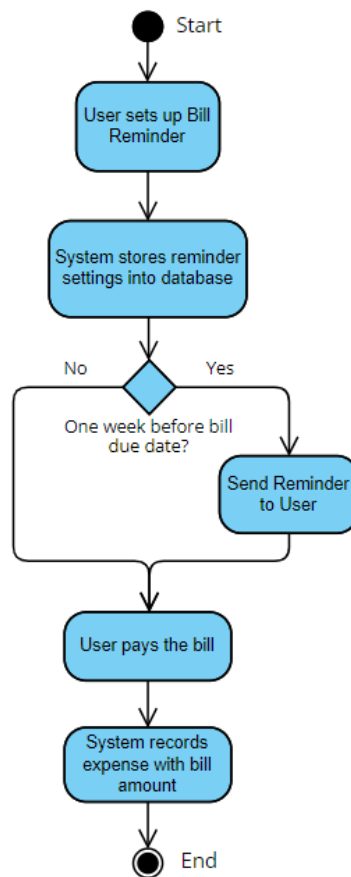


Figure 3.3.4 Bill Reminders Activity Diagram

The Bill Reminders feature assists users in managing their monthly recurring payments and one-time payments, such as house rentals and various utility fees. When adding a new bill reminder, users can input the following details:

- Bill name
- Category
- Amount
- Bill Frequency (Recurrent or One-time)
- Notification (On due date, one day before due date, week before due date, or none)
- Due Date
- Note

For bills set as "Recurrent Payment," the feature will send monthly reminders based on the specified due date. For "One-time Payment" bills, users will receive a single reminder on the set due date. Users can also customize the notification setting.

Once a bill reminder is saved, users can:

- View the reminder details.
- Mark the bill as paid, the system will then update the payment date, and record the bill as an expense.
- Delete bill reminders as needed.

3.3.6 Design of Financial Goal Setting

The Financial Goal Setting feature allows users to establish their desired financial goals, such as purchasing a new phone, a car, or planning a vacation. Users can set a deadline and specify the cost associated with each goal.

When creating a new goal, users can specify the following details:

- Goal name
- Total cost
- Description
- Deadline
- Current Saving

After saving the goal to the database, users can start to contribute to the goal until the goal is reached. When contributing to the goal, users can input the amount they wish to contribute. The feature then updates and saves the total amount towards the goal.

When the goal is reached, the feature shows a congratulatory message to the users. Users can then choose to delete the goal.

3.3.7 Design of Retirement Planning

The Retirement Plan feature is structured into two sections. The first section calculates and generates a basic retirement plan based on the following user-provided details:

- Current age
- Retirement age
- Life expectancy
- Current Savings
- Desired Retirement Monthly Income

The generated retirement plan in the first section includes:

- The total amount needed at desired retirement age,
- Monthly saving required to achieve the retirement goal.

The formulas are shown below:

$$\begin{aligned} \textit{Total Amount Needed at Retirement Age} & \qquad \qquad \qquad (1) \\ & = (\textit{Life Expectancy} - \textit{Retirement Age}) \\ & \quad * \textit{Desired Retirement Monthly Income} \end{aligned}$$

$$\begin{aligned} \textit{Monthly Saving Needed} & \qquad \qquad \qquad (2) \\ & = \frac{\textit{Total Amount Needed at Retirement Age}}{\textit{Retirement Age} - \textit{Current Age}} \end{aligned}$$

Formulas [1] and [2] showed the calculations used by the feature to generate the simplified retirement plan in the first section.

To proceed to the second section which generates a much more comprehensive retirement plan, users can input additional retirement details, including:

- Monthly savings
- Estimated Healthcare Annual Costs
- Annual Inflation Rate
- Current investment and profit rate
- Monthly investment and profit rate

- Monthly EPF contribution and dividend rate
- Current EPF amount
- Other existing provision

By using the details above, the feature will generate a comprehensive retirement plan for users.

The plan includes useful information such as:

- Current Assets
- Projected Assets at Retirement
- Shortfall Amount
- Monthly Saving Needed
- Future Value of EPF Contribution

The formulas are shown below:

$$\begin{aligned}
 \text{Current Assets} & \qquad \qquad \qquad (3) \\
 & = \text{Existing Provision} + \text{EPF Balance} \\
 & \quad + \text{Current Investment Amount} + \text{Current Saving}
 \end{aligned}$$

$$\begin{aligned}
 \text{Future Value of Monthly Savings} & \qquad \qquad \qquad (4) \\
 & = \frac{(\text{Monthly Savings} * \text{Total Months until Retirement})}{(1 + \text{Annual Inflation Rate})^{\text{Years until Retirement}}}
 \end{aligned}$$

$$\begin{aligned}
 \text{Future Value of EPF Contribution} & \qquad \qquad \qquad (5) \\
 & = \text{Monthly EPF Contribution} * 12 \\
 & \quad * \left(1 + \frac{\text{annual EPF dividend rate}}{12}\right)^{\text{Total Months until Retirement}}
 \end{aligned}$$

$$\begin{aligned}
 \text{Future Value of Current Investments} & \qquad \qquad \qquad (6) \\
 & = \text{Current Investment Amount} \\
 & \quad * \left(1 + \frac{\text{Annual Profit Rate}}{12}\right)^{\text{Total Months until Retirement}}
 \end{aligned}$$

$$\begin{aligned}
 & \text{Future Value of Monthly Investments} && (7) \\
 & = \text{Total Amount of Monthly Investments} \\
 & \quad * \left(1 + \frac{\text{Annual Profit Rate}}{12} \right)^{\text{Total Months until Retirement}}
 \end{aligned}$$

$$\begin{aligned}
 & \text{Projected Assets at Retirement Age} && (8) \\
 & = \text{Future Value of Monthly Savings} \\
 & \quad + \text{Future Value of EPF Contribution} + \text{Current EPF Balance} \\
 & \quad + \text{Future Value of Current Investments} \\
 & \quad + \text{Future Value of Monthly Investments} \\
 & \quad + \text{Existing Provisions}
 \end{aligned}$$

$$\begin{aligned}
 & \text{Shortfall Amount} && (9) \\
 & = (\text{Total Desired Retirement Funds} \\
 & \quad + \text{Total Healthcare Cost for Retirement}) \\
 & \quad - \text{Projected Assets at Retirement Age}
 \end{aligned}$$

$$\begin{aligned}
 & \text{Monthly Savings Needed to Achieved Retirement Plan} && (10) \\
 & = \frac{\text{Shortfall Amount}}{\text{Total Months until Retirement}}
 \end{aligned}$$

3.3.8 Design of Expense Analysis

The Expense Analysis feature utilizes user's expense data to provide recommendations and insights into their spending habits. The feature analyzes users' expenses based on three methods:

- The 50/30/20 Budgeting Rule
- User's Spending Guide
- Retirement Planning

Firstly, the feature applies the 50/30/20 Budgeting Rule to categorize users' spending into three categories: needs, wants, and savings. The feature displays whether users' expenses align with these categories or if they are overspending in any categories.

Secondly, the feature uses the estimated expense categories provided in users' spending guide to compare with users' actual spending. Thus, users are able to visualize their expenses based on categories and identify areas for improvement.

By combining the first and second methods, the feature calculates a financial well-being score ranging from 0 to 100. Higher scores indicate better adherence to the spending guide and the 50/30/20 budgeting rule, and lower scores indicating poorer adherence.

Due to the diversity in users' financial situations, the generated score might not provide the most accurate measure to user's financial well-being. Thus, users are given an option to answer a questionnaire by CFPB (Consumer Financial Protection Bureau) to determine their Financial Well-Being score. Higher scores indicate strong financial behavior and high level of financial security, while lower scores suggest potential financial challenges and difficulties in managing finances effectively.

Chapter 4

System Design

4.1 System Architecture

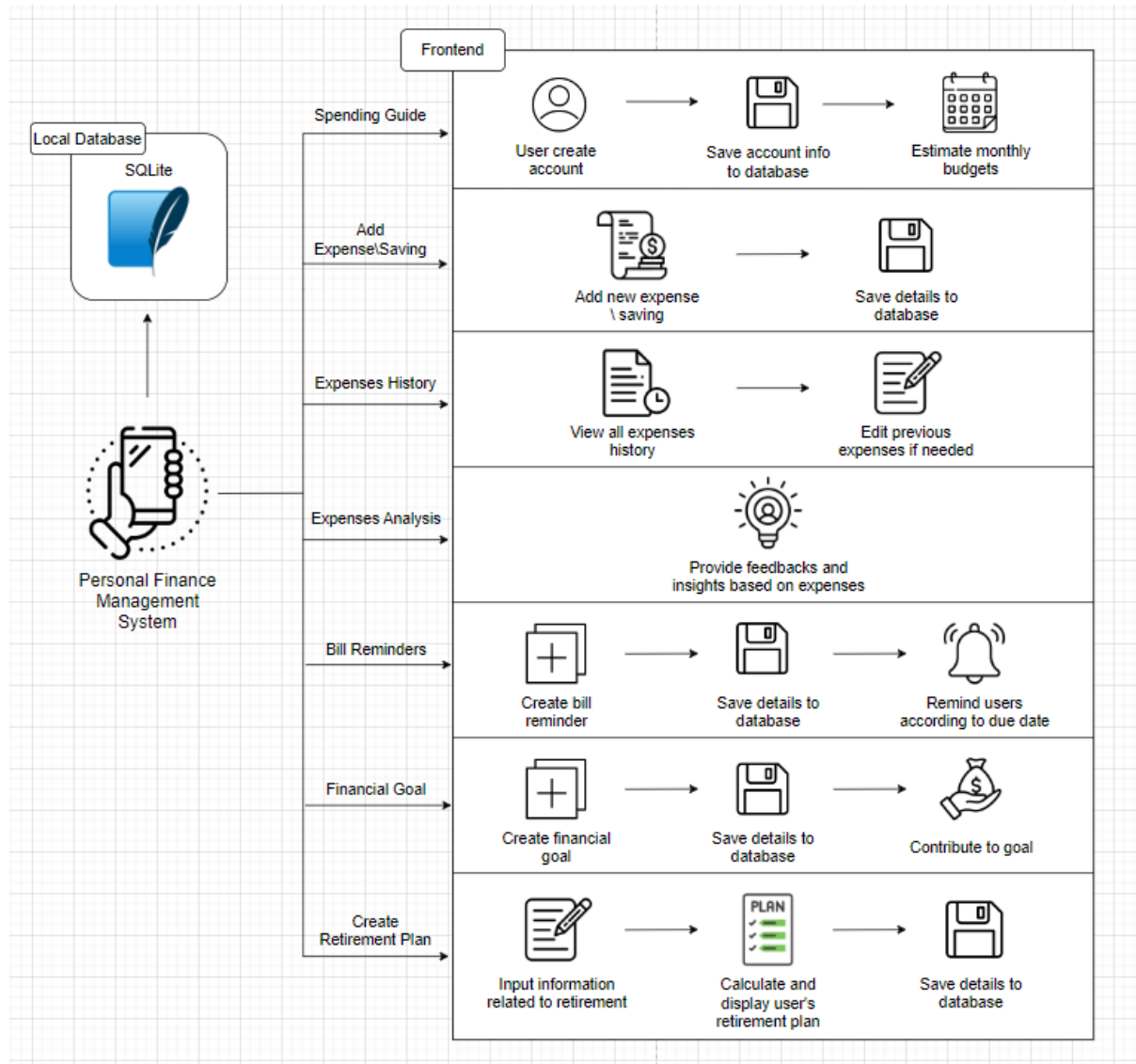


Figure 4.1 System Architecture Block Diagram

The figure above shows the system block diagram of the personal finance management system. The system uses SQLite database as the local database to store all users' information and support various functionalities efficiently.

The system consists of 7 functionalities to effectively help users in managing their finances.

4.2 Data Storage Design

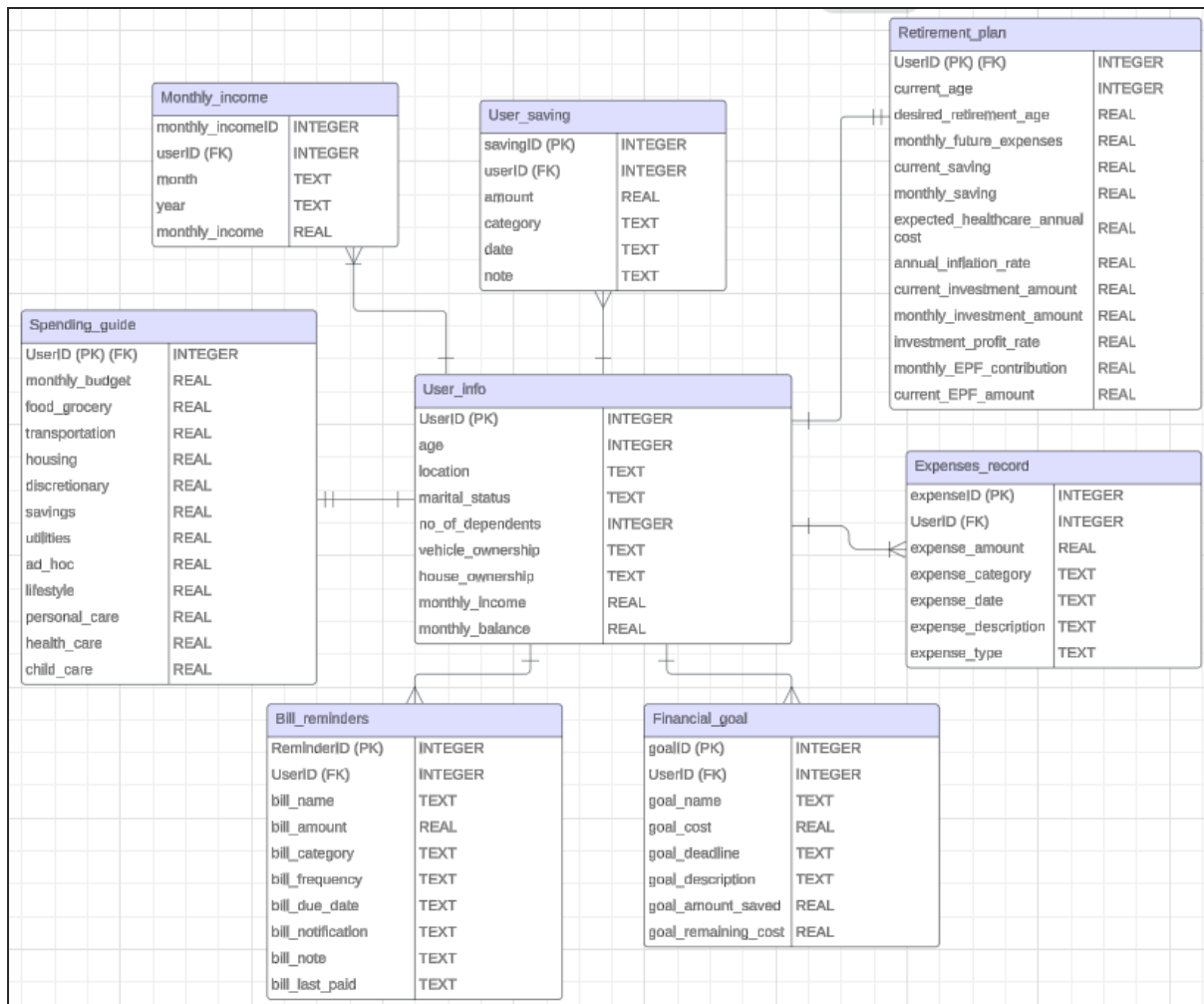


Figure 4.3 Data Storage Design


The data storage design comprises a relational database system featuring eight entities, including user information, expense records, user savings, spending guides, retirement plans, bill reminders, and financial goals. Users can have multiple expense records, savings, and monthly incomes within the system. Similarly, users can create numerous bill reminders and financial goals tailored to their financial needs. However, each user is restricted to having only one retirement plan and spending guide.

Users are able to modify their data within the system as necessary. This architecture shows the interactions between components, enabling users to input, modify, and access their financial information efficiently. Overall, the design aims to assist users in managing their finances effectively while maintaining flexibility and data integrity.

