

DIET MANAGER

By

LEE CHEE WAH

A REPORT

SUBMITTED TO

Universiti Tunku Abdul Rahman

in partial fulfillment of the requirements

for the degree of

BACHELOR OF INFORMATION SYSTEMS (HONOURS) INFORMATION SYSTEMS

ENGINEERING

Faculty of Information and Communication Technology

(Kampar Campus)

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It is hereby certified that Lee Chee Wah (ID No: 1902956) has completed this final year project/ dissertation/ thesis* entitled “Diet Manager” under the supervision of Abdulkarim Kanaan Jebna (Supervisor) from the Department of Information and Communication Technology, Faculty of Information and Communication Technology.

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ABSTRACT

Mobile applications have become essential for individuals seeking to manage their health and lifestyle, particularly wellness apps that offer self-monitoring and diet tracking features. The project reviews on three of the current existing system, and critically analysed each of their advantages and limitation of the system. The Diet Manager app addresses issues in existing apps, such as lack of motivation and user disinterest, hence, the aim of the thesis is the implementation of better diet calories counting features with providing by implementing timelapse pictures of user progress and a streak system to reward consistency. This project aims to develop an Android app tailored for individuals with weight concerns, incorporating several sub-objectives: a diet management module, weight tracking tool, summary report system, reminder tool, timelapse feature, and streak system. The Phased Development methodology was used, adhering to the System Development Life Cycle (SDLC) for planning, analysis, design, implementation, and testing. The Diet Manager app provides a comprehensive solution for self-monitoring, diet tracking, and motivation enhancement, encouraging users to adopt and maintain a healthier lifestyle. Future improvements could include custom food item addition, personalized dietary recommendations, activity monitoring, and broader platform compatibility, enhancing user experience and increasing the app's utility in the health and wellness sector. In conclusion, the Diet Manager app offers a systematic, high-quality, and user-friendly solution for individuals seeking to manage their weight and improve their overall health.

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CHAPTER 1 INTRODUCTION

With the technological advancements today, mobile application in our mobile devices has increasingly become more and more popular with tools that could ease our daily lives. Mobile applications these days evolved into tools that help individuals take control of their lifestyle and health, especially wellness applications where individuals want to perform self-monitoring and diet tracking with the functions and guidance such as calorie-tracking functions provided by the app. A study showed that more than half of the people in the United States have downloaded at least one health-related app [1]. Part of the motivation for this project is to contribute to the wellness application sector to help users to improve their healthy lifestyles. In this chapter, we present the background and motivation of our research and the outline of the thesis.

Wellness mobile application can be utilized to keep track of users' health and assist them in keeping a healthy lifestyle; it plays a significant role in keeping track of and regulating an individual's weight [1]. The diet managing apps falls under the category of wellness apps. A diet manager app, as its name implies, is a weight management app for users to monitor their diet by performing self-monitoring on themselves. The main functions of these apps include calculating daily food calorie intake, setting targeted weight goals, tracking user daily calorie intake and tracking the progress of the user's diet performance.

The purpose of this proposal is to introduce the background, innovation, problem statement of the topic, motivation of the research, the project scope and objectives of the proposal, the contribution to the field, and the outline of the thesis. The proposal will explain the problem of the diet manager app, which describes the problem of the app requiring users constantly monitor food intake, the lack of explanation of diet apps for users to understand the dieting strategies involved, and the issue of users forgetting to record their meals in the apps. The motivation of the research describes the reasons behind the implementation of better diet calorie counting features by providing detailed guides for users about dieting. Besides that, the scope of the project describes the implementation of a diet managing system into an Android mobile platform for Android users. The contribution describes the implementation of diet management.

1.1 Problem Statement

- i. **Users may lose interest or give up using the app when results do not meet their expectations.**

A dieting app is a tool that user input their efforts to start their dieting journey, and the output would be their desired weight change of the user. But if the results do not favour the user, the user may lose the motivation to continue dieting and may eventually lead to stop using the app. The diet app lacks the features to create something that is meaningful to the user, something that makes the user think that all the effort that the user put into dieting is meaningful in some ways, even if their results do not favour the user.

According to a study conducted [2], the study sought to better understand user views and experiences in order to inform the development of future smartphone applications for health behaviour change. The research identified numerous characteristics that influenced user engagement with the apps. Participants emphasised the importance of personal relevance, which means that the app should be adapted to individual needs and tastes. They also emphasised the importance of user-friendliness, with intuitive interfaces and simple navigation. Users also praised the apps' capacity to provide reliable and accurate information. Social support options, such as discussing progress with friends or joining communities with similar goals, were also deemed beneficial for motivation and engagement.

Such a problem can be solved by implementing a timelapse feature of the user's diet progress. The timelapse feature collects and compiles the pictures taken by users daily throughout their diet progress and makes it into a timelapse of pictures displaying pictures of the user from the beginning of the diet journey until the end of the diet journey. The timelapse can be downloaded and shared with friends. The user can create something about themselves going through a diet journey from the app. Users will find the diet journey that they went through may not necessarily be pointless, and the timelapse that they create using the diet journey can keep them motivated and get back to using the app and continue to diet.

ii. The user lacks the motivation to lose weight.

Dieting app requires the user's constant effort to monitor their food consumption and daily activities routine, but because of this, many users drop off quickly after one or two months of the initial usage of the app [2]. The possible reason behind this can be that users' only interest in using diet apps is because they want to lose or gain weight. If the user loses interest in dieting, they will stop using the app. The diet app lacks certain features to keep the continuous motivation the user had when they first started to use the diet app to diet. Such a problem can be solved by implementing a streak system that can be used to keep the user motivated to use the diet app. Users will collect one streak point for each day they manage to keep their food calorie intake within the limit throughout their dieting journey. As each dieting day goes by, let's say 70 days, the streak points increase up to 70 points, and the user gets to keep their streak. If users missed to collect any of their streak points for the day, they would lose their streak, which means the streak points will be down to 0, and they will have to start all over again. The number of streak points that are accumulated can be used to display or symbolize the amount of hardship and determinacy of a person, and the number can be shared with friends. User will try not to lose their streak because they might think all the effort they put into collecting the streak points daily will all go to waste. This situation may create a habit-forming to keep users using the app, and users will engage more with the app.

In short, there is no good application able to provide the convenience of user input food intakes, detailed explanation on the diet calculation as well as the confidence of the user to app for their time commitment. Thus, there is an agile need for such an application to assist in providing user diet information that users can fully understand and use. The diet manager will provide all the basic diet managing functions such as calories tracking module, weight tracking tool, record and estimate time required to reach weight goal, summary report system to monitor to keep track of diet goal, reminder tool to input daily calories, as well as functions that can keep the interest of the user to continue using the app that other diet app did not have, such as a function to create timelapse of user diet progress and function to count user streak.

1.1.2 Motivation

With the fast-growing development of technology, especially in the mobile application development sector, mobile application not only provides humans with productive functions such as basic calling and messaging or email functions, but they also evolved into tools that help to improve human lifestyle. This is especially true when mobile applications these days provide humans with personal needs such as a self-managing diet. Integrating a diet managing system into the mobile application can supply the needs of individuals who want to manage their weight, and a mobile application is preferable and welcomed by individuals compared to hiring a personal health fitness instructor or attending fitness classes. Hence, the aim of the thesis is the implementation of better diet calorie counting features by providing a timelapse system to create an overview of the user's diet progress using pictures and a streak system to keep the user motivated to use the diet app by having user building streak in the app, to solve the problems of the existing system mentioned.

1.2 Objectives

Main objective: To develop a diet manager system for individuals with weight concerns by implementing the system into an Android mobile application.

Sub-objectives:

1. Develop a diet management module to calculate the user's food calorie intake in every meal.
2. Develop a weight tracking tool to record users' weight and for users to keep track of their weight.
3. Develop a summary report system to monitor user dieting progress to keep track of user diet goals.
4. Develop a reminder tool for users to input user's food calorie intake when the users forget to.
5. Develop a timelapse of the user's diet progress using pictures that the user saves daily for the user to have an overview of their diet progress.
6. Develop a streak system for the user to collect streak points when the user does not exceed their daily calorie intake limit.

1.3 Project Scope and Direction

The expected outcome of this project is a piece of android mobile application software with the diet manager system implemented. The diet manager system is targeted to android mobile phone users with weight concerns looking for an application to monitor their diet.

1.4 Contributions

The contribution of this project is to develop a diet managing system into an Android mobile application with new, improved features such as:

1. Provide a tool for users to create a timelapse of their diet progress by collecting and compiling all the pictures taken by the user daily throughout their dieting journey. The diet manager app must provide a meaningful experience for the user when the user diet. Most diet apps only provide the dieting functions for the user to use, and the output of their dieting journey results is their weight change. But not all dieting results are in favour of the user, and some results may not come out as the user expected. This may create some demotivation or loss of interest for the user to continue their dieting journey, but this is where the timelapse function comes and makes the whole dieting experience more pleasant and meaningful. The user can take a picture of themselves daily throughout their dieting journey, and the app will collect and compile all the pictures in sequence from the beginning of the dieting day towards the end of the dieting day to create a wonderful timelapse of pictures of their body changes. This timelapse can be downloaded into a file and shared with people. This can create a sense of success to congratulate the user for their achievement from the app itself and also creates a sense that the diet journey is not pointless for the user that their weight goal is not achieved and may motivate the user to continue their effort in dieting.
2. Provide an interesting streak system whereby the user continues to redeem daily streak points and does not break the streak whenever the user does not overconsume their daily calorie limit. The diet manager app provides a streak system whereby users can collect a streak point daily in the app if they do not over-consume their daily calorie intake limit throughout their dieting journey. The streak will break if the user does not collect the streak point or over-consumes their daily calorie intake. For example, when a user has been collecting the streak for more than six weeks, which is equivalent to 42 streaks, it creates the urge for the user to keep the streak

for all the effort the user put into accumulating that particular amount of streak points. This creates the motivation for the user to continue on dieting journey, as well as making their dieting journey experience fun. It may also make use to have the continuous use of the app, and as time goes by, the continuous effort will slowly become a daily habit for the user to use the app and record their daily calorie intake.

1.5 Report Organization

The content of this project is displayed in the following five chapters. In Chapter 1, describe the project background, as well as the three problems that the currently existing system has, followed by the motivation of the project, which is to implementation of better diet calorie counting features by providing detailed guides to educate users about dieting, to solve the problems of the existing system mentioned. Then, it also describes four project objectives and the two novelties that contributed to developing the system for the project.

Then, Chapter 2 describes the three previous works on diet manager, which are Lose it!, FatSecret, and MyNetDiary, as well as followed by the limitation for each system faced.

Then, Chapter 3 describes the System Methodology used for the development of this project which is the SDLC Waterwall approach. And the chapter is followed by the system design diagram, which is the use case diagram and the activity diagram. And lastly And lastly the chapter ends with the project timeline, which discusses the duration required for the entire development of the Diet Manager will be divided into two semesters, with each version of the app for each semester to develop.

Then, Chapter 4 describes the System Implementation. And then, the sub-chapter within it describes the Firestore Database Tree-Like diagram and Firebase Realtime Database design which is the database model used for the Diet Manager project. Then the chapter follows with a Sitemap diagram, which discusses the Diet Manger's structure and navigations between pages and functions. Besides that, it also described the UI design of all the pages screen that contains the main functions of the Diet Manager. Lastly, it also discussed the architecture design used for the Diet Manager, which is the Client Server Architectural Diagram.

Then, Chapter 5 describes the System Design and Implementation. The following chapter describes the Hardware Setup required, such as devices used for the implementation of the Diet Manager. Then followed by a brief discussion of the

components of the Software Setup required, such as the Flutter Set-up, Java Set-up, Android Studio Set-up, Firebase Set-up and Mobile Devices Set-up for the implementation of the Diet Manager. Then followed by the discussion of more elaborated and detailed Settings and Configuration required for each of the Software Setup components mentioned previously. Then, followed by the System Operations, which discussed all available operations of each page of the Diet Manager, such as the User Authentication, Page Navigations, Record page, Progress Page, Welcome page, Reminder Page, Timelapse Page, Streak Page and User Profile Page. Then the chapter followed by a discussion on the Implementation Issues and Challenges mentioned, such as user-friendly and intuitive UI/UX, integration with Firebase and Calculation accuracy. And lastly, the chapter ends with the concluding remark, which briefly summarizes all work that is discussed in Chapter 5.

Then Chapter 6 describes the System Evaluation and Discussion. The chapter begins with the system testing and performance metrics, which provide an overview of the system testing performed on the application, focusing on integration testing techniques and their role in ensuring seamless functionality between different components. And it describes the performance metrics used to evaluate the effectiveness of the testing process. Then in the following chapter, discussed the Integration testing was performed on only the major functions of the Diet Managers, which are the Record page, Progress Page, Reminder Page, Timelapse Page, Streak Page and one other function, User Profile Page. And the result of each test performed on each of the functions will be summarized. Then, The following chapter describes some of the project challenges, which are the UI design and Optimizing Performance. Then the chapter followed by the objectives evaluation, which evaluated all project objectives of the project met. And lastly, the chapter ends with the concluding remark, which briefly summarizes all work that is discussed in Chapter 6.

Then Chapter 7 described the Conclusion, which summarized the work done in the whole project. Then the chapter followed by the recommendations which introduced some of the limitations which were difficult for users to add unique food items to their diet plans and the limited tracking of physical which may not track this crucial component of leading a healthy lifestyle of the project and the recommended solutions included a function that lets users design their own food products and include them in their diet plan to get around this restriction and include a feature that enables users to

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CHAPTER 1

manually track their physical activity or interact with fitness trackers to overcome this issue.

CHAPTER 2 LITERATURE REVIEW

This chapter review the previous works on diet management applications available on mobile platforms, focusing on their features, functionalities, and limitations. By examining the strengths and weaknesses of existing diet management applications, this literature review aims to identify potential areas of improvement that can enhance the overall user experience and effectiveness of these apps in helping users reach their weight management goals. This chapter begins with an overview of three popular diet management applications, namely Lose it!, FatSecret, and MyNetDiary, discussing their key features, functionalities, and user interfaces. The the chapter followed by the limitations of these applications, highlighting potential areas for improvement. Lastly, the subsequent sections discussed the details of each application and examine their specific limitations.

2.1 Previous Works on Diet Manager

2.1.1 Lose it!

Lose it! is a diet manager application available on the mobile Android platform. The app was founded in 2008 with the aim of making counting calories simpler. The main objective of the creation of the app is to help individuals to reach a healthy weight by providing them with the proper tools to reach their goals. The app is based on three main key aspects, set goals, track food, and lose weight.