4.3 Interface Design with Procedure Elaboration

This chapter shows the user interface design of the system and step-by-step procedure elaboration.

4.3.1 Welcome Page for First-Time User



Age: 18

Location: Johor

Status: Single

Vehicle: I own a vehicle

Vehicle: I rent

Number of Children: 0

Your Monthly Income:

\$ Monthly Income

Required*

GET STARTED

Figure 4.3.1 Welcome Page Interface

For first-time users, the welcome page prompts users to input their personal information. This information is used to generate a personalized spending guide.

After users have inputted all required details, they can press the “Get Started” button to finish setting up their profile. The system will then save user information into the database and direct users to the main menu.

Then, the users will be able to use the system after successfully creating the account.

4.3.2 Main-Menu User Interface

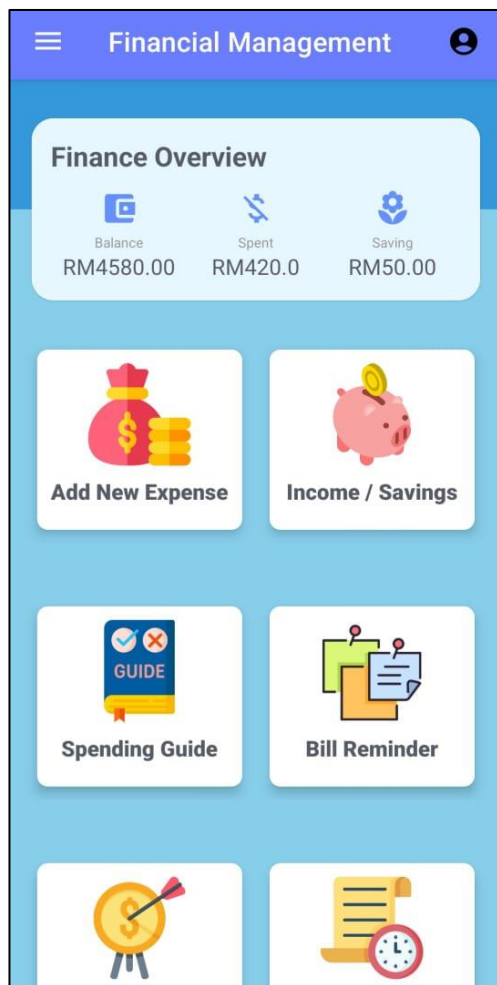


Figure 4.3.2.1 Main Menu Interface

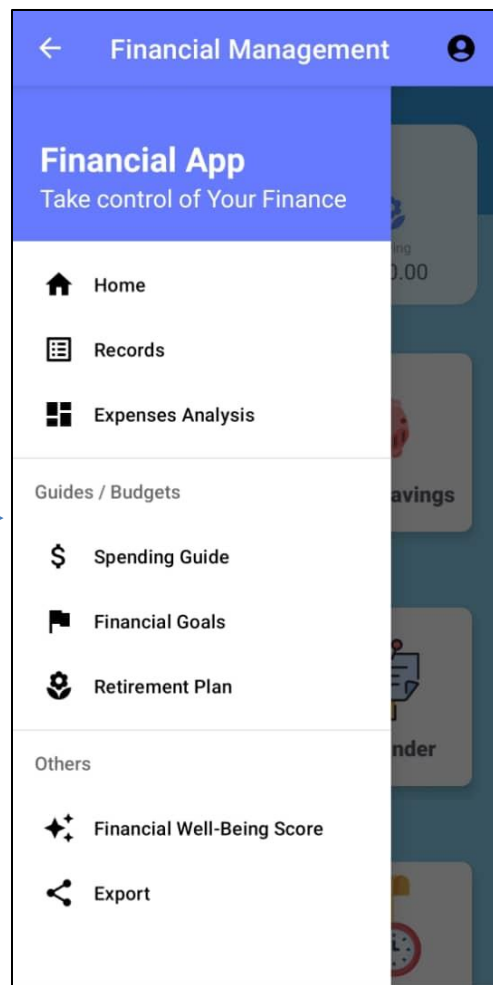


Figure 4.3.2.2 Main Menu Navigation Drawer

In the main menu interface as shown in Figure 4.3.2.1, the finance overview displays Balance, Spent, and Saving. The Balance shows the remaining amount users have for the month. The Spent displays the total amount users have spent during the month. Similarly, the Saving displays the amount users have saved for the month. The Financial Overview layout will be updated automatically at the beginning of each month.

Below the Finance Overview, users can access all the features by clicking on the card views, such as Add New Expense, Spending Guide, and Bill Reminder.

In the top-right corner, users can click the icon to view and modify their account details as needed. In the top-left corner, users can pull the navigation-drawer to view and select the features that the system provides.

4.3.3 User Account Details Interface

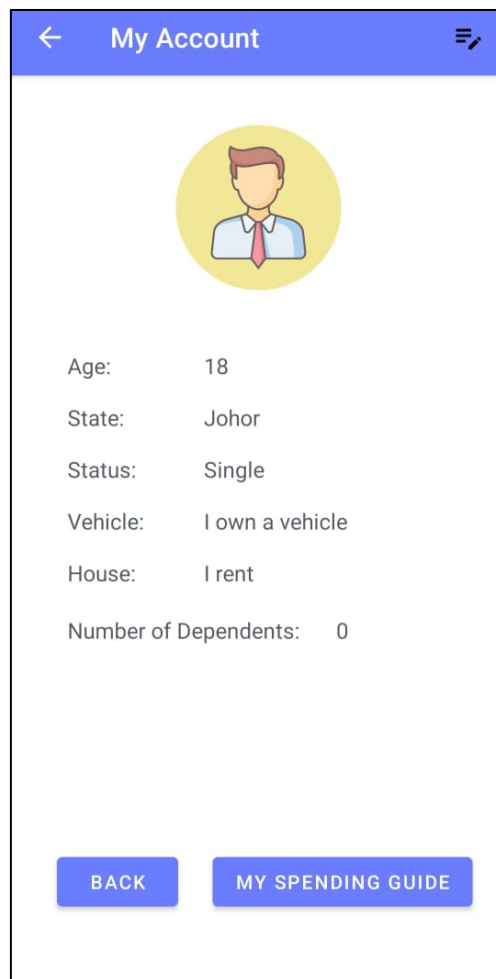


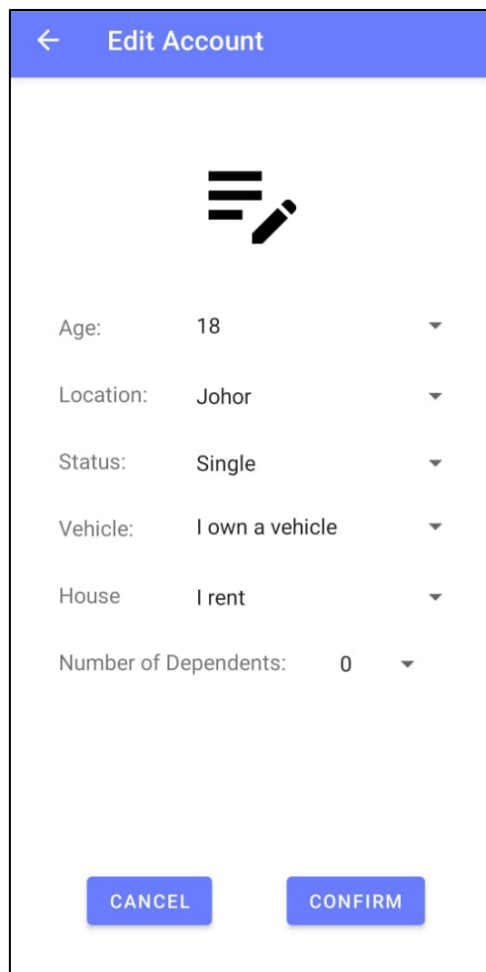
Figure 4.3.3 User Account Details Interface

As shown in Figure 4.3.3, this interface displays all the user account details that were previously set by users on the welcome page.

Users can click the “Back” button to return to the main menu. Users can also click the “My Spending Guide” button to view their personalized spending guide.

In the top-right corner, users can click the icon to modify their account details as needed.

4.3.4 User Account Details Modification Interface



The screenshot displays a mobile application interface titled "Edit Account". At the top, there is a blue header bar with a white back arrow on the left and the text "Edit Account" in white. Below the header, a large black icon of a pencil editing a list is centered. The main content area contains six rows of form fields, each with a label on the left, a value in the middle, and a downward-pointing arrow on the right. The fields are: "Age: 18", "Location: Johor", "Status: Single", "Vehicle: I own a vehicle", "House: I rent", and "Number of Dependents: 0". At the bottom of the screen, there are two blue buttons with white text: "CANCEL" on the left and "CONFIRM" on the right.

Figure 4.3.4 User Account Modification Interface

The interface shown in Figure 4.3.4 allows users to modify their account details easily by selecting the items they wish to modify. Once they finish the changes, they can click the “Confirm” button to save their updated account settings. Then, the system will automatically update the personalized spending guide based on the modified account details.

4.3.5 Personalized Spending Guide Interface

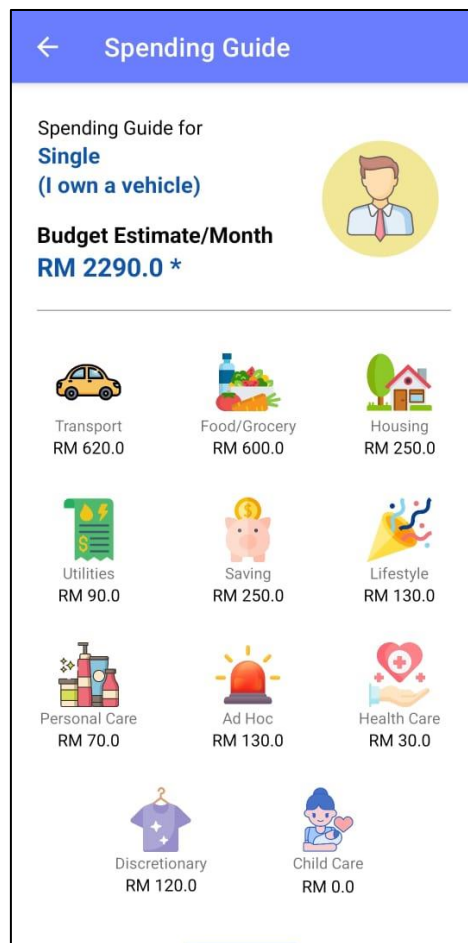


Figure 4.3.5.1 Spending Guide Interface

This interface displays the estimated monthly budget and expenses on different types of categories based on users account details. Besides, the users have the option to adjust spending for each category by clicking on the category icons.

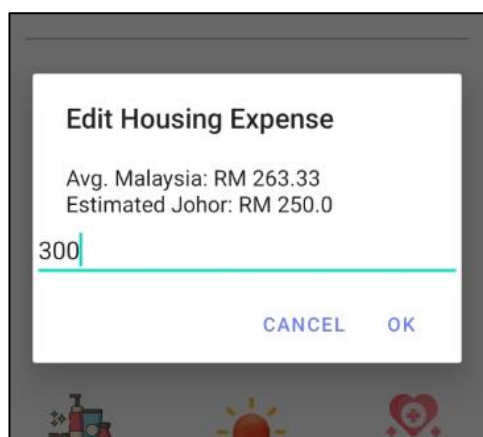


Figure 4.3.5.2 Edit Spending Guide



Figure 4.3.5.3 Updated Spending Guide

As shown in the figures above, the system prompts users to input a new value for their chosen spending category. Additionally, the interface provides users with the average spending data for Malaysia and Johor, since the user resides in Johor.

After users confirm the adjustments, the interface will update the budgets accordingly.

4.3.6 Add Expense Interface

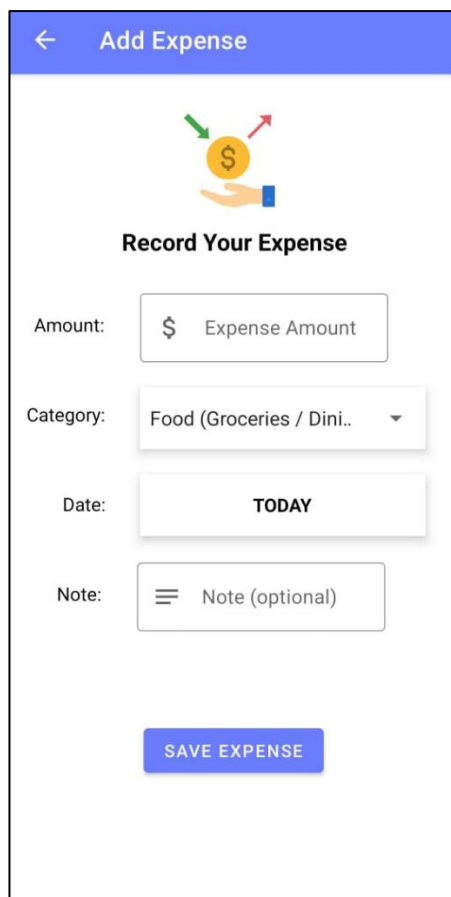


Figure 4.3.6.1 Add Expense Interface

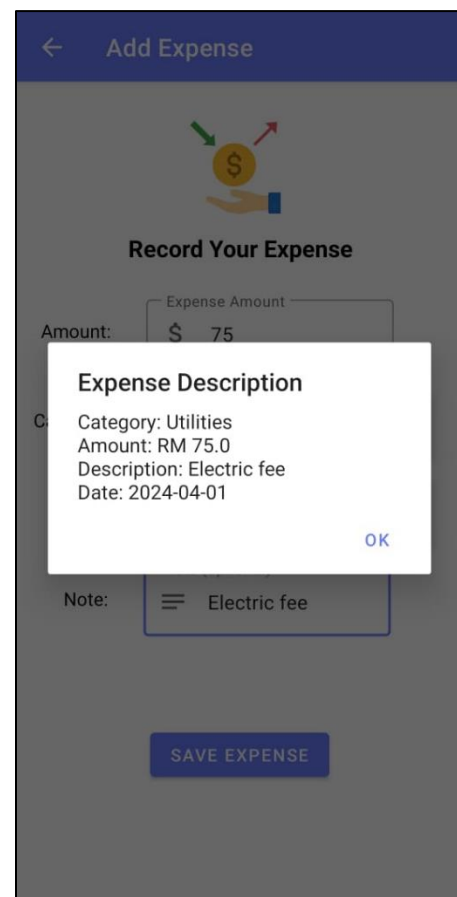


Figure 4.3.6.2 Expense Summary

This interface enables users to record their expenses by inputting the expense details such as the amount, category, date, and note.

Once users click the "Save Expense" button, the system shows a summary of the entered expense details and save the record in the database.

4.3.7 Add Income / Savings Interface

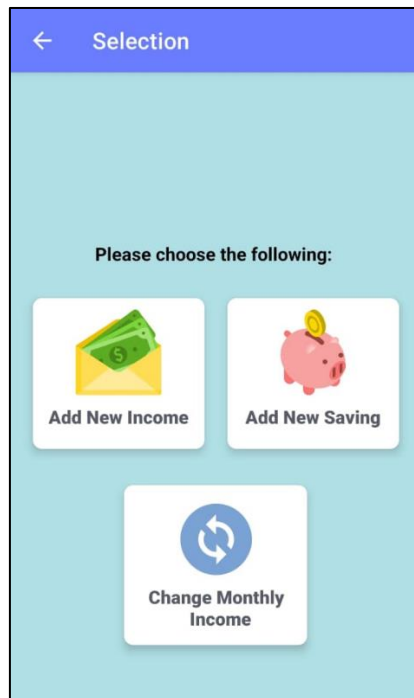


Figure 4.3.7.1 Add Income / Savings Interface

This interface provides users with the option to either add new income to their current monthly income, add savings, or change monthly income.