When opening the app, the app will walk through new users with specified steps to help user to set up their weight loss success (Refer to Figure 2.1). There are six steps for the user to set up their profile. Most of the step only requires the user to answer questions and collect feedback. However, we are more interested in reviewing the main functionality of the app, and we will skip between important steps related to the main functions. We skip to the second step, where the user will input their information such as current birthdate, height, weight and gender (Refer to Figure 2.2). Then in the fourth step, the user will input their goal weight and how quickly the user wants to reach the goals. The app will calculate and estimate the daily calorie cap and time for the user to reach their target goal (Refer to Figure 2.3). After the user walkthrough all the steps, the app will lead to the main page of the app. There are four tabs at the bottom of the screen for the user to navigate between them (Refer to Figure 2.4).

We will start with the first tab, which is the Log tab. The Log enables the user to input each meal the user takes in. The app has a search function to browse all types of food and display the calories for each of them (Refer to Figure 2.5). The top part of the page shows the maximum number of daily calories for the user to keep track of (Refer to Figure 2.6).

The next tab is the Goals tab. The Goals tab shows the current progress of the user's diet. It keeps track of the user's weight by daily by having user to enter their weight occasionally. The app will make adjustment according and estimate the number of days left for the user to reach their goals (Refer Figure 2.7).

The next tab which is the My Day tab. The My Day tab shows a simple summary of the daily and weekly calories intake by the user. It also shows the daily streak of the user following according to the recommend calories intake (Refer Figure 2.8).

The last tab is the Social tab. The social tab allows users to post their thoughts and messages in the community for other users that uses the app to see. The user can add friends and message them using the app (Refer Figure 2.9).

The apps have the features for user to set reminder for user to input their calories intake in case the user forgets (Refer Figure 2.10).

The strength of Lose it! are that it the user interface is very easy for user to view and understand. For example, the main tab which is Log tab shows all the information the user needs to keep track of their calorie intake which makes it very straightforward and very easy for the user's eye to navigate the content instantly. There are only four simple tabs for user to navigate, which the app simple to use for all ages, especially to users that are not familiar with using mobile phone. The app also has a broad directory of all types of food information and its calories for user easily input their food calories in each meal without the user to enter the calories of the food taken themselves.