Add New Income

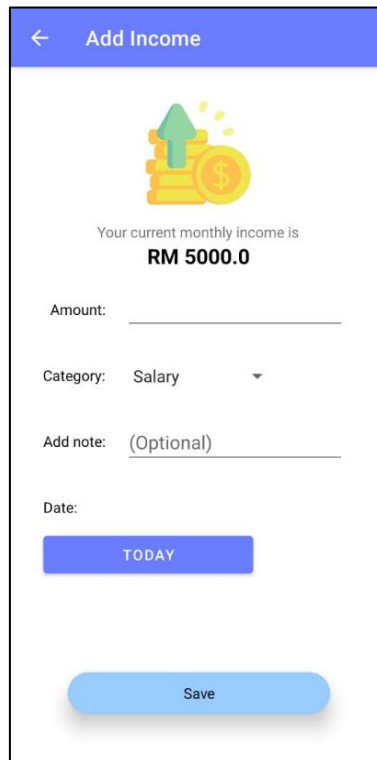


Figure 4.3.7.2 Add Income Interface

The interface shown in Figure 4.3.7.2 displays user's current monthly income, and the users can input details such as the amount, category, date, and note. After that, the system will save the new income details to the database and display a summary similar to figure xx.

Add Savings

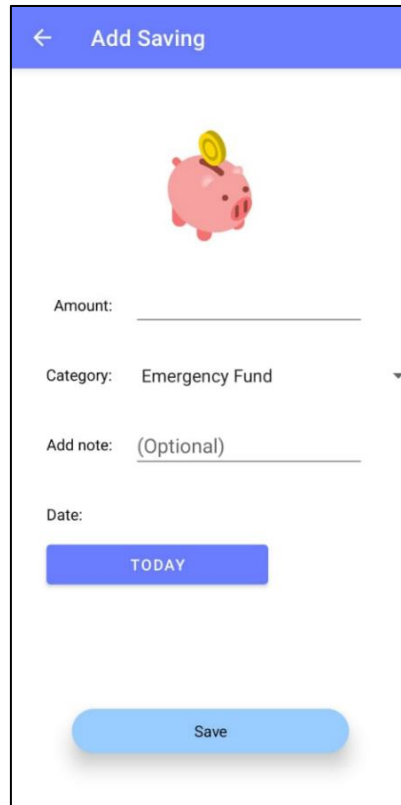


Figure 4.3.7.3 Add Saving Interface

Similar to adding new income, users can add savings by entering details such as the amount, category, date, and note. Then, the system saves the data in the database and display a summary of the entered details.

Change Monthly Income

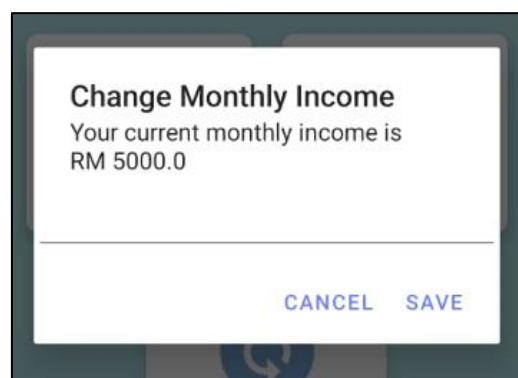


Figure 4.4.7.4 Change Monthly Income Interface

This interface allows users to change their current monthly income easily by inputting the new value.

4.3.8 View Expense Records Interface



Figure 4.3.8.1 View Expense Record Interface

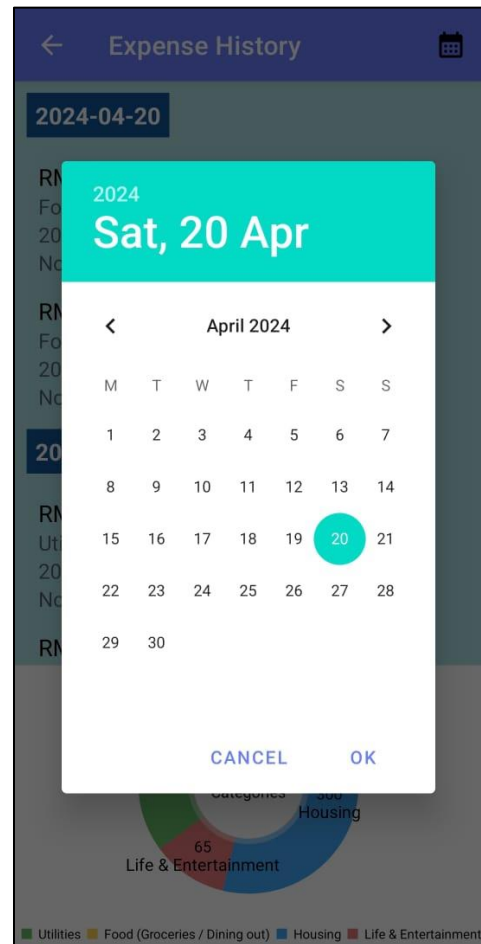


Figure 4.3.8.2 Calendar Interface

This interface displays all the users' expense records together with their details. Additionally, users are able to modify and delete the records as needed.

The screenshot shows a mobile application interface titled "Edit Record". At the top left, there is a back arrow icon. Below the title, the form contains the following fields: "Select the Date:" with a date picker showing "2024-04-20"; "Amount:" with a text input field containing "50"; "Description:" with a text input field containing "dinner"; and "Category:" with a dropdown menu showing "Food (Groceries / Dining out)". At the bottom of the form is a blue button labeled "UPDATE".

Figure 4.3.8.3 Edit Expense Record Interface

As shown above, users can input new details to update the selected expense record.

To assist users in finding their expense records efficiently, users can click the icon located in the top-right corner to select a date from the calendar. After selecting a date, the interface filters and displays the expense records according to the selected date.

4.3.9 Retirement Plan Interface

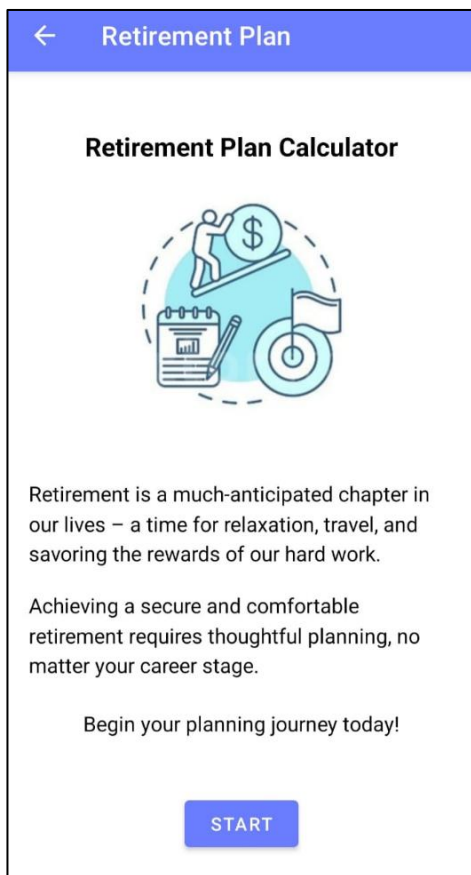


Figure 4.3.9.1 Retirement Plan Interface

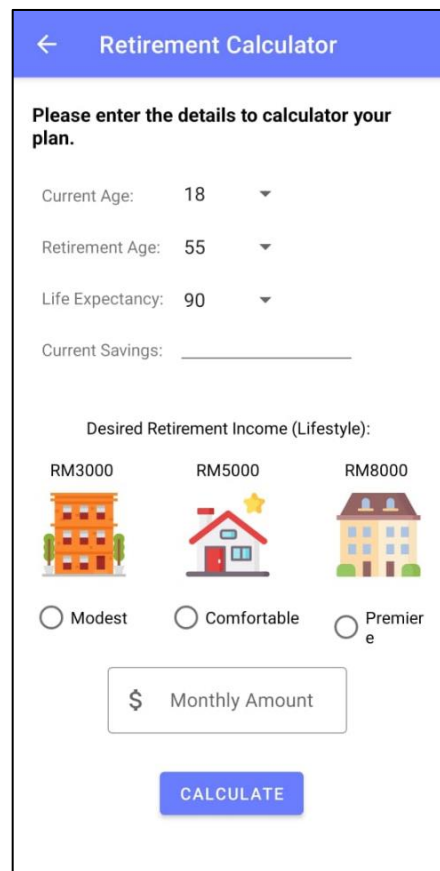


Figure 4.3.9.2 Create Retirement Plan Interface

To start creating a retirement plan, the interface displays a brief introduction to the users. Users can begin by pressing the “Start” button. Then, users can fill in their retirement details, as shown in figure xx.

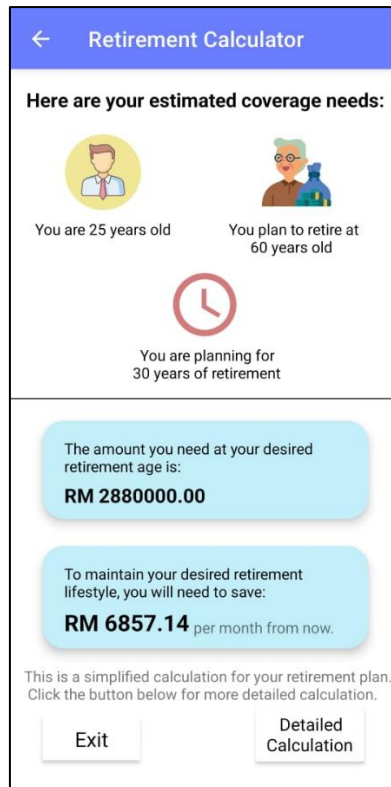


Figure 4.3.9.3 Simplified Retirement Plan

The feature then uses the entered data to generate a simplified retirement plan that includes the total amount needed for retirement and the monthly savings required to achieve the plan.

Figure 4.3.9.4 Input Retirement Details Interface

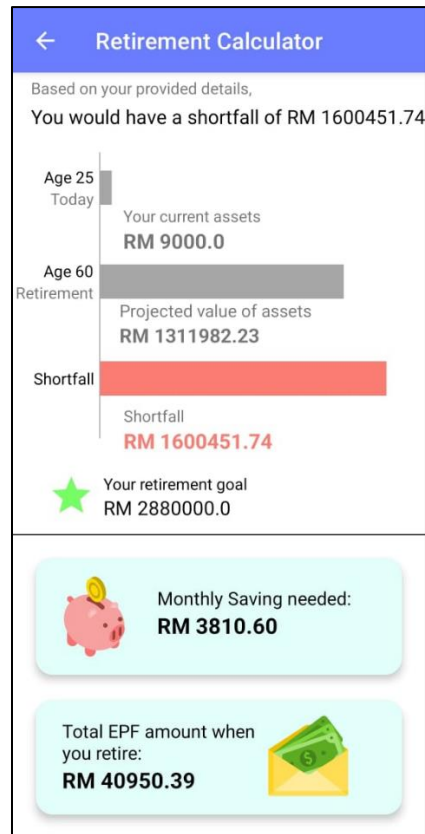


Figure 4.3.9.5 Detailed Retirement Plan

To generate a more comprehensive retirement plan, users can select the “Detailed Calculation” button to input additional details, which the feature uses to generate a more accurate retirement plan. The plan includes additional information such as users’ projected value of assets at retirement age, the shortfall or surplus amount, monthly saving needed to achieve the retirement goal, and the projected total EPF amount at retirement age.

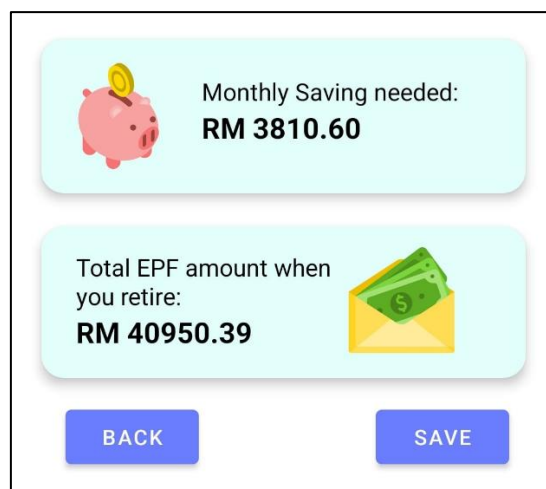


Figure 4.3.9.6 Monthly Saving and EPF amount

To save the retirement plan, users can simply select the “Save” button. The system will then save the retirement plan in the database.

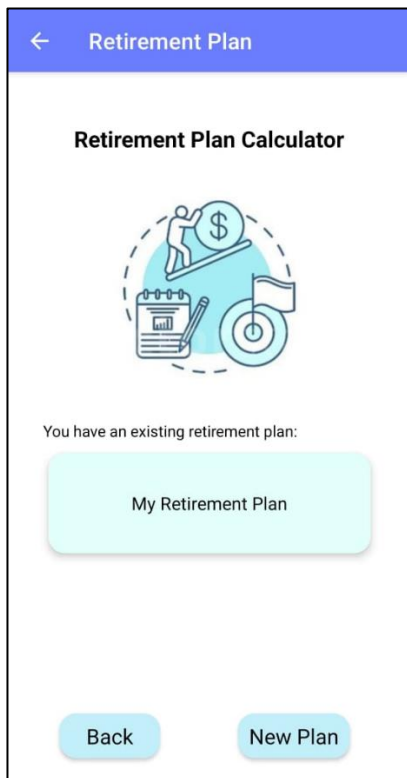


Figure 4.3.9.7 Retirement Plan interface with Saved Retirement Plan

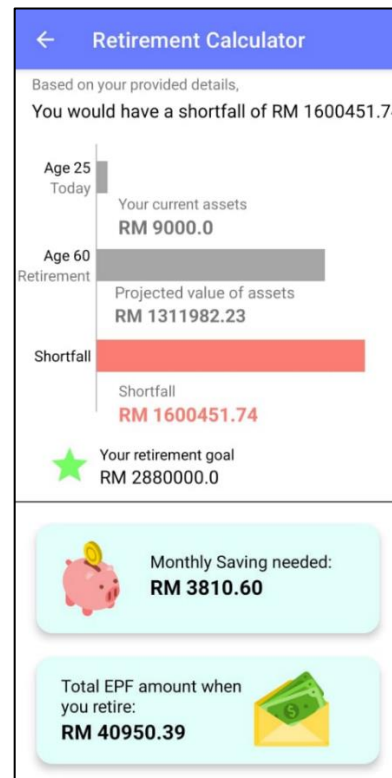


Figure 4.3.9.8 User Retirement Plan Interface

Users can view their saved retirement plan by selecting the “My Retirement Plan” button. The system will then display the retirement plan accordingly. Lastly, users can create a new plan by selecting the “New Plan” button.

4.3.10 Financial Goals Interface

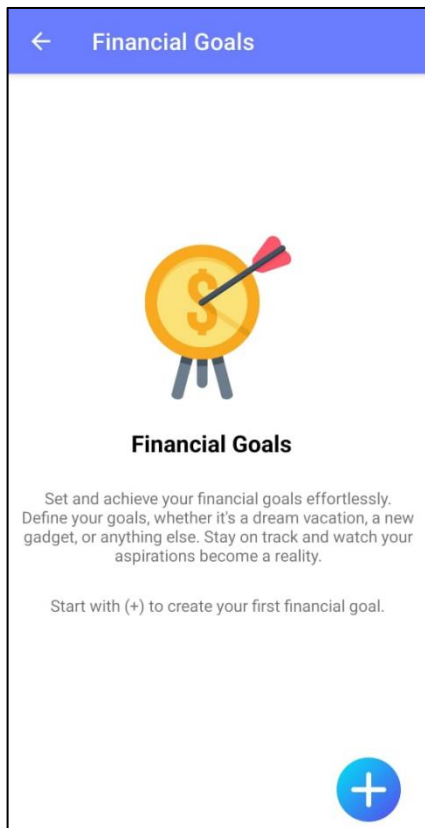


Figure 4.3.10.1 Financial Goals Interface

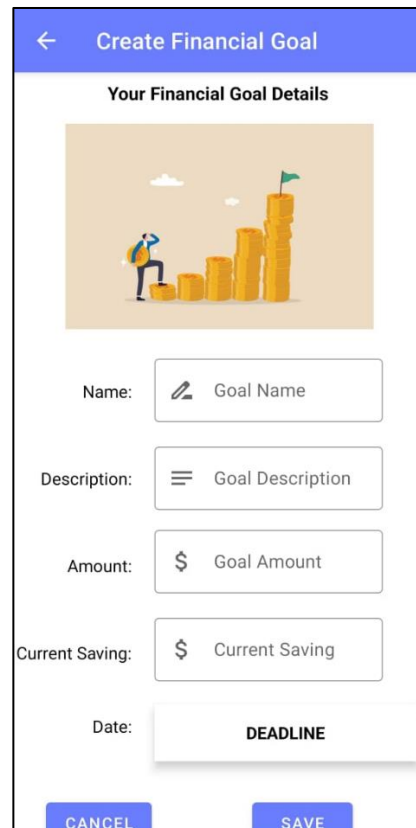


Figure 4.3.10.2 Create Financial Goals Interface

Similar to Bill Reminders interface, if users do not have any existing financial goals, the interface will display a brief description of this feature. Users can create new financial goals by clicking on the plus icon located at the bottom-right corner.

In the Create Financial Goal interface, users can input the details including the goal name, description, total cost, deadline, and current saving. Then, the system will save the financial goal to the database.

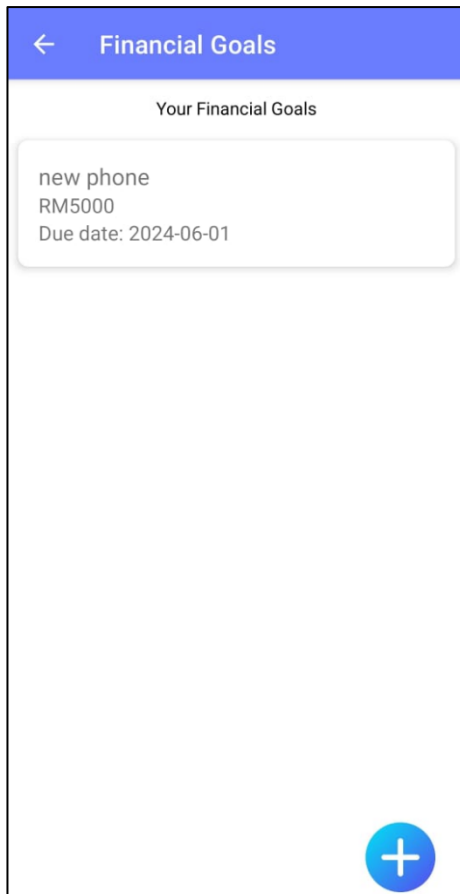


Figure 4.3.10.3 Financial Goals List Interface

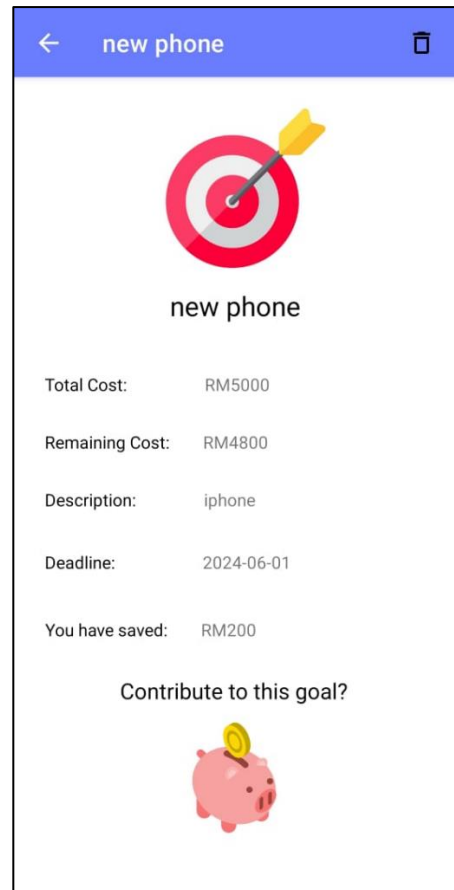


Figure 4.3.10.4 Financial Goals Details Interface

If users have existing financial goals, the interface will display all the financial goals.

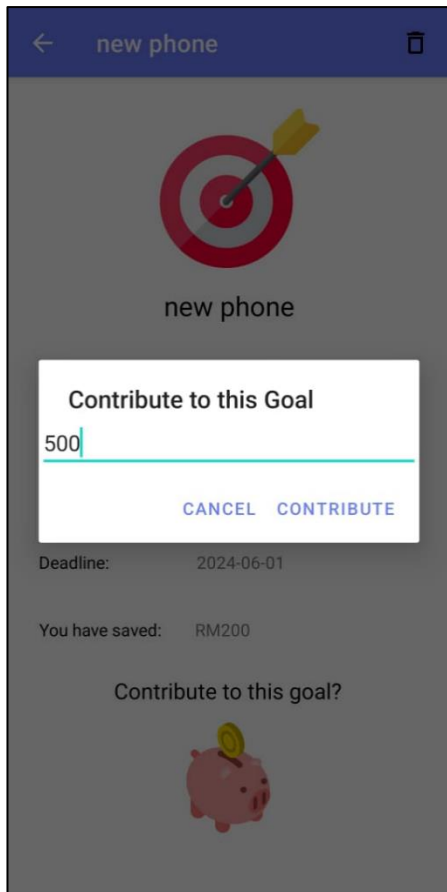


Figure 4.3.10.5 Goal Contribution Interface

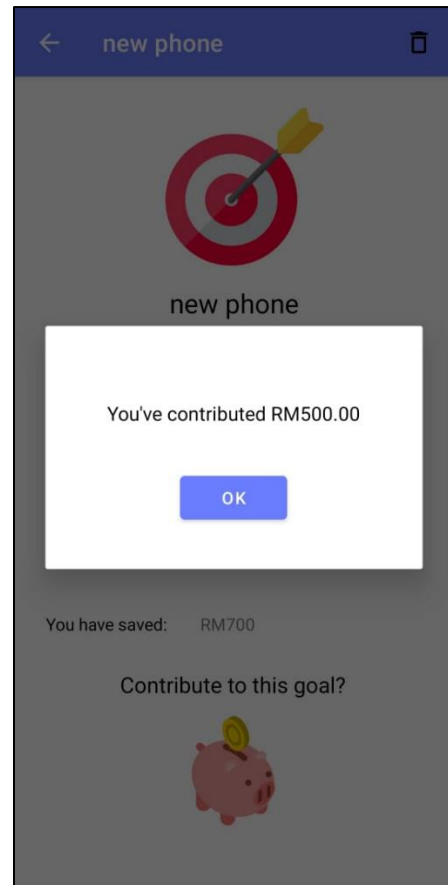


Figure 4.3.10.6 Amount of Goal Contributed

Users can select the financial goals to view the details and contribute to the goal. By clicking on the Piggy Bank icon, the users can input the amount they wish to contribute. The system will then calculate the total savings accumulated and compare it to the total cost required to reach the goal.

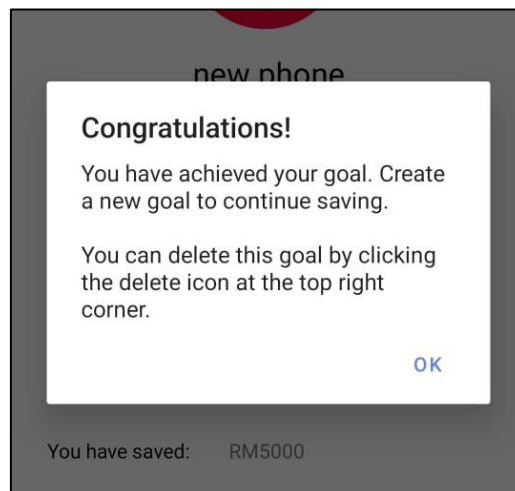


Figure 4.3.10.7 Goal Reached

4.3.11 Bill Reminders Interface

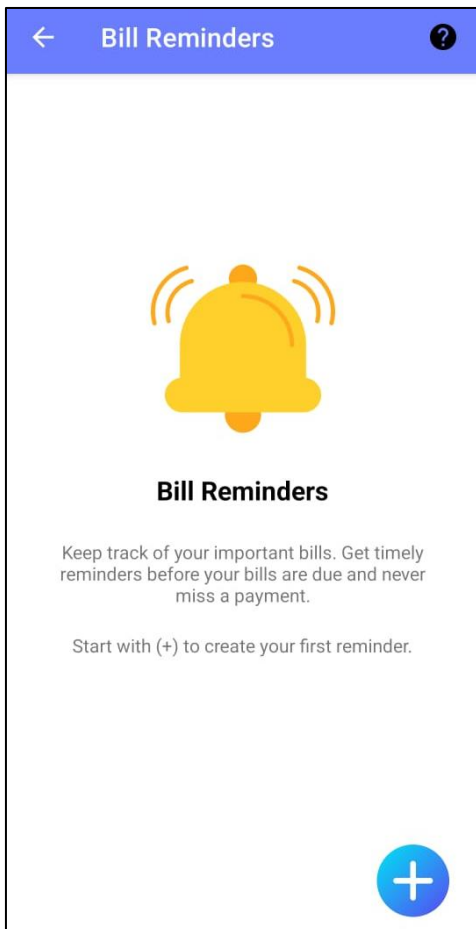


Figure 4.3.11.1 Bill Reminders Interface

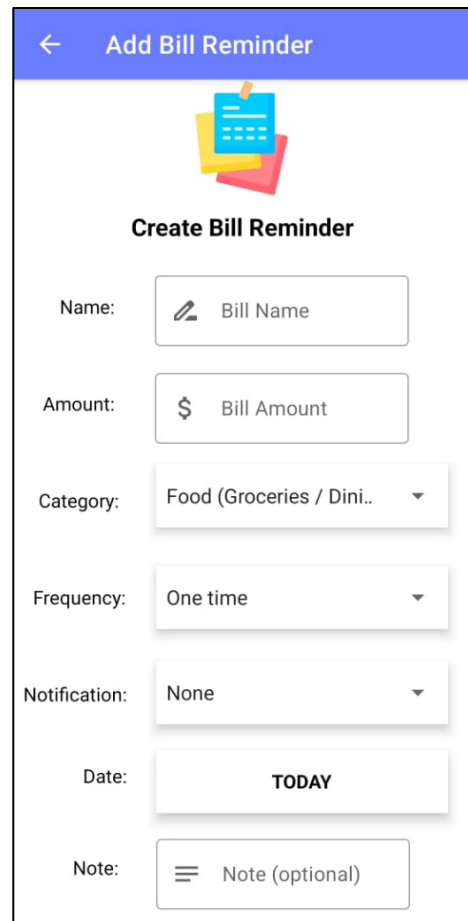


Figure 4.3.11.2 Create Bill Reminders

If users do not have any existing bill reminders, the interface will display a brief description of this feature. Users can create their bill reminders by clicking on the plus icon located at the bottom-right corner.

As shown in the figure above, the users can input their bill reminder details such as name, category, amount, reminder frequency, notification, due date, and note. For the reminder frequency, users can choose between monthly recurring or one-time reminders. For the notification, users can adjust when they receive the reminders, such as on the due date, one day before, three days before, one week before, or none.

After confirming the details, the system will save the bill reminder to the database and send notification to users based on the due date and notification setting.

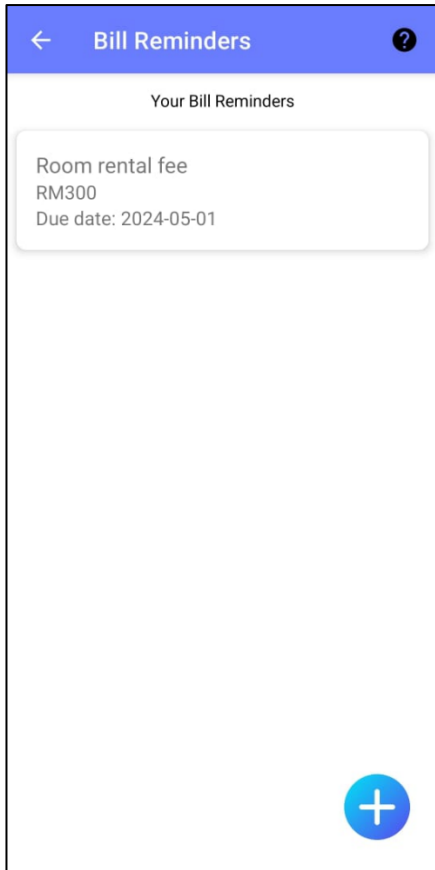


Figure 4.3.11.3 Bill Reminders List

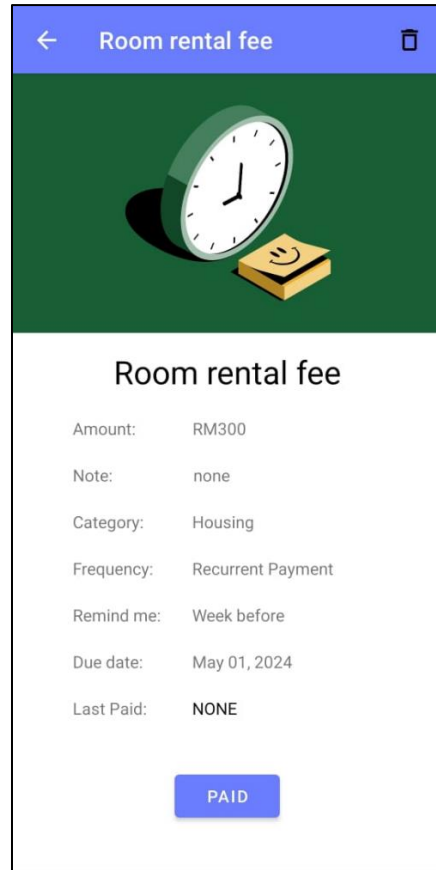


Figure 4.3.11.4 Bill Reminders Details

If users have existing bill reminders, the interface will display all the existing bill reminders.

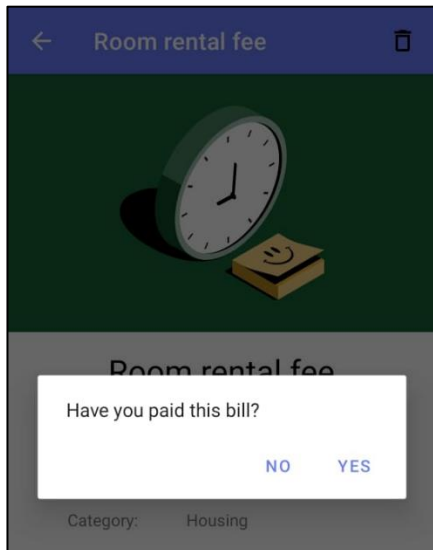


Figure 4.3.11.5 Pay Bill Reminder

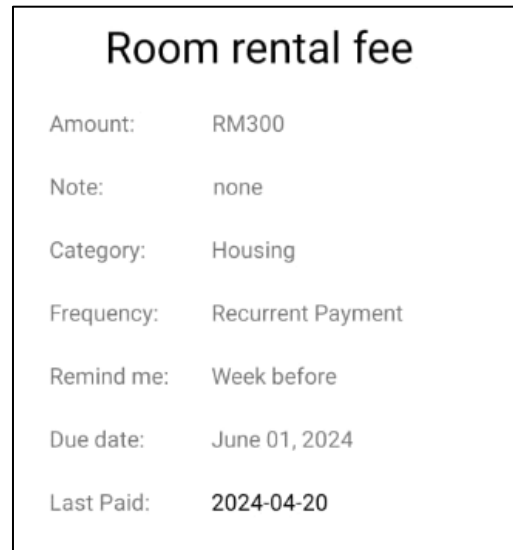


Figure 4.3.11.6 Bill Reminder Updated Details

Users can select the bill reminders to view the details and mark them as paid. The system will then record the payment date when users press the “Paid” button.