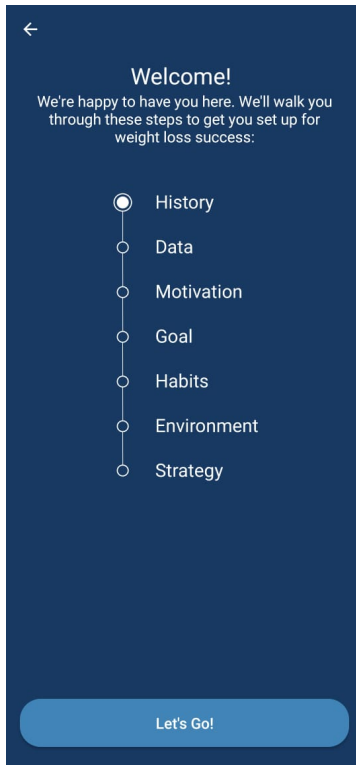


Figure 2. 1 The setup page for user

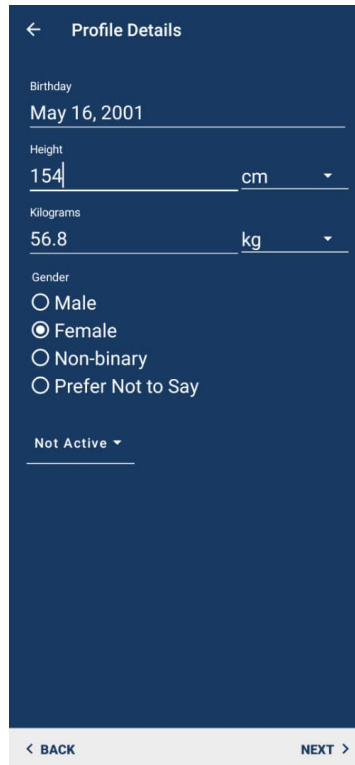


Figure 2. 2 The user basic information

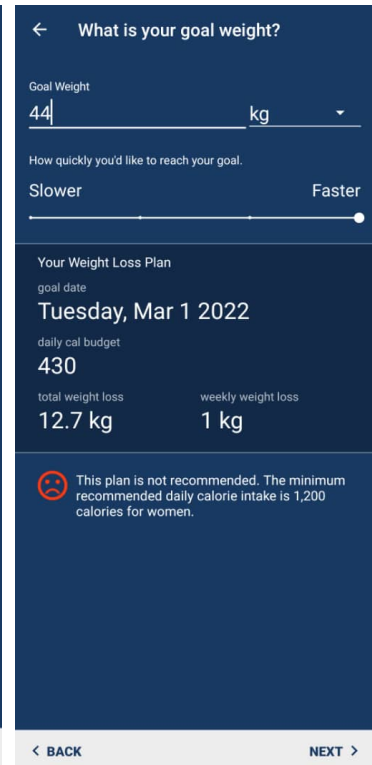


Figure 2. 3 The user calculated weight plan

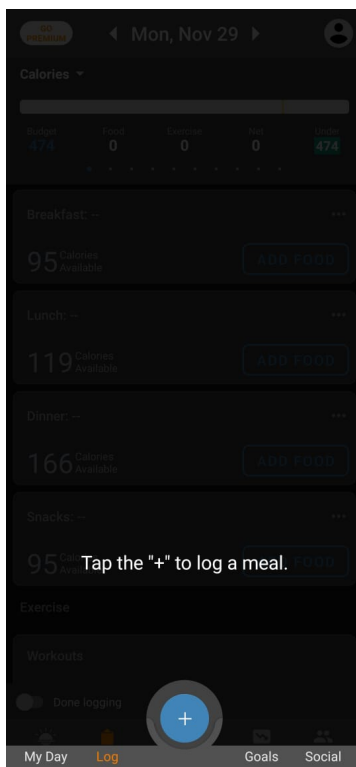


Figure 2. 4 The navigation tab of the app

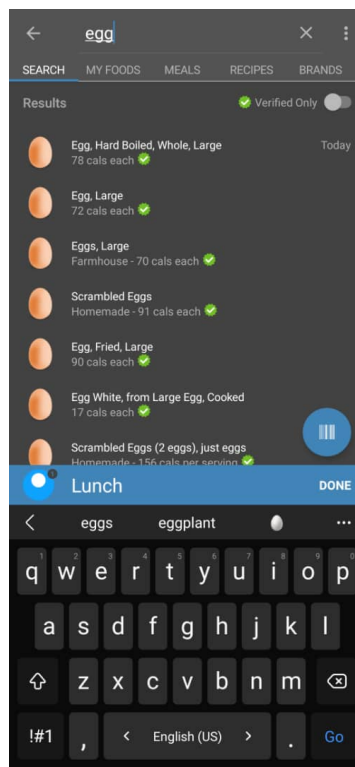


Figure 2. 5 The search food function of the app

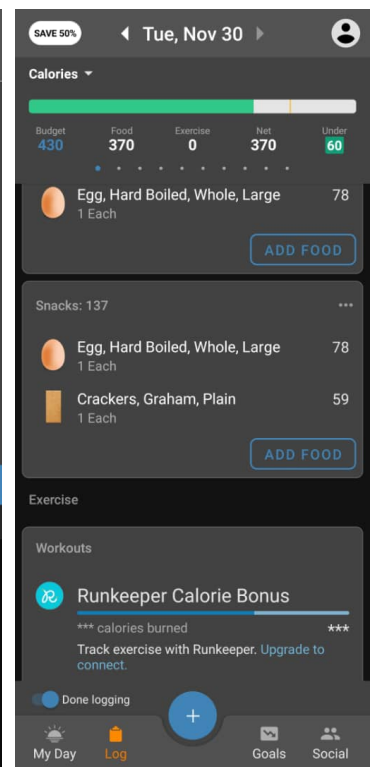


Figure 2. 6 The Log tab in the app

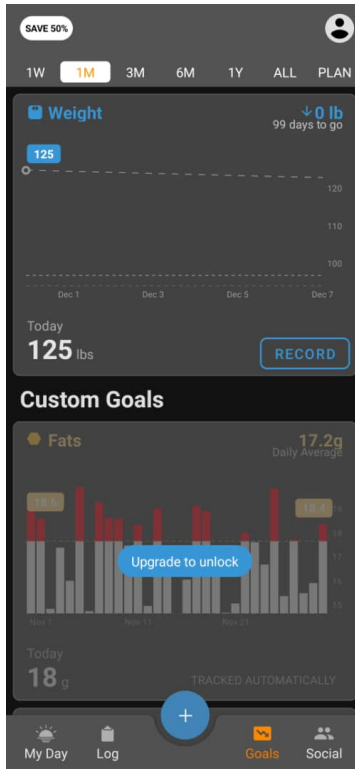


Figure 2. 7 The Goals tab in the app

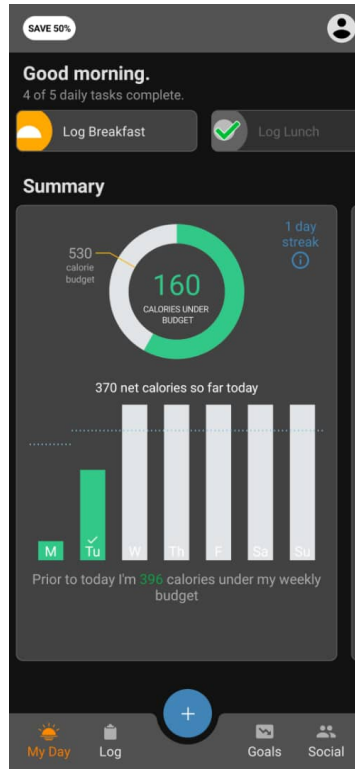


Figure 2. 8 The My Day tab in the app

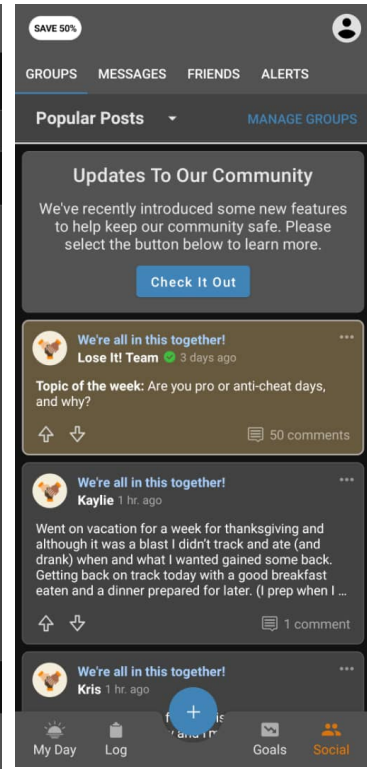


Figure 2. 9 The Social tab in the app

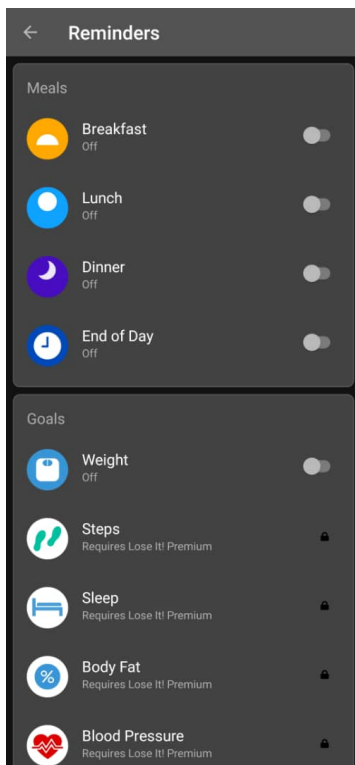


Figure 2. 10 The Reminder functions in the app

2.1.2 FatSecret

FatSecret is a diet managing app available for Android mobile platform. The app was founded in 2007 in Melbourne, Australia by Lenner Moses and Rodney Moses. The main objective of this app is for calorie counting and meal tracking.

When opening the app, the app will walk through the user with few questions to help user to calculate the recommended daily calories and set up the profile (Refer Figure 2.11). The question will have user to answer their targeted goals, gender, activity level, current weight, height, birthdate, region and how fast the user wants to achieve their goal. The app will use the information gathered by the user and calculate the recommended daily calories intake and the estimated time required for the user to lose weight (Refer Figure 2.12). After setting up the user profile, the app led the user to their home page in the app. There are 4 tabs at the bottom of the app for user to navigate between tabs.

The first tab is Diary tab. The Diary tab displays the daily recommended calories intake for user to follow (Refer Figure 2.13). The apps allow user to enter the food they consumed for each meal. The apps allow user to input their meal by searching their food in their app (Refer Figure 2.14).

The next tab is Reports tab. The Reports tab displays the daily and weekly calories intake of the user in the form of bar graph (Refer Figure 2.15). There are other sections in this page as well, such as Macros that display the nutrients of the food taken by the user for the day (Refer Figure 2.16). The other sections which is the Nutrients, show more detailed version of the nutrients of the food taken by the user for the day (Refer Figure 2.17).

The next tab is Weight tab. The Weight tab tracks the weight of the user daily, by having user to input their weight in the app occasionally. The app will keep a record of the weight daily and display the amount of weight left to reach the targeted goal (Refer Figure 2.18).

The last tab is Home tab. The Home tab shows the diet progress of other users that using the app (Refer Figure 2.19). The user can share their progress in the app for other users to see as well.

The app also has the options to set reminder for user to do task (Refer Figure 2.20). User can set the reminder to weight themselves, or to input the food taken in each meal to remind user in case they forget.

The strength of the FatSecret app is that it provides user with very detailed information such as the nutrients of the food taken by the user for the day. The app also has a wide and huge database of types of food and its calories for user to search and input their food intake for each meal. The app has a simple UI which makes the content easy for user to navigate around the app. The app also has diet calendar where it allows user to record the activities performed by the user everyday (Refer Figure 2.21).