4.4.12 Expense Analysis

4.4.12 Expense Analysis Interface

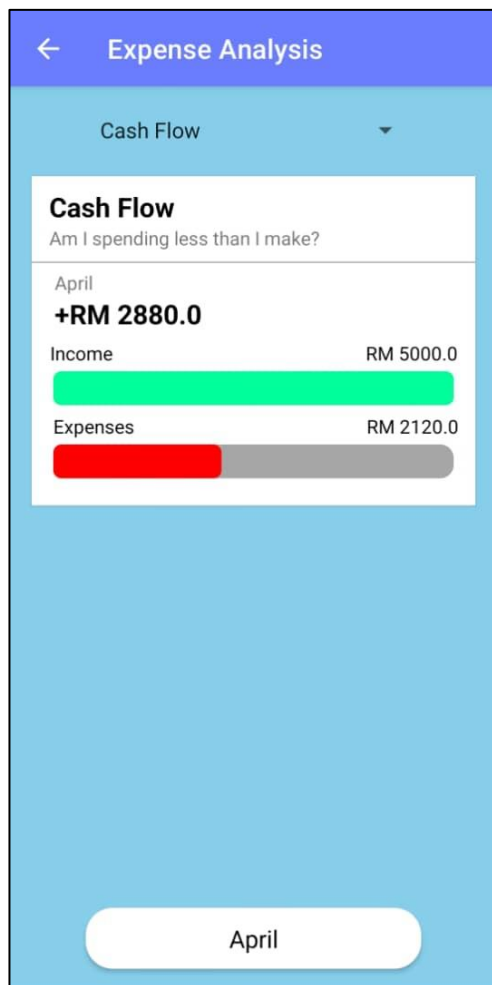


Figure 4.4.12.1 Expense Analysis Cash Flow



Figure 4.4.12.2 Expense Analysis Dropdown Menu

Figures above show the Expense Analysis interface. In this interface, users can explore their expense analysis from different perspectives, such as:

- Cash Flow
- 50/30/20 Budgeting Rule
- Spending Guide
- Retirement Plan
- Financial Well-Being Score

For cash flow, it compares the total income with total expenses to show whether users are spending more than they earn.



Figure 4.4.12.3 Expense Analysis 50/30/20 Budgeting Rule

In the 50/30/20 Budgeting Rule section, the interface shows the total income categorized into three categories: Needs, Wants, and Savings. The progress bars show the percentage allocation in each category. Progress bars with full color indicates the spending has exceeded the budget.

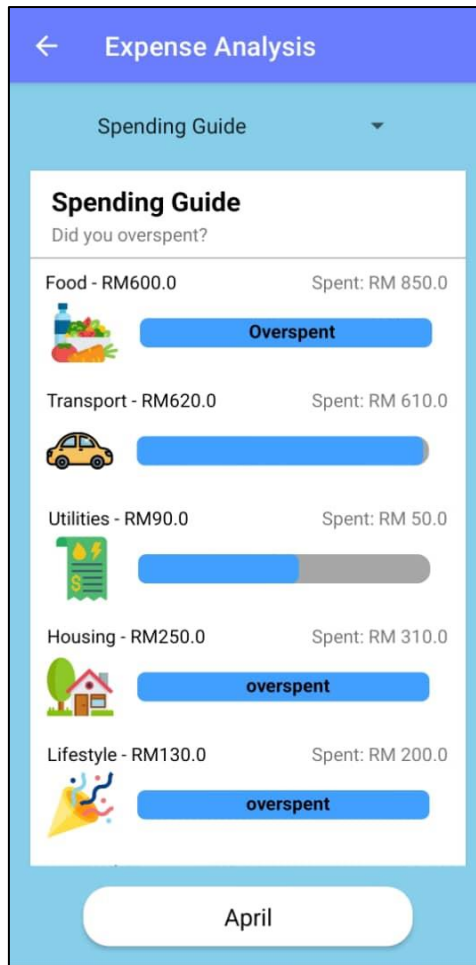


Figure 4.4.12.4 Expense Analysis Spending Guide

In the Spending Guide section shown in Figure 4.4.12.4, the interface displays estimated monthly budgets with corresponding progress bars. If spending exceeds the budget in a category, the text “Overspent” appears on the progress bars.

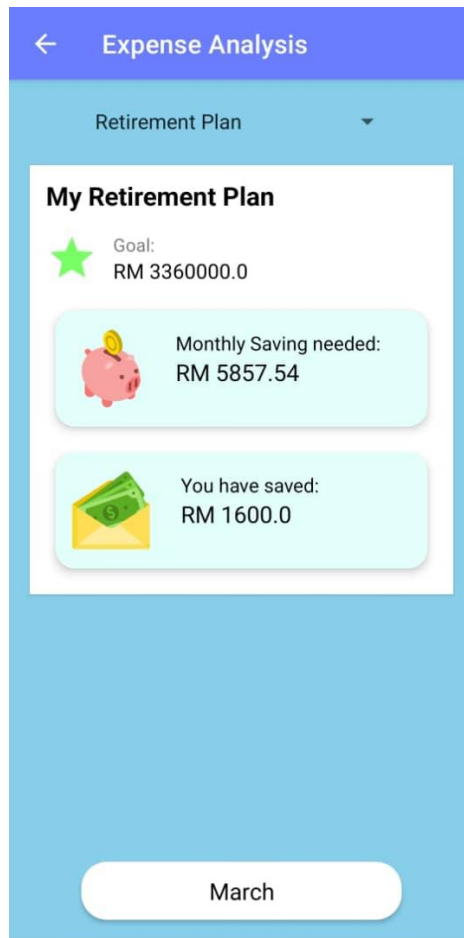


Figure 4.4.12.5 Expense Analysis Retirement Plan

In the Retirement Plan section, users can view the monthly savings required to reach their retirement goal together with the current saved amount.

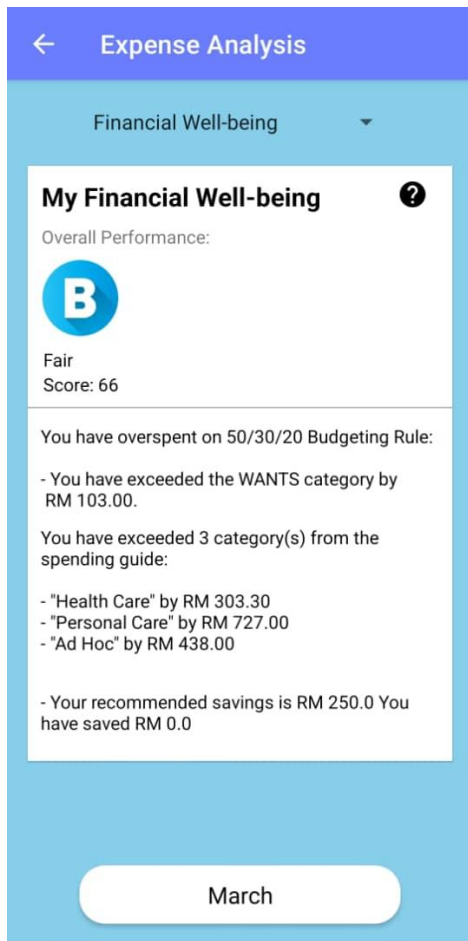


Figure 4.4.12.6 Expense Analysis Financial Well-Being

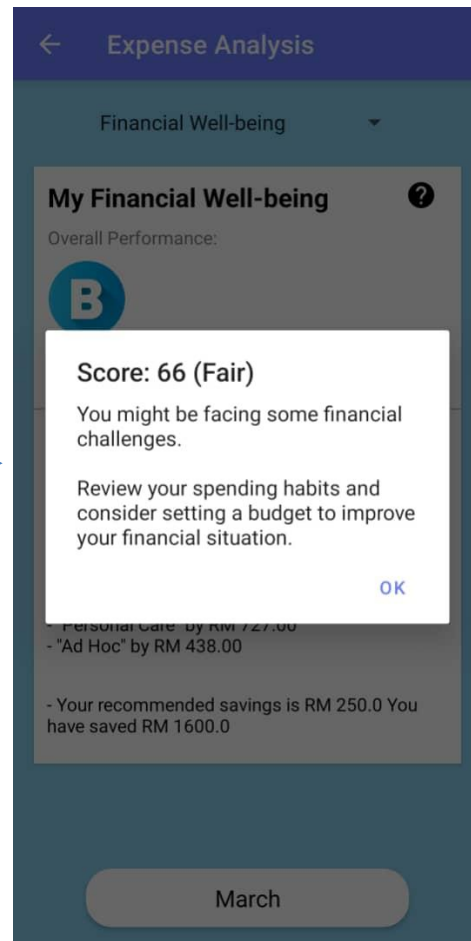


Figure 4.4.12.7 Expense Analysis Financial Well-Being Score

For the financial well-being section, the interface displays a score based on users' adherence to both the spending guide and the 50/30/20 budgeting rule.

Besides, the interface provides feedback based on users' spending patterns. For example, when spending is aligned with the budgeting rule, the interface shows a message informing user. If spending exceeds the categories from spending guide, the exceeded categories are display along with the exceeded amount.

Lastly, the interface shows the recommended savings and the actual saved amount.

In short, the financial well-being assists users in identifying areas where users can improve their financial habits. The score reflects how well users manage their finances according to these guidelines.

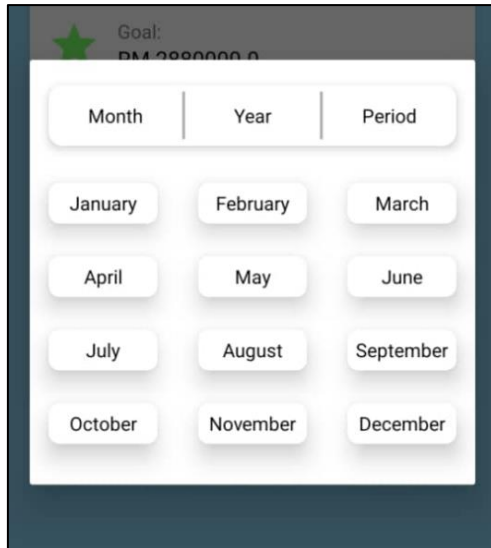


Figure 4.4.12.8 Select Monthly Period

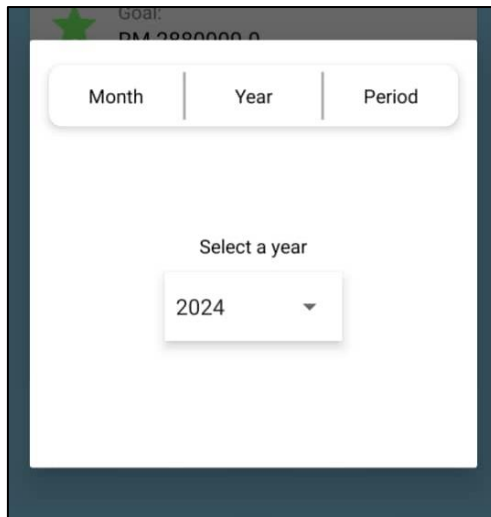


Figure 4.4.12.9 Select Yearly Period

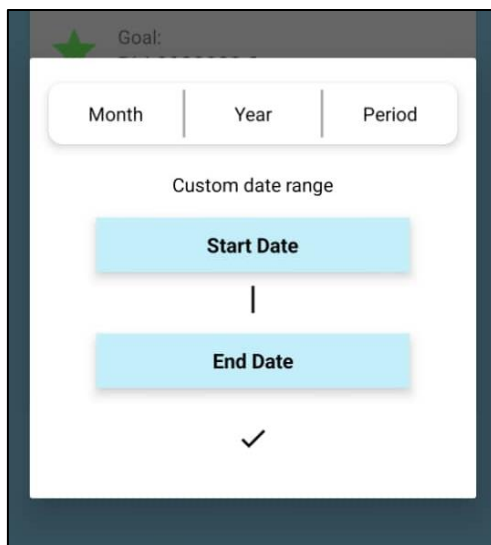


Figure 4.4.12.10 Select Custom Period

Additionally, the interface allows users to select a period to perform expense analysis, the periods include:

- Monthly Period
- Yearly Period
- Custom Period

Then, the interface displays the analysis within the selected period. For example, when custom period, 2024-03-01 and 2024-04-30 is selected:

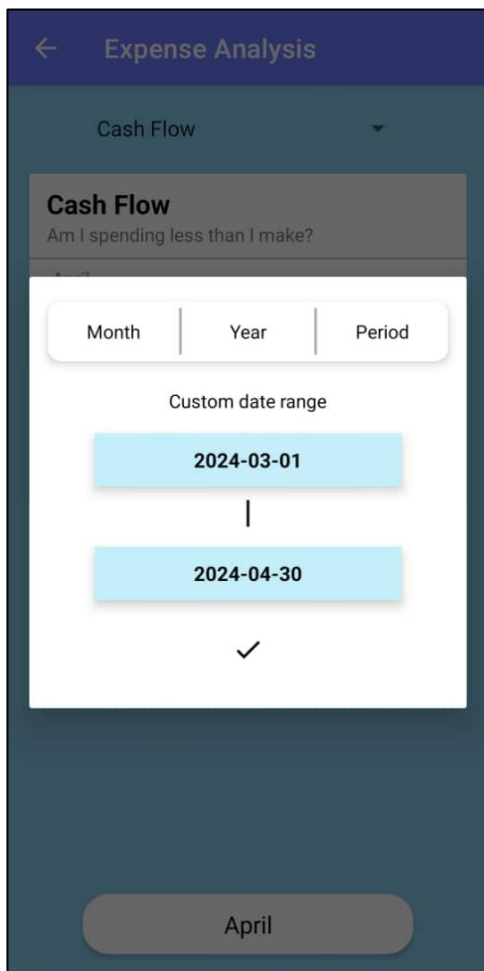


Figure 4.4.12.11 Custom Period Example

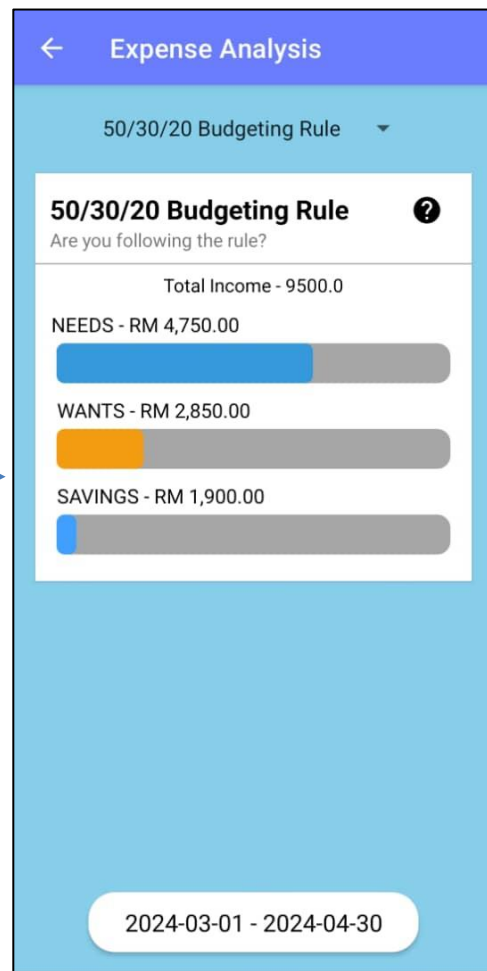


Figure 4.4.12.12 Custom Period Example Result

Chapter 5

System Testing

This chapter documents the result of system testing conducted according to the test plan to evaluate the project's objectives.

To test the first objective, a user survey was conducted to gather feedback from individuals who used the personal finance management app. This survey assessed the app's objective in assisting and recommending users in budget setting and spending decisions.

To test the second and third objectives, test plans were created and carried out to verify the system functionalities in helping users with expenses, savings, retirement planning, and analyzing users' expenses to provide valuable insights.

5.1 Objective 1: Budgeting and Spending Recommendations

5.1.1 User Survey Procedure

To evaluate the app's objective of assisting and recommending users in budget setting and spending decisions, a user survey was conducted with 10 individuals from different backgrounds. The procedure for the survey was as follows:

1. The APK file for the personal finance management app was shared with each participant so they could download the application.
2. Participants were asked to use the app to record their expenses for three months, from January to March 2024.
3. After they have completed, participants were requested to export their expense datasets using the app's export function, which generated an Excel file.
4. Participants were also requested to complete a Google Form survey, which included a set of questions designed to verify whether the app successfully met the objective of assisting and recommending users in budget setting and spending decision.

The list of questions is as followed:

- 1. Do you agree that the budget setting and spending recommendations provided by the personal finance management system are effective?**

This question aims to evaluate the effectiveness of the app's budgeting and spending recommendations. It verifies whether the app provides useful and practical guidance to manage their finances.

- 2. Do you agree that you have successfully used the budgeting functionalities provided by the application to manage your expenses?**

This question measures how successfully users are able to use the app's budgeting functionalities to manage their expenses.

- 3. Do you feel more in control of your finances since using the personal finance management system?**

This question verifies whether the app has helped users gain control of their finances. It indicates the app's impact on users' overall financial management.

- 4. Do you agree that the spending guides provided by the application have positively influenced your spending decisions?**

This question evaluates whether the app's spending guides have a positive impact on users' spending habits. It helps verifies the effectiveness of the spending guide feature.

- 5. Do you agree that the application has helped you identify areas where you can reduce unnecessary expenses?**

This question evaluates the app's effectiveness in helping users identify unnecessary expenses.

- 6. Do you find the expense recording feature user-friendly and easy to use?**

This question evaluates the ease of use and user-friendliness of the app's expense recording feature. It verifies if users find the feature convenient for tracking their expenses.

5.1.2 User Demographic

The user survey involved 10 participants who used the personal finance management app to record their expenses for three months. Participants were selected from different demographic groups to collect feedback on the app's functionality and performance.

- Age Range: The participants were between the ages of 22 and 60.
- Occupations: Participants came from various occupational backgrounds, including university students, employees, self-employed individuals, and fresh graduates who were either unemployed or working part-time.
- Income Range: The participants had different income, ranging from RM1,200 to RM8,000.
- Education Levels: All student participants were pursuing a university degree.

The participants' diverse backgrounds provided a comprehensive view of the app's performance across different user groups. These experiences were useful in evaluating the app's objective in assisting and recommending users in budget setting and spending decisions.

5.1.3 User Survey Result Discussion

The user survey results provide insights and verify the project’s effectiveness in assisting and recommending users in budget setting and spending decisions. The survey results are discussed below.

Question 1: Effectiveness of Budget Setting and Spending Recommendations

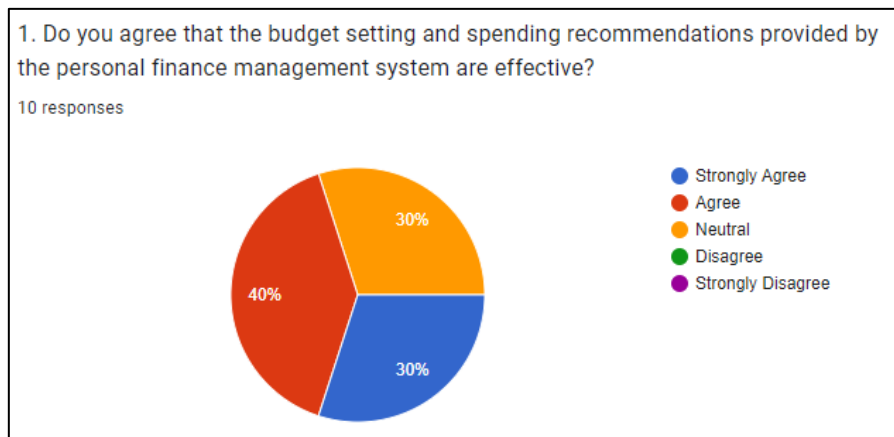


Figure 5.1.3.1 User Survey Result Question One

Based on the result from Figure 5.1.3.1, 30% and 40% of participants agreed that the budget setting and spending recommendations provided by the app are effective. Meanwhile, 30% of participants were neutral, which indicates that there may be aspects that could be improved.

Question 2: Successful Use of Budgeting Functionalities

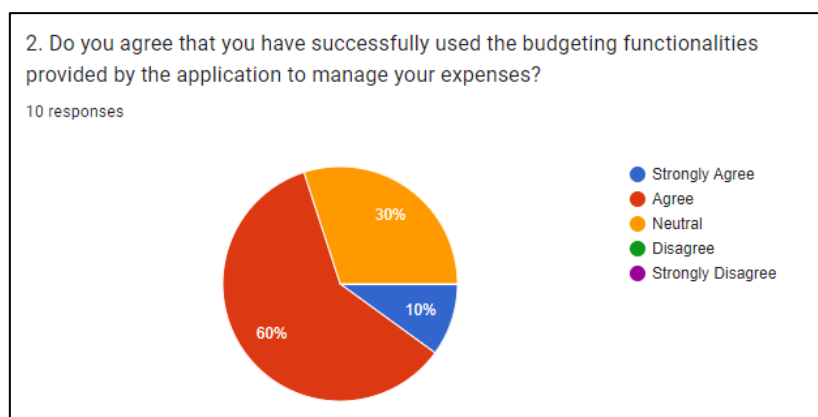


Figure 5.1.3.2 User Survey Result Question Two

Based on the result above, most participants (60% agreed, 10% strongly agree) showed positive signs that they have successfully used the budgeting functionalities. However, 30% of the participants were neutral, which suggests that the budgeting tools could be further improved.

Question 3: Control Over Finances

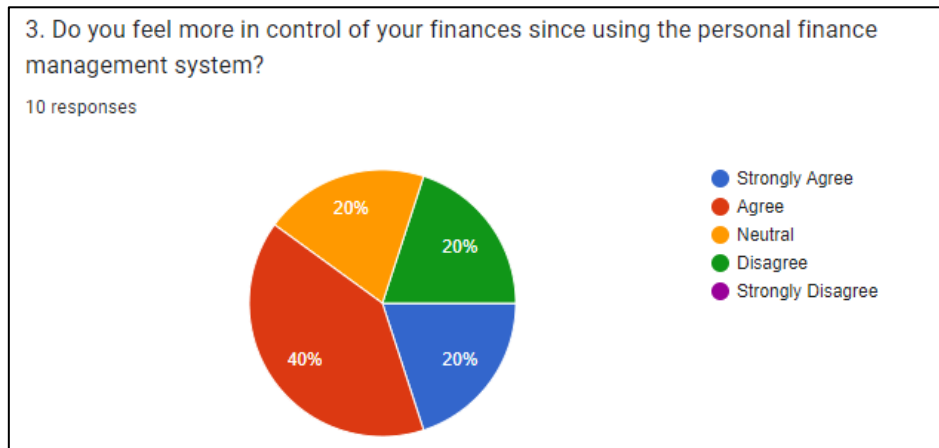


Figure 5.1.3.3 User Survey Result Question Three

60% of participants (20% strongly agree, 40% agree) felt more in control of their finances since using the app, but 20% were neutral and 20% disagreed. This suggests that for some users, the app may not provide enough control to improve their finances.

Question 4: Positive Influence of Spending Guide

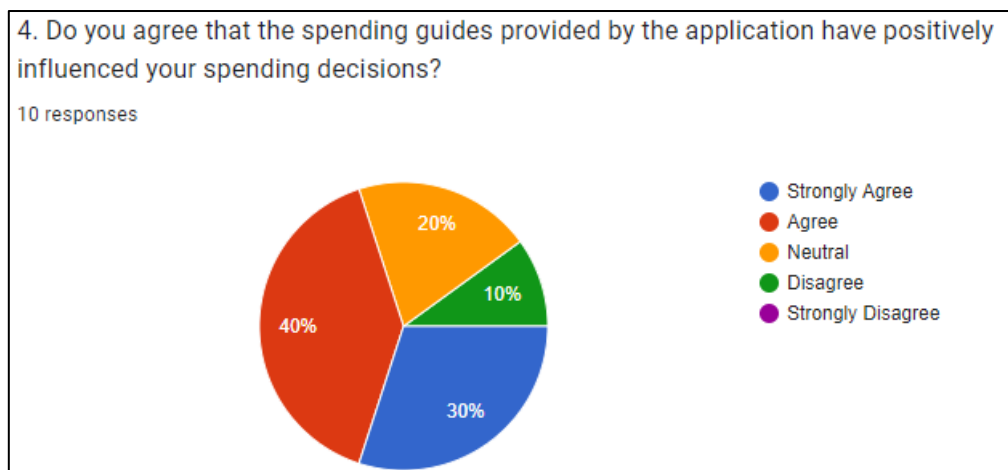


Figure 5.1.3.4 User Survey Result Question Four

Most participants (40% agreed, 30% strongly agreed) found that the spending guide feature has positively influenced their spending decisions. While 20% were neutral and 10% disagreed. This indicates that the spending guide may not be suitable for all users.

Question 5: Identification of Unnecessary Expenses

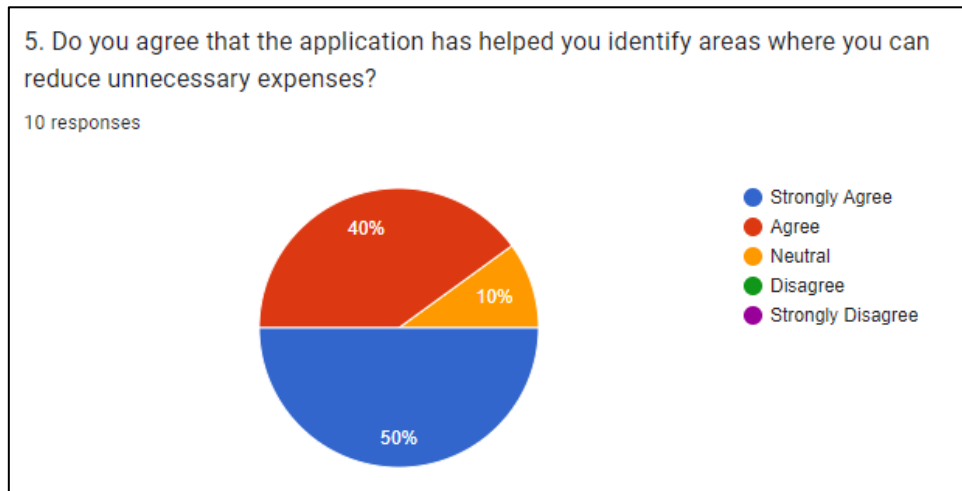


Figure 5.1.3.5 User Survey Result Question Five

Based on the result above, 50% strongly agreed, and 40% agreed, which strongly suggests that the app has successfully helped users identify areas to reduce unnecessary expenses. However, 10% were neutral.

Question 6: User Friendliness of The App

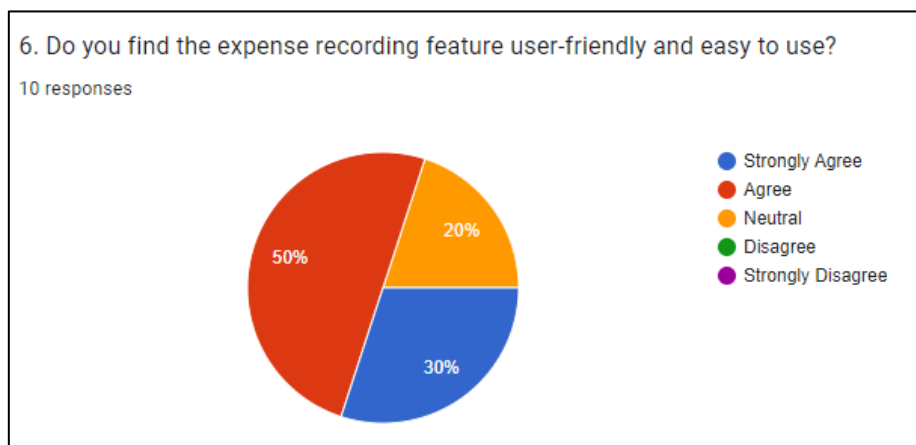


Figure 5.1.3.6 User Survey Result Question Six

According to Figure 5.1.3.6, most participants found the expense recording feature user-friendly and easy to use (30% strongly agreed, 50% agreed). However, 20% were neutral, which indicates that the features and interface design could be improved further.

5.2 Objective 2: Expenses Recording, Retirement Planning, Financial Goal

5.2.1 Expense Recording Test Plan

This test plan is to verify that users are able to record their expenses using the application. The test includes verifying whether the system is able to save the data into the database and show the record at “Expense Record” function.

Test Input:

Amount	Category	Date	Note
50	Utilities	2024-04-01	Electric fee

Table 5.2.1 Expense Record Test Input

Test Result:



Figure 5.2.1.1 Expense Record Test Output 1

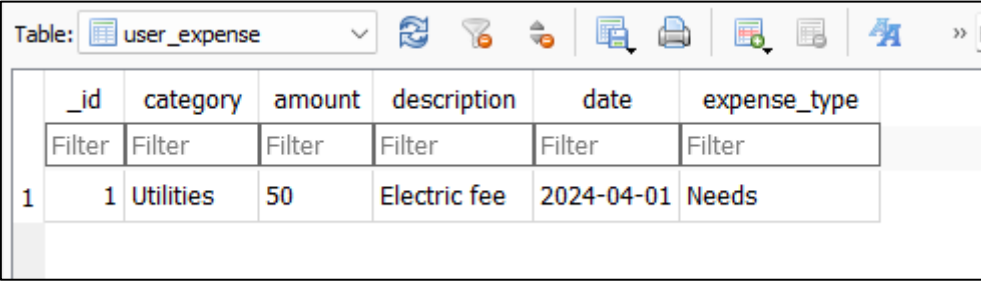
A screenshot of a database table viewer. The table is named "user_expense". The columns are: "_id", "category", "amount", "description", "date", and "expense_type". The table contains one record with the following values: "_id": 1, "category": Utilities, "amount": 50, "description": Electric fee, "date": 2024-04-01, "expense_type": Needs. The table has a filter bar above it with "Filter" text for each column.

Figure 5.2.1.2 Expense Record Test Output 2

As shown in the test results above, the system is able to store in the database, and display the record in the system properly.

5.2.2 Retirement Plan Test Plan

This test plan is to verify that users are able to create a retirement plan using the application. The test verifies that the retirement plan feature uses the specified formulas to generate the result correctly.