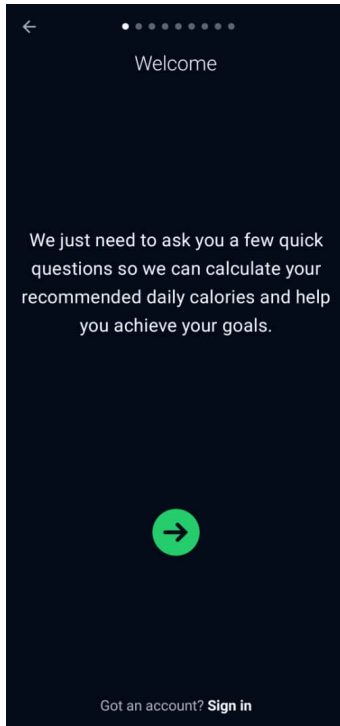


Figure 2. 11 The question s for user to set up their diet plan

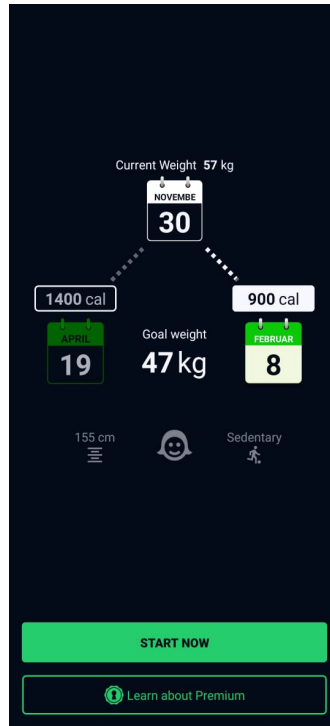


Figure 2. 12 The recommended diet plan set up by the app

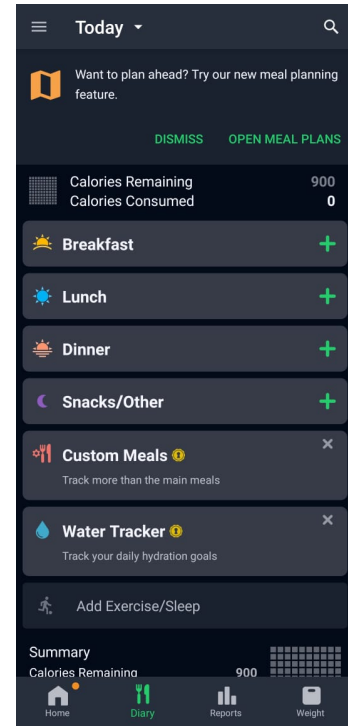


Figure 2. 13 The Diary tab of the app

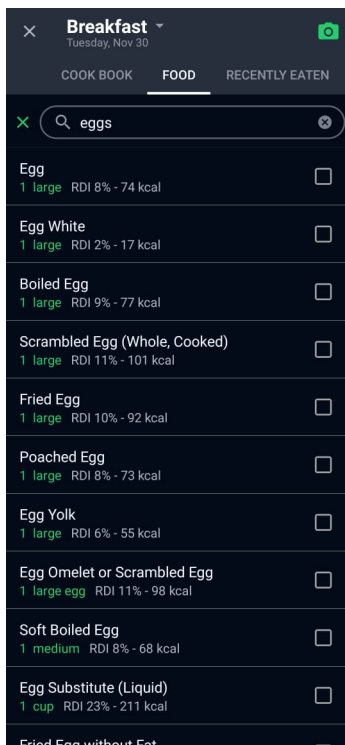


Figure 2. 14 The search function of the app

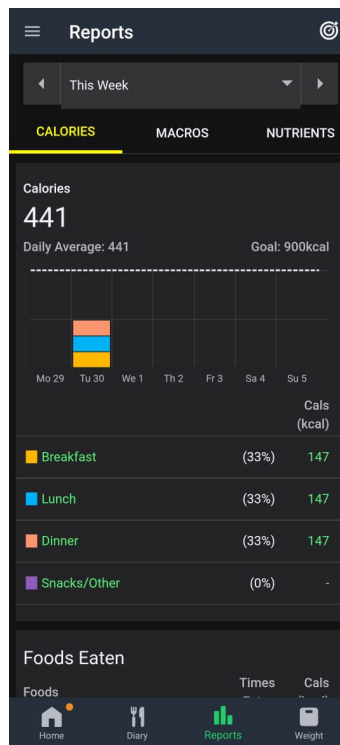


Figure 2. 15 The Report tab of the app

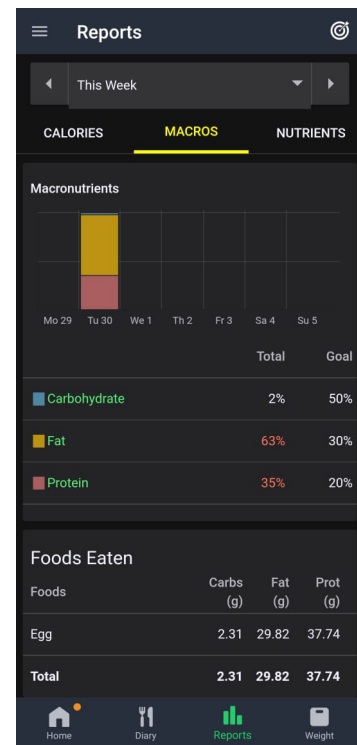


Figure 2. 16 The Macro section of the Report tab in the app

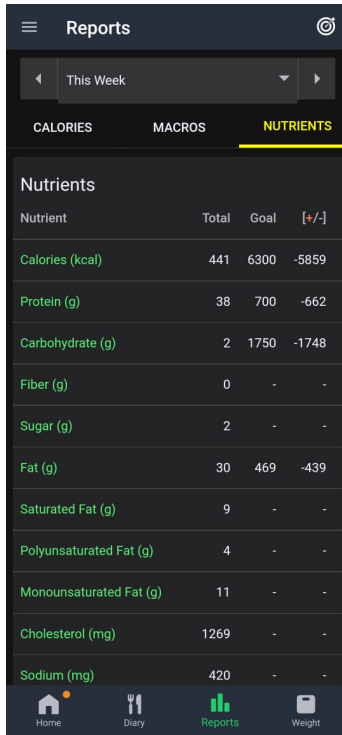


Figure 2. 17 The Nutrients section of the Report tab in the app

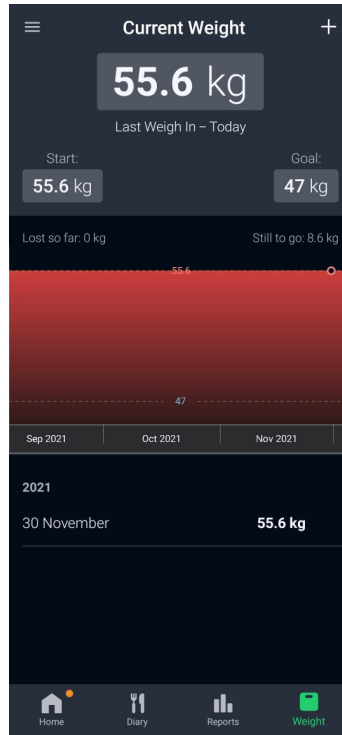


Figure 2. 18 The Weight tab of the app

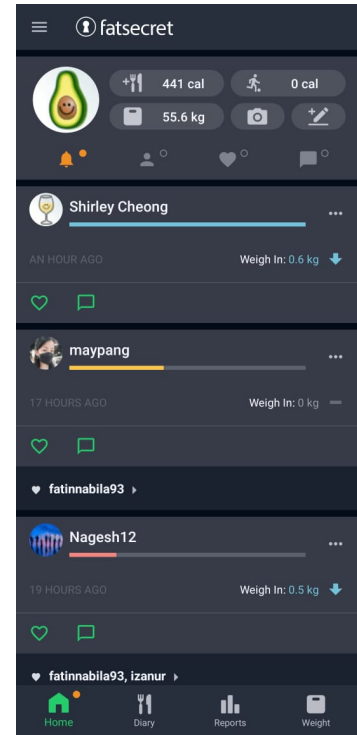


Figure 2. 19 The Home tab of the app

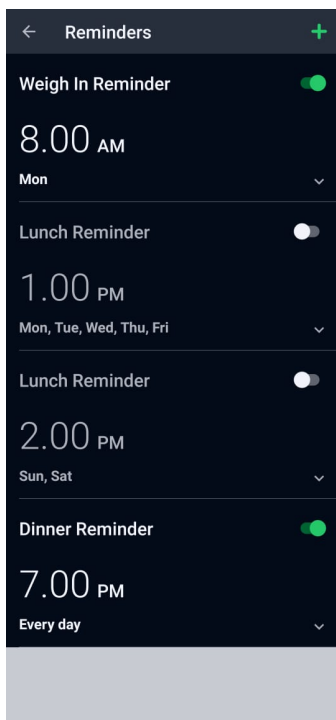


Figure 2. 20 The reminder function of the app



Figure 2. 21 The Diet Calendar planner for the app

2.1.3 MyNetDiary

MyNetDiary is an online wellness application available for both Android and iOS platform. The app was launched in 2007. The application main purpose served as calories and exercise tracker.