Test Input:

Current Age	Retirement Age	Life Expectancy	Current Savings	Retirement Monthly Income
25	60	90	5000	8000

Table 5.2.2 Retirement Plan Test Input

The screenshot shows a mobile application interface titled "Retirement Calculator". It prompts the user to "Please enter the details below". The input fields are as follows:

- Monthly Savings: 500.00
- Estimated Healthcare Annual Costs: 10000.00
- Annual Inflation Rate: 4
- Current Investment: Amount 1000.00, Profit Rate % 5
- Monthly Investment: Amount 500.00, Profit Rate % 5
- Monthly EPF Contribution: Amount 500.00, Profit Rate % 5.5
- Current EPF Contribution: 6000.00
- Other Existing Provision: 2000.00

Figure 5.2.2.1 Retirement Plan Test Input

Expected Output

Current Assets

$$\begin{aligned} &= \text{Existing Provision} + \text{EPF Balance} + \text{Current Investment Amount} \\ &+ \text{Current Saving} = 2000 + 6000 + 1000 + 5000 = 14000 \end{aligned}$$

Future Value of Monthly Savings

$$\begin{aligned} &= \frac{(\text{Monthly Savings} * \text{Total Months until Retirement})}{(1 + \text{Annual Inflation Rate})^{\text{Years until Retirement}}} = \frac{(500 * 420)}{(1 + 0.04)^{35}} \\ &= 53271.25 \end{aligned}$$

Future Value of EPF Contribution

$$\begin{aligned} &= \text{Monthly EPF Contribution} * 12 \\ &* \left(1 + \frac{\text{annual EPF dividend rate}}{12}\right)^{\text{Total Months until Retirement}} \\ &= (500 * 12) * \left(1 + \frac{0.055}{12}\right)^{420} = 40950.39 \end{aligned}$$

Future Value of Current Investments

$$\begin{aligned} &= \text{Current Investment Amount} \\ &* \left(1 + \frac{\text{Annual Profit Rate}}{12}\right)^{\text{Total Months until Retirement}} \\ &= 1000 * \left(1 + \frac{0.05}{12}\right)^{420} = 5733.72 \end{aligned}$$

Future Value of Monthly Investments

$$\begin{aligned} &= \text{Total Amount of Monthly Investments} \\ &* \left(1 + \frac{\text{Annual Profit Rate}}{12}\right)^{\text{Total Months until Retirement}} \\ &= 210000 * \left(1 + \frac{0.05}{12}\right)^{420} = 1204080.87 \end{aligned}$$

Projected Assets at Retirement Age

$$\begin{aligned} &= \text{Future Value of Monthly Savings} \\ &+ \text{Future Value of EPF Contribution} + \text{Current EPF Balance} \\ &+ \text{Future Value of Current Investments} \\ &+ \text{Future Value of Monthly Investments} + \text{Existing Provisions} \\ &= 53217.25 + 40950.39 + 6000 + 5733.72 + 1204080.87 + 2000 \\ &= 1311982.23 \end{aligned}$$

Retirement Goal = *Total Retirement Month * Desired Retirement Monthly Income*

$$= (30 * 12) * 8000 = 2880000$$

Shortfall Amount

$$\begin{aligned} &= (\text{Retirement Goals} + \text{Total Healthcare Cost for Retirement}) \\ &- \text{Projected Assets at Retirement Age} \\ &= (2880000 + 32433.98) - 1311982.23 = 1600451.75 \end{aligned}$$

Monthly Savings Needed to Achieved Retirement Plan

$$= \frac{\text{Shortfall Amount}}{\text{Total Months until Retirement}} = \frac{1600451.74}{420} = 3810.60$$

Test Result

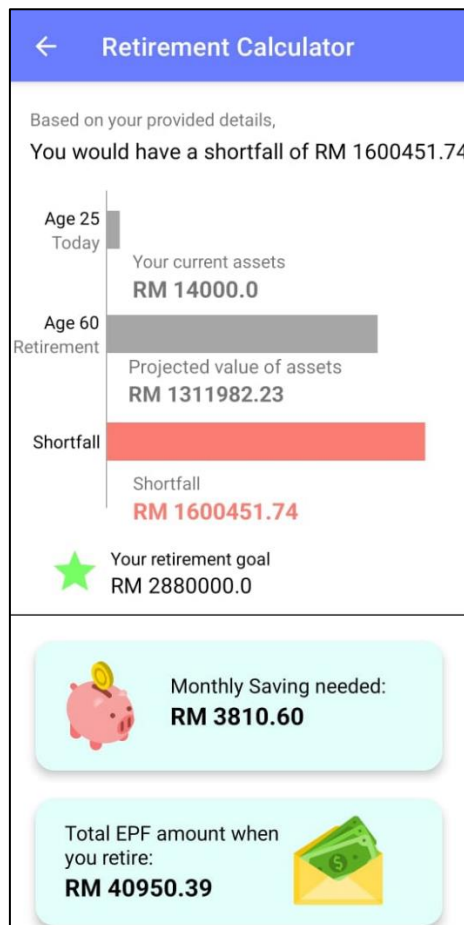


Figure 5.2.2.2 Retirement Plan Test Output

As shown above, the test result matched the expected output. This verified that the feature successfully generates the retirement plan according to the specified formulas.

5.2.3 Financial Goal Test Plan

This test plan is to verify that users are able to create financial goals using the application. The test verifies whether the feature allows users to contribute to the goal and calculate the remaining cost for the goal. The feature is expected to show a message to inform users if they have reached the goal.

Test Input:

Name	Description	Amount	Current Saving	Deadline
Credit card debt	Reduce debt	8000	500	2024-06-01

Table 5.2.3 Financial Goal Test Input

Test Result:

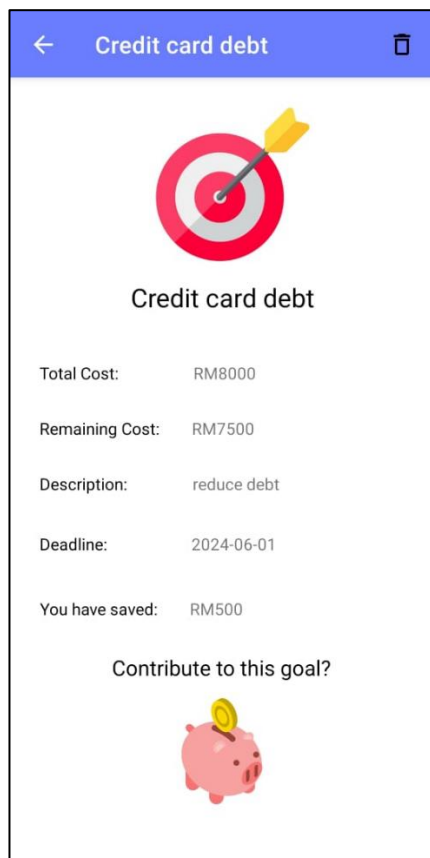


Figure 5.2.3.1 Financial Goal Test Result 1

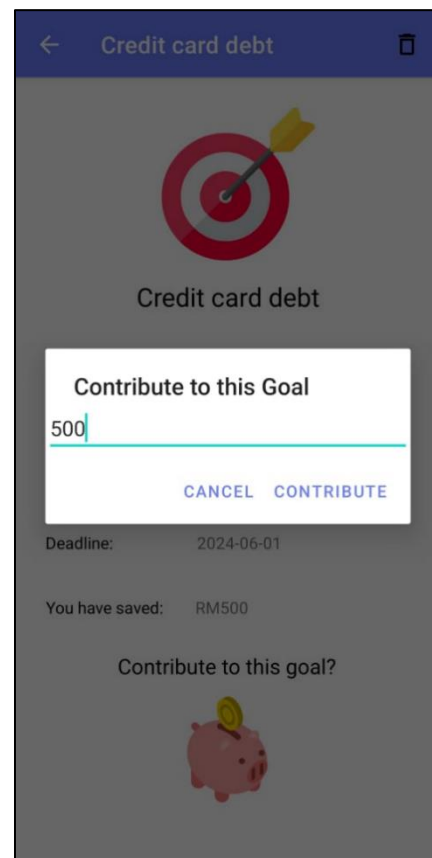


Figure 5.2.3.2 Financial Goal Test Result 2

As shown in the result above, the feature is able to save and display user's financial goal and allow users to contribute to the goal until the goal is achieved.

Total Cost:	RM8000
Remaining Cost:	RM7000.0
Description:	reduce debt
Deadline:	2024-06-01
You have saved:	RM1000

Figure 5.2.3.3 Financial Goal Test Result 3

After contributing RM 500 to the goal, the remaining cost changed from RM 7500 to RM 7000, and the saved amount from RM 500 to RM 1000.

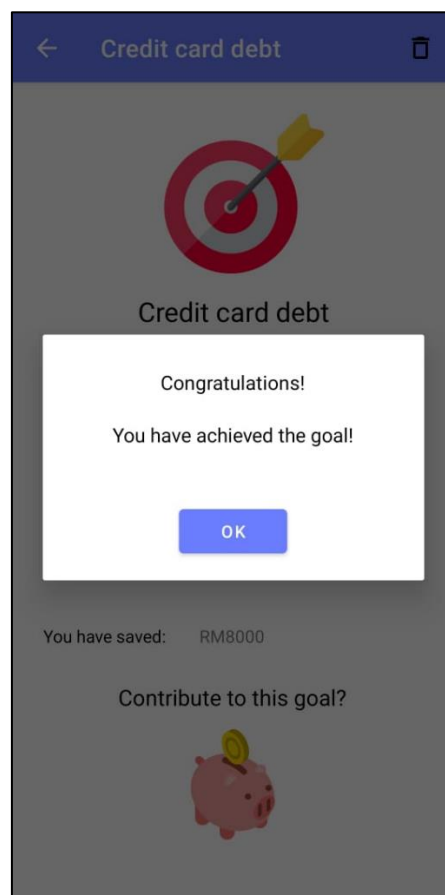


Figure 5.2.3.4 Financial Goal Test Result 4

When the remaining cost is zero or the goal is reached, the feature showed a congratulation message informing users have achieved the goal.

5.3 Objective 3: Expense Analysis

To test the Expense Analysis feature, an expense dataset was selected from one of the survey participants. This dataset is used to verify whether the feature is able to provide insights and recommendations.

In this test plan, all the sub-sections in the feature are tested, including:

- Cash Flow
- 50/30/20 Budgeting Rule
- Spending Guide
- Financial Well-Being
- Retirement Plan

5.3.1 Cash Flow Output

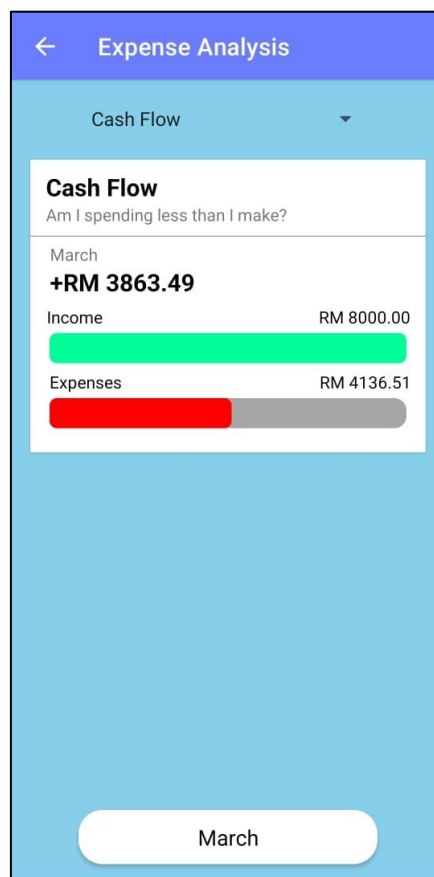


Figure 5.3.1.1 Cash Flow Output

In Figure 5.3.1.1 Cash Flow Output, the expense analysis showed that the user's expenses were less than their income, indicating the user earns more than they spend.

5.3.2 50/30/20 Budgeting Rule Output

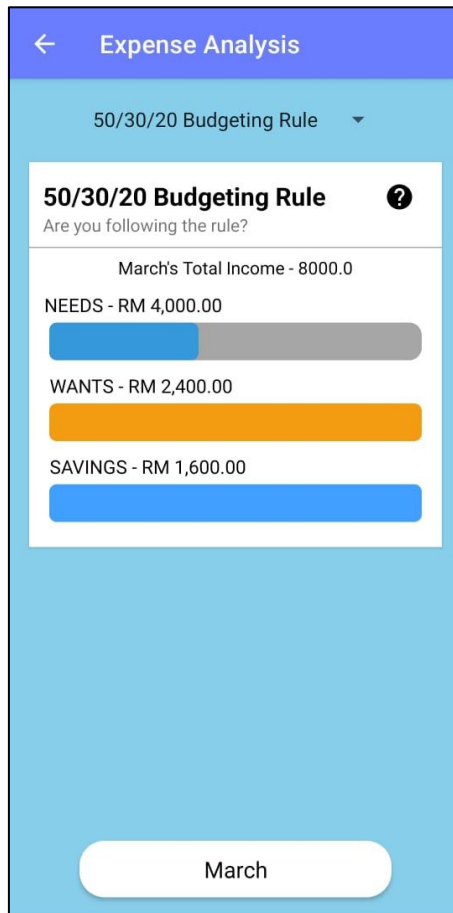


Figure 5.3.2.1 50/30/20 Budgeting Output

As shown in Figure 5.3.2.1, the feature categorized user's income into 3 categories, "Needs", "Wants" and "Savings". The progress bars represent the percentage of the user spending allocated to the specific category.

Based on the result, the user has exceeded the budgets on the category "Wants" and "Savings".

5.3.3 Spending Guide Output



Figure 5.3.3.1 Spending Guide Output

According to the output in Figure 5.3.3.1, the feature compared user's spending against the spending guide. The progress bars represent the percentage of user's spending relative to the spending guide amount.

Based on the result, user did not overspend on the shown categories.

5.3.4 Financial Well-Being Output

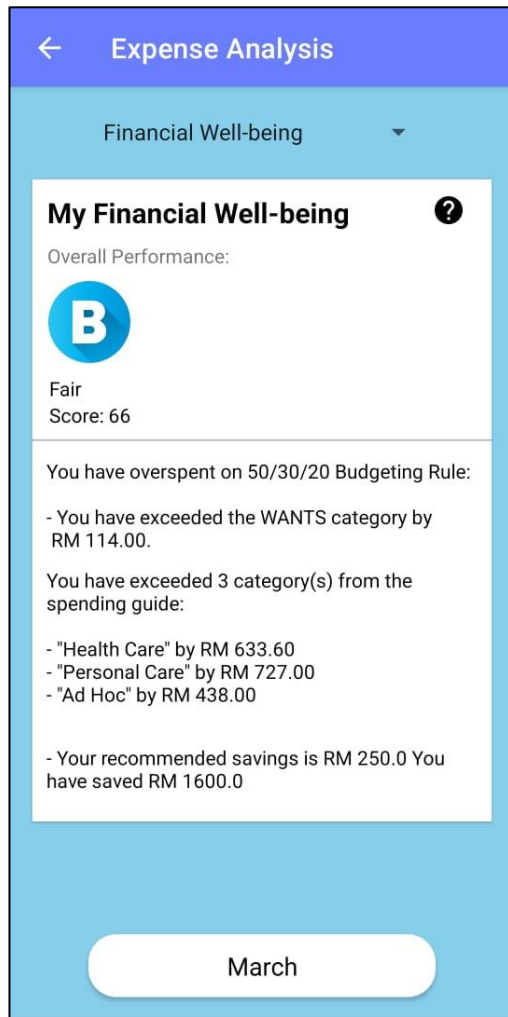


Figure 5.3.4.1 Financial Well-Being Output

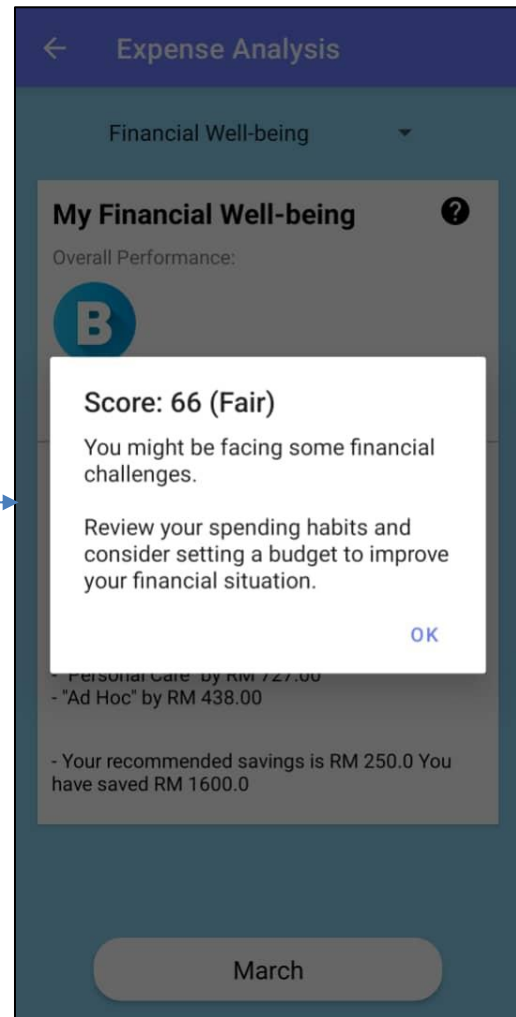


Figure 5.3.4.2 Financial Well-Being Score

As shown in Figure 5.3.4.1, the feature reported that the user has exceeded the 50/30/20 Budgeting Rule, specifying the exceeded categories along with the overspent amount.

The feature also reported the number of categories that user have overspent based on spending guide. The feature showed the specific categories that were overspent by user. Lastly, the feature also compared the recommended savings with user's actual saving.

As shown in Figure 5.3.4.2, the feature generated a score that reflects user's adherence to the budgeting rule and spending guide. Explanation of the score is provided together with the recommendations for potential financial improvement.