When opening the app, it immediately questioning the last meal the user had (Refer Figure 2.22). Then the app led the user to enter the food they had of the last meal. The app has the search functions to search all type of food and shows its calories for each food (Refer Figure 2.23). After adding the last meal, the app will record calories of the food for that meal and led user to the main page which is the Dashboard (Refer Figure 2.24).

The app has four tabs at the bottom of the screen for user to navigate between them. The first tab is the Dashboard tab. It displays the calories intake for each meal of the day and user create the calorie budget plan at the page. It begins setting up user profile by asking question such as gender, height, birthdate, current weight, and target weight goal. After setting up, the app will recommend the calorie budget for the user to follow, and the app will track the calories intake left for the day (Refer Figure 2.25). Besides that, the page also shows the total nutrients of the food user consume for the day.

The next tab is Coach tab. The Couch tab displays and tracks the progress of the diet. It provides the estimation of number of days required for the to reach their target weight goal (Refer Figure 2.26).

The next tab is Diet tab. The Diet tab shows different types of diet plan for user to choose from (Refer Figure 2.27). When user select the diet plan, it will explain to the user about the selected diet plan, but the features is only available for paid users with premium plan (Refer Figure 2.28).

The last tab is the Me tab. The Me tab shows the other functions of the app such as Recipe Import, for user to import recipe from external sources, Recipe Database for user to search food information, Measurements for user to save their blood pressure and Personal Info for user to update their profile information (Refer Figure 2.29).

The app also has the functions to Set Reminders for user to record their food every meal in case they forget (Refer Figure 2.30). The app also has functions to link the app with fitness trackers devices (Refer Figure 2.31).

The strength of the app is that it is very straightforward and easy to use. As an example, all the main functions such as calories tracking and estimation of number of days required to reach targeted goals displayed in simple way where user can understand immediately. The app also has broad database of many types of food for user to search when recording their meals which makes it easy for user to obtain information of the food.

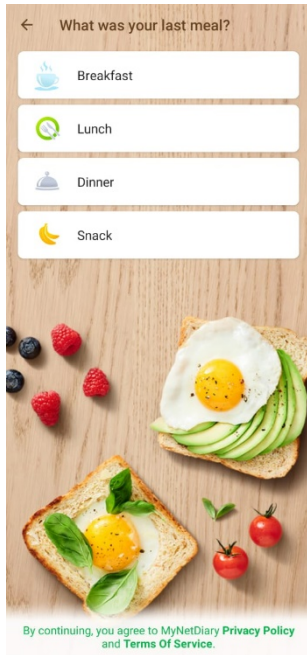


Figure 2. 22 The app requesting user last meal

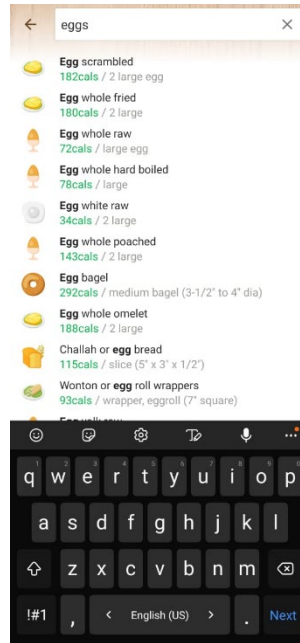


Figure 2. 23 The app have search function

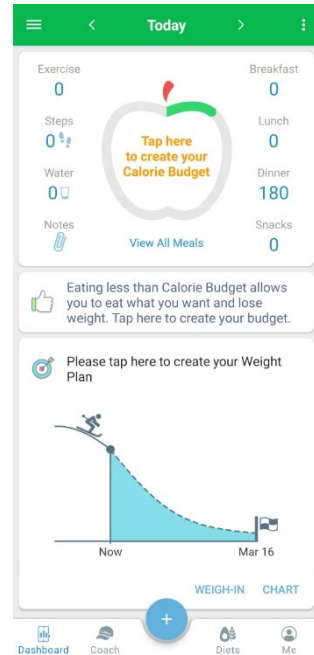


Figure 2. 24 The Dashboard tab app show calories intake for every meal

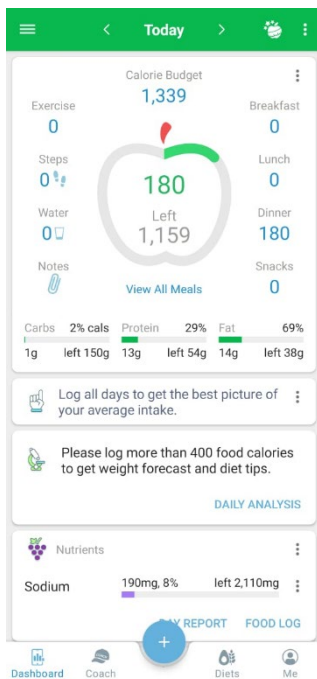


Figure 2. 25 The Dashboard tab app show daily calories budget

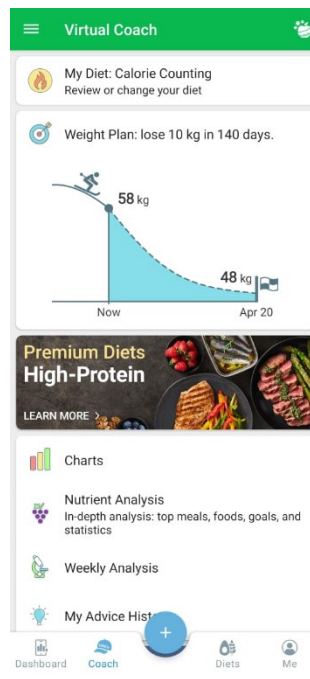


Figure 2. 26 The Coach Tab at the app

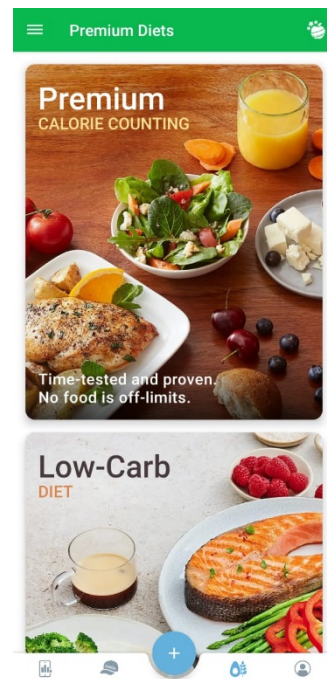


Figure 2. 27 The Diets Tab at the app

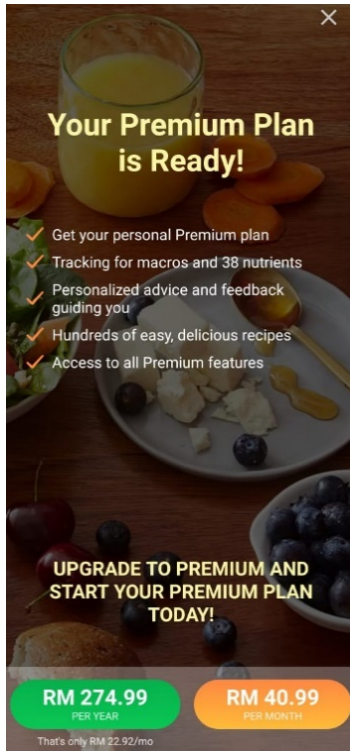


Figure 2. 28 The premium functions of the app

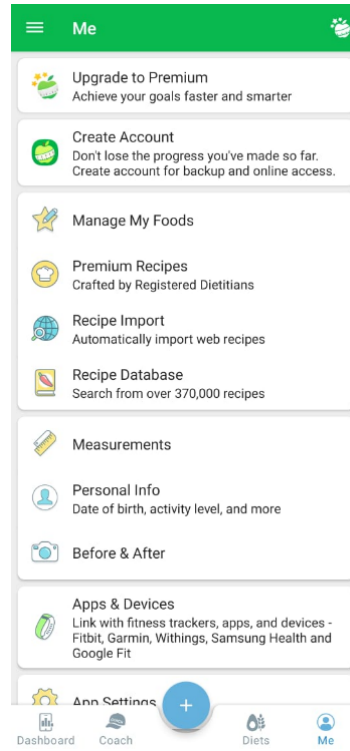


Figure 2. 29 The Me tab of the app

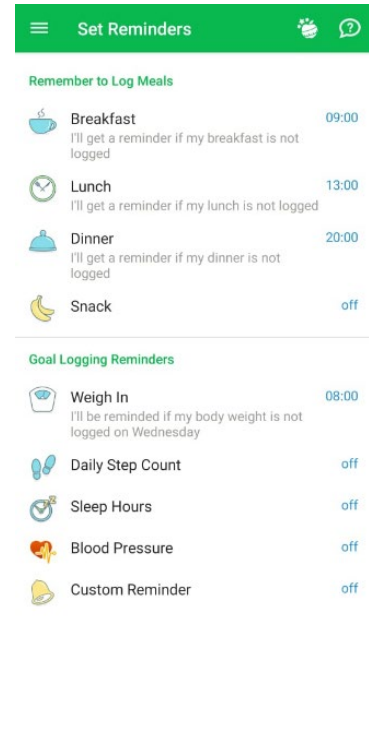


Figure 2. 30 The set reminder function of the app

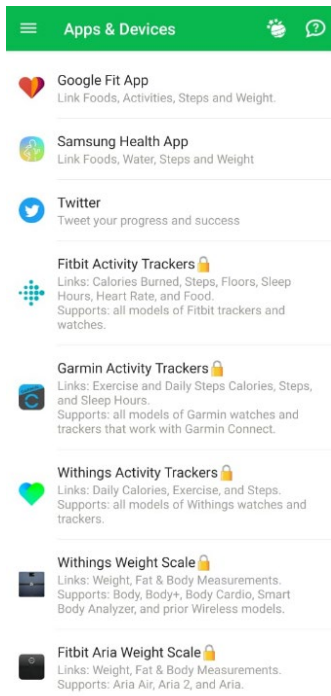


Figure 2. 31 The set reminder function of the app

2.2 Limitations of Previous Studies

2.2.1 Lose it!

The app did not show the estimated days left for the user to achieve the targeted weight goal. Besides that, the app should also include features that are interesting that can create continuous user interest using the app, such as users can create something meaningful from the app, for example, a timelapse of pictures of themselves and collecting streak points to keep the streak throughout their dieting progress.

2.2.2 FatSecret

The summary report in the app does not estimate the days for the user to reach their targeted goals. Instead, it only shows the remaining weight for the user to lose. I find this information to be very less helpful, especially when users are eager to check if they can see results and if they can shorten the time required to lose weight if they lose weight faster than what is recommended by the app. The app should include and update the estimated dates or days left to reach their targeted goals every time the user updates their body weight to the app. Motivation is an important aspect that should be implemented in diet apps for users to stay motivated, for example, by providing real-time feedback and digital personal instruction [3]. Beside that, the app does not explain how calorie counting works in managing weight loss; this is important, especially to those users that are new to the dieting plan and needs to understand more about how dieting works. The app should explain the scientific and technical studies for users to understand how the app manages diet according to studies. Like the previous system, the app should also include features that are interesting that can create continuous user interest using the app, such as a timelapse of pictures of themselves and collecting streak points to keep the streak throughout their dieting progress.

2.2.3 MyNetDiary

The app did not show the estimated days left for the user to achieve the targeted weight goal. Similarly to the previous method, the app does not explain how calorie counting works in weight loss management; this is significant, especially for users who are new to the dieting plan and need to learn more about how dieting works. Users should be able to grasp how the app regulates nutrition based on scientific and technological research if the app explains the scientific and technical studies. The app

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should have engaging elements that will keep users interested in using the app, such as a timelapse of themselves and accumulating streak points to keep the streak going throughout their dieting process.

CHAPTER 3 SYSTEM METHODOLOGY/APPROACH

This chapter describes the system methodology used in the development of the Diet Manager app. The planning, analysis, design, implementation, and testing phases of the app's development are covered in this chapter using the System Development Life Cycle (SDLC) methodology. In addition, the topic of phased development is covered, emphasising how the app is split into two versions with different functionalities. The details of each phase are covered in-depth in each section of this chapter, giving a thorough understanding of the process used to create the Diet Manager app.

3.1 System Methodology

The methodology used to develop the proposed system will be based on the System Development Life Cycle (SDLC), which uses a phased development model. The goal of the SDLC is to provide an organised method for developing software, ensuring that the finished product is of high quality, satisfies user requirements, and is delivered within the allotted budget and time limitations. Its ability to reduce risks and support efficient resource management underpins its significance. The system's success and functionality are ensured by the five phases of the development process: planning, analysis, design, implementation, and testing. Each of these phases is essential to the systems' success.

3.1.1 Planning Phase

The planning phase will be gathering information on the existing system by reviewing other diet manager apps. This phase will determine all the basic functions and the expected output of the diet managing app, such as calorie counting, tracking diet progress functions etc. The project's goals, criteria, and specifications are set during this phase, along with its needs. Finding out about current methods and assessing their advantages and disadvantages can assist in determining the gaps that the new diet management software can address. To make sure the app satisfies the demands of those who are its intended audience, it is crucial to identify the core capabilities and desired results. In this phase, the project's feasibility is also evaluated, along with the cost, availability of resources, and timeline needed for success. Therefore, careful planning is essential to guarantee the project's success and to reduce the possibility of costly mistakes and delays during later stages of development.

3.1.2 Design Phase

The design phases will start with creating the diet manager app design of all the defined functions of the diet manager app. In this stage, it is required to visually translate the user interface and functionality of the app using the project's main objectives and sub-objectives. Then the project can begin by developing a thorough design for each of the specified features of the diet manager app, including the diet management module, the weight tracking tool, the summary report system, the reminder tool, the timelapse tool, and the streak system. The architecture, layout, navigation, and user experience of the app will all be included in the design. This step is crucial because it makes sure that the app's features and functionalities work together effectively and efficiently, resulting in a user-friendly and simple to use app.

3.1.3 Implementation Phase

The implementation phases will start implementing the diet manager functions according to the design phase. All the functions of the app will be implemented at this phase. In this phase, the project will place the Diet Manager's features and functions into operation in accordance with the design guidelines established in the previous phase. In order to produce an app that is fully functioning, this phase entails writing the app's code and integrating all of its features and components. The implementation stage is crucial since it is here that the software takes shape and where its original idea materialises. The project will ensure that all app's features perform well together and are user-friendly. The Diet Manager app were developed and improved during the implementation phase to make sure it satisfied the project's goals and user requirements. The Diet Manager app were checked and ensured that the app runs properly on the Android platform during this phase. The Diet Manager app will be prepared for testing and deployment after the implementation step has been successfully completed. The implementation stage is a crucial step in the creation of the Diet Manager app, and its accomplishment defines the functionalities that satisfies the objectives of the project.