5.3.5 Retirement Plan Output

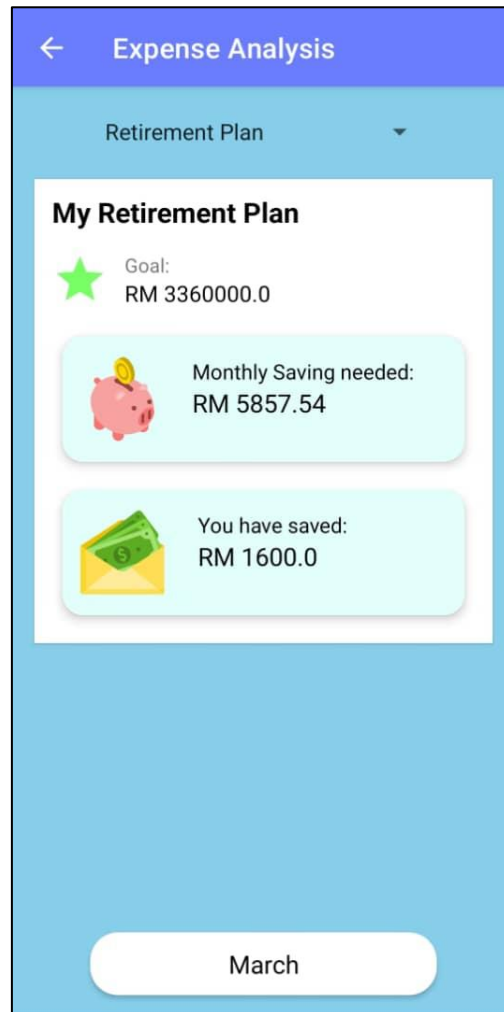


Figure 5.3.5.1 Retirement Plan Output

According to the output in Figure 5.3.5.1, the feature used the data from retirement plan to present and compare the required monthly saving against the user's saved amount.

Chapter 6: Discussion

This chapter discusses whether the project met its objectives based on system testing.

6.1 Objective Discussion

6.1.1 Objective One

Based on the user survey results discussed in Chapter 5, it strongly suggests that the project meets its objective of assisting and recommending users in budget setting and spending decisions.

The survey results show that most participants agreed that the app's budgeting and spending recommendations were effective (30% strongly agree, 40% agree). This verifies that the app provides useful and practical guidance for managing their finances.

However, the survey also indicates areas where the app could be improved. For example, 30% of participants expressed a neutral stance on the app's effectiveness in budget setting and spending recommendations.

Additionally, the survey results also indicates that the user-friendliness of the expense recording feature could be improved further to enhance user experience.

6.1.2 Objective Two

Based on the system testing results from Objective Two, the tests successfully verified that the Expense Recording, Retirement Plan, and Financial Goal features are working as intended.

For the Expense Recording feature, the test plan showed that the feature is able to save user's expense data into the database and display the records in the Expense Record feature.

For the Retirement Planning feature, the test verified that the feature is able to generate retirement plan accurately by using the specified formulas, as the test outputs were aligned with the calculated results.

For the Financial Goal feature, it is verified that the feature is able to provide updates according to user's contribution. The updates include the remaining costs and congratulatory messages when the goal is completed.

6.1.2 Objective Three

The system testing result focusing on verifying the Objective Three, Expense Analysis feature has indicated that the feature is working as expected. By using the expense dataset from a survey participant, the feature is verified to be able to provide insights and recommendations to users, helping to user to identify areas for improvement.

6.2 Future Improvement

Based on the user survey results, it is evident that the system holds significant potential for improvement, especially in areas such as the budgeting tool and personalized spending guide.

To make the system more comprehensive, future research could be done to gain more knowledge in personal finance management. By having a deeper understanding in personal finance, additional useful features could be implemented to further assist user in financial management.

The expense datasets collected from survey participants could be useful for testing any new features added to the system in the future.

Chapter 7: Conclusion

In conclusion, the project offers a comprehensive solution to address the challenges of personal finance management, especially in meeting the needs of Malaysian users. By addressing the limitations identified in existing financial tracker applications, such as the lack of budgeting functionalities and the absence of features of retirement planning and expense analysis, the project aims to empower individuals to make informed spending decisions and achieve long-term financial goals.

Overall, the project has successfully met its objectives, as evidenced by user survey result and system testing results. The results highlight the effectiveness of the application in assisting individuals with budgeting, expense recording, retirement planning, and financial goal setting.

The project offers a significant effort to empower individuals with the tools and knowledge to manage their finances and achieve long-term financial stability. By providing practical solutions and guidance, the project has the potential to make a meaningful impact on improving financial literacy and well-being in Malaysia.

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APPENDIX A

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: Y4 S1	Study week no: 1
Student Name & ID: Cheok Shen Yao, 19ABC04362	
Supervisor: Dr. Ku Chin Soon	
Project Title: Personal Finance Management System	

1. WORK DONE

- Revised FYP 1 report.
- Discussed the project with Dr. Ku.

2. WORK TO BE DONE


- Develop the system.

3. PROBLEMS ENCOUNTERED


- None

4. SELF EVALUATION OF THE PROGRESS

- Satisfied



Supervisor's signature



Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: Y4 S1	Study week no: 2
Student Name & ID: Cheok Shen Yao, 19ABC04362	
Supervisor: Dr. Ku Chin Soon	
Project Title: Personal Finance Management System	

1. WORK DONE

- Researched on Bill Reminder to have clear direction in the feature.
- Successfully implemented the Bill Reminder feature.

2. WORK TO BE DONE


- Continue to develop the system.

3. PROBLEMS ENCOUNTERED


- None

4. SELF EVALUATION OF THE PROGRESS

- Satisfied



Supervisor's signature



Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: Y4 S1	Study week no: 3
Student Name & ID: Cheok Shen Yao, 19ABC04362	
Supervisor: Dr. Ku Chin Soon	
Project Title: Personal Finance Management System	

1. WORK DONE

- Research on Financial Goal to have a clear direction while implementing the feature.
- Successfully implemented the Financial Goal feature.

2. WORK TO BE DONE

- Continue to develop the system.

3. PROBLEMS ENCOUNTERED


- None

4. SELF EVALUATION OF THE PROGRESS

- Satisfied



Supervisor's signature



Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: Y4 S1	Study week no: 4
Student Name & ID: Cheok Shen Yao, 19ABC04362	
Supervisor: Dr. Ku Chin Soon	
Project Title: Personal Finance Management System	

1. WORK DONE

- Improved the Spending Guide feature.
- Researched about retirement plan calculation.
- Implemented the Retirement Plan feature.

2. WORK TO BE DONE


- Continue to develop the system.

3. PROBLEMS ENCOUNTERED


- None

4. SELF EVALUATION OF THE PROGRESS

- Satisfied



Supervisor's signature



Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: Y4 S1	Study week no: 5
Student Name & ID: Cheok Shen Yao, 19ABC04362	
Supervisor: Dr. Ku Chin Soon	
Project Title: Personal Finance Management System	

1. WORK DONE

- Demonstrated the Retirement Plan feature to Dr. Ku.
- Started to implement the Expense Analysis feature.
- Discussed with Dr. Ku about the Expense Analysis's requirements.

2. WORK TO BE DONE

- Continue to develop the system.

3. PROBLEMS ENCOUNTERED


- Faced difficulties while implementing the Expense Analysis feature.
- Unsure about the requirements and interface design.

4. SELF EVALUATION OF THE PROGRESS

- Satisfied



Supervisor's signature



Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: Y4 S1	Study week no: 6
Student Name & ID: Cheok Shen Yao, 19ABC04362	
Supervisor: Dr. Ku Chin Soon	
Project Title: Personal Finance Management System	

1. WORK DONE

- Perform research to have a clear direction to implement Expense Analysis feature.
- Made progress on implementing the Expense Analysis feature.

2. WORK TO BE DONE


- Continue to develop the system.

3. PROBLEMS ENCOUNTERED


- None

4. SELF EVALUATION OF THE PROGRESS

- Satisfied



Supervisor's signature



Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: Y4 S1	Study week no: 7
Student Name & ID: Cheok Shen Yao, 19ABC04362	
Supervisor: Dr. Ku Chin Soon	
Project Title: Personal Finance Management System	

1. WORK DONE

- Finished implementing the Expense Analysis feature.
- Demonstrate the Expense Analysis to Dr. Ku.

2. WORK TO BE DONE


- Perform system testing to verify project's objective.

3. PROBLEMS ENCOUNTERED


- None

4. SELF EVALUATION OF THE PROGRESS

- Satisfied



Supervisor's signature



Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: Y4 S1	Study week no: 8
Student Name & ID: Cheok Shen Yao, 19ABC04362	
Supervisor: Dr. Ku Chin Soon	
Project Title: Personal Finance Management System	

1. WORK DONE

- Performed system testing on Expense Analysis and Retirement Plan.

2. WORK TO BE DONE

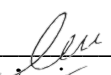
- Start to conduct user survey.
- Implement an Export feature to get participants' expense dataset.
- Prepare survey questions by using Google Form.

3. PROBLEMS ENCOUNTERED


- None

4. SELF EVALUATION OF THE PROGRESS

- Satisfied



Supervisor's signature



Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: Y4 S1	Study week no: 9
Student Name & ID: Cheok Shen Yao, 19ABC04362	
Supervisor: Dr. Ku Chin Soon	
Project Title: Personal Finance Management System	

1. WORK DONE

- Found 10 participants for the user survey.
- Implemented the Export feature.
- Sent the app's APK file for participants to download the app.

2. WORK TO BE DONE

- Improve user interface.
- Start to write report.
- Discuss with Dr. Ku about the report.

3. PROBLEMS ENCOUNTERED


- None

4. SELF EVALUATION OF THE PROGRESS

- Satisfied



Supervisor's signature



Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: Y4 S1	Study week no: 10
Student Name & ID: Cheok Shen Yao, 19ABC04362	
Supervisor: Dr. Ku Chin Soon	
Project Title: Personal Finance Management System	

1. WORK DONE

- Improved user interface.
- Discussed with Dr. Ku about the report.
- Made progress on report writing.

2. WORK TO BE DONE


- Continue to write the report.

3. PROBLEMS ENCOUNTERED


- None

4. SELF EVALUATION OF THE PROGRESS

- Satisfied



Supervisor's signature



Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: Y4 S1	Study week no: 11
Student Name & ID: Cheok Shen Yao, 19ABC04362	
Supervisor: Dr. Ku Chin Soon	
Project Title: Personal Finance Management System	

1. WORK DONE

- Made progress on the report.
- Improved the system.

2. WORK TO BE DONE


- Continue to write the report.
- Further improve the system.

3. PROBLEMS ENCOUNTERED


- None

4. SELF EVALUATION OF THE PROGRESS

- Satisfied



Supervisor's signature



Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: Y4 S1	Study week no: 12
Student Name & ID: Cheok Shen Yao, 19ABC04362	
Supervisor: Dr. Ku Chin Soon	
Project Title: Personal Finance Management System	

1. WORK DONE

- Demonstrated the system to Dr. Ku.
- Finished the report.

2. WORK TO BE DONE

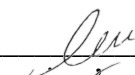
- Finish the report for submission.

3. PROBLEMS ENCOUNTERED


- None

4. SELF EVALUATION OF THE PROGRESS

- Satisfied



Supervisor's signature



Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: Y4 S1	Study week no: 13
Student Name & ID: Cheok Shen Yao, 19ABC04362	
Supervisor: Dr. Ku Chin Soon	
Project Title: Personal Finance Management System	

1. WORK DONE

- Submitted the report.

2. WORK TO BE DONE


- Prepare presentation slide for FYP presentation.

3. PROBLEMS ENCOUNTERED


- None

4. SELF EVALUATION OF THE PROGRESS

- Satisfied

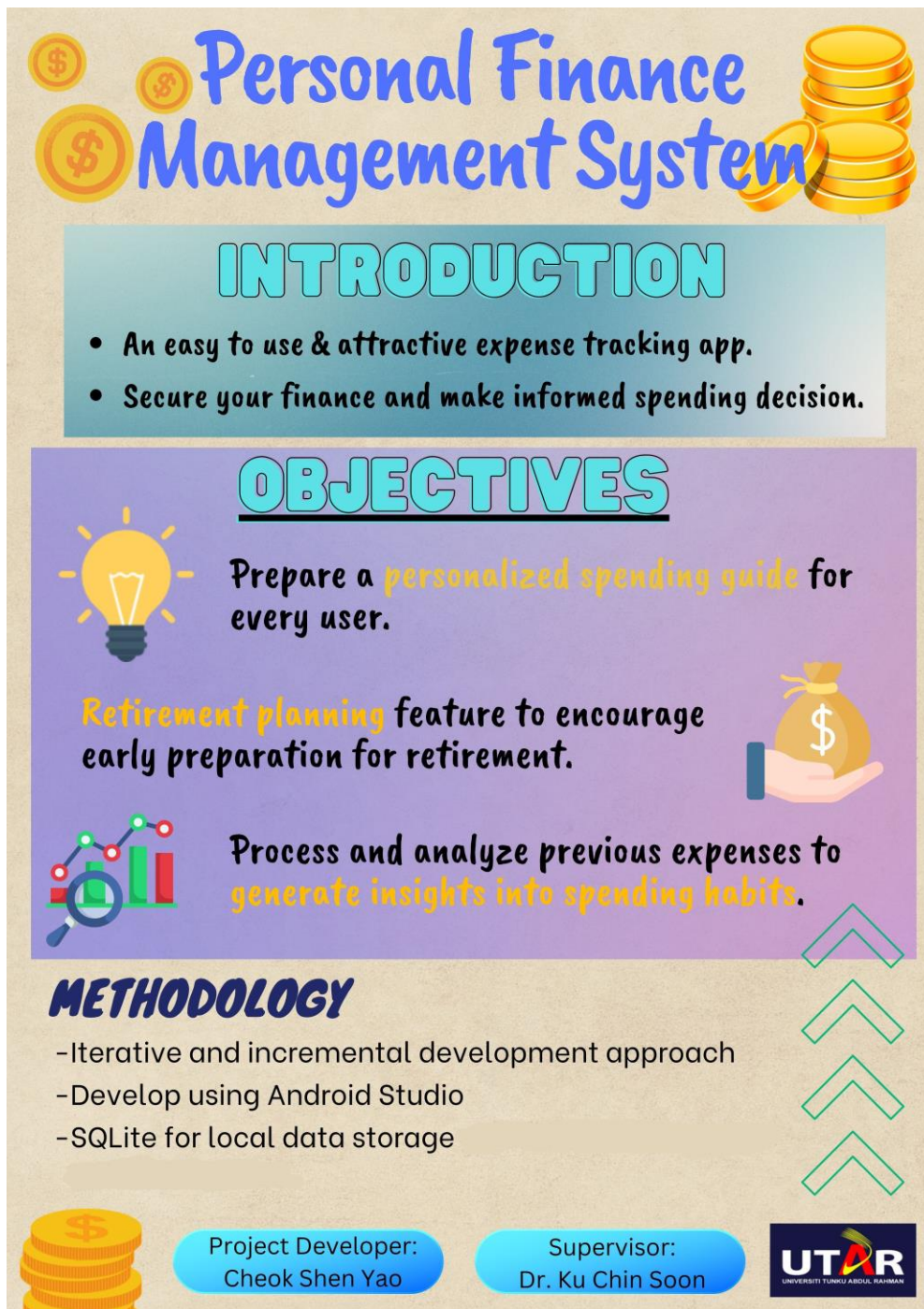


Supervisor's signature



Student's signature

A.1 POSTER



The poster features a title 'Personal Finance Management System' in blue, surrounded by gold coin icons. It is divided into four main sections: Introduction, Objectives, Methodology, and Credits. The Introduction section lists two bullet points. The Objectives section contains three points, each with an icon: a lightbulb for a personalized spending guide, a hand holding a money bag for retirement planning, and a magnifying glass over a bar chart for expense analysis. The Methodology section lists three development approaches. The Credits section identifies the project developer and supervisor. The UTAR logo is in the bottom right corner.

Personal Finance Management System

INTRODUCTION

- An easy to use & attractive expense tracking app.
- Secure your finance and make informed spending decision.

OBJECTIVES


- Prepare a **personalized spending guide** for every user.
- Retirement planning feature to encourage early preparation for retirement.
- Process and analyze previous expenses to generate insights into spending habits.

METHODOLOGY

- Iterative and incremental development approach
- Develop using Android Studio
- SQLite for local data storage

Project Developer:
Cheok Shen Yao

Supervisor:
Dr. Ku Chin Soon



PLAGIARISM CHECK RESULT

Document Viewer

Turnitin Originality Report

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Word Count: 9156
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Title of Final Year Project	Personal Finance Management System

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