3.1.4 Testing Phase

The testing phase will run and test the diet manager app to see if all the functions work. The Diet Manager app's testing phase is an important stage in its development. The project team will use the app during this phase to test and confirm that all of the features and functions operate as planned. Finding any mistakes, flaws, or glitches that

might have appeared during the development and implementation phases is the goal of the testing phase. The system will be tested using integrated testing, which verifies that all of the app's elements and interactions operate as intended. This kind of testing is necessary to make sure the app performs as intended and achieves the project's goals. The testing stage is crucial since it makes sure the Diet Manager app were prepared for deployment. Testing guarantees that the app is dependable, safe, and operates well on the Android platform.

3.1.5 Phased Development

The Diet Manager app's Phased Development is a crucial strategy that manage the project's complexity. The development of the overall system will break into two series of versions that will be developed in series. The first version of the system consisted of all the basic functions of the diet app, such as calorie counting calculation, recording calorie intake daily, tracking diet progress with the user's weight and reminders for the user to input food intake in every meal or end of the day. Prior to moving to the second version, the app will be tested in the first version to make sure it satisfies the project's objectives and user needs. The second version will implement advanced features such as providing diet teachings and guidance for the user to follow, an explanation of how dieting works to the user and a display summary report for the user to view overall performance.

3.2 System Design Diagram

3.2.1 Use Case Diagram

The following (Refer to Figure 3.1) use case diagram described all the functions that the user can perform on the Diet Manager app.

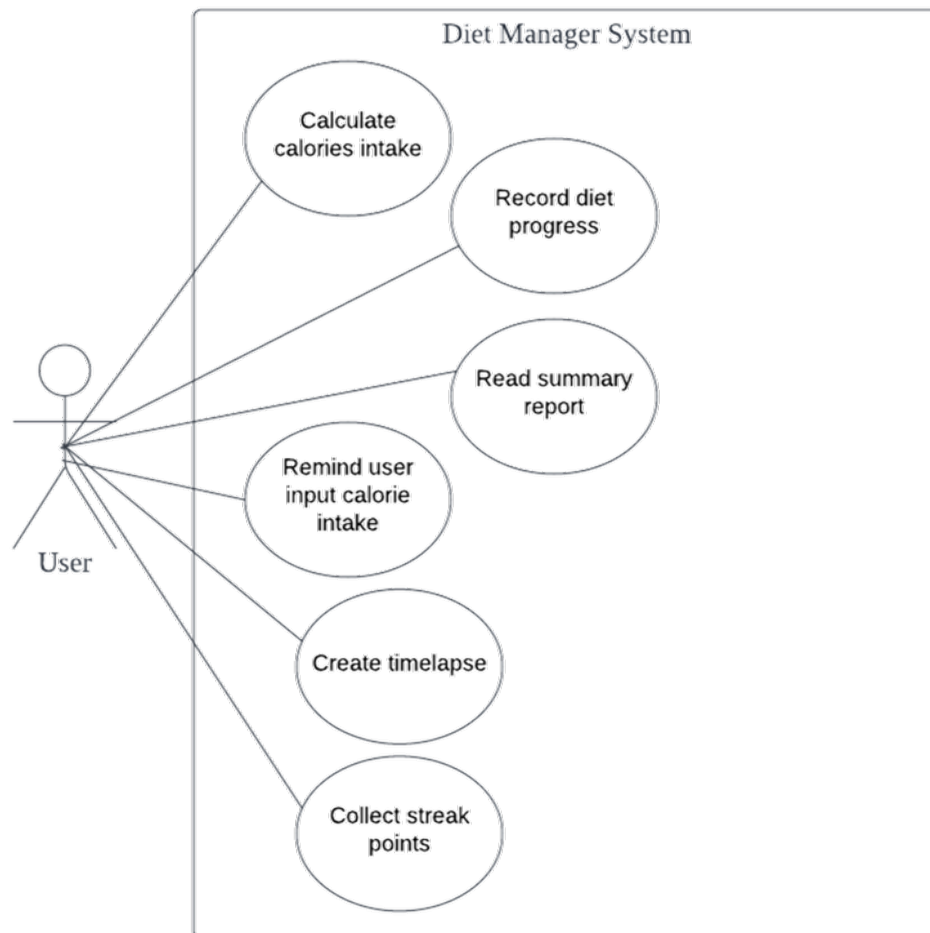


Figure 3. 1 Use Case Diagram

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This use case in Figure 3.1 described all the available functionality implemented in the Diet Manager app. The actor in the use case is a any user who are dieting that uses the Diet Manager system an an android device. The user can perform all six of the Diet Manager’s main functionalities in the android device which are calculate calories intake, record diet progress, read summary report, remind user input calories intake, create timelapse and collect streak points.

3.2.2 Activity Diagram

The following activity diagram (Refer Figure 3.2) describe the processes of action carried out by each use case function.

i. Calculate calories intake

Calculate calories intake

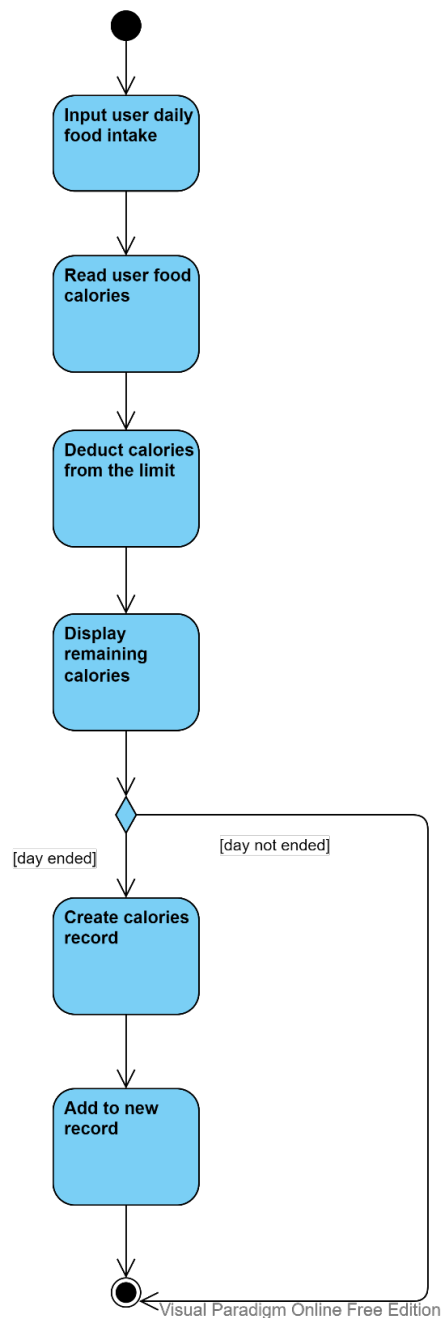


Figure 3. 2 Calculate the calories intake function

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The Figure 3.2 described the calculate calories intake function of the Diet Manager. The process begin by user entering their daily calories intake into the app, Then inputted user calories will be read by the app. The app will deduct the daily calories intake limit with the inputted user calories to produce and display the remaining calories. Add the end of the day, app will create a new calories record from the user added calories.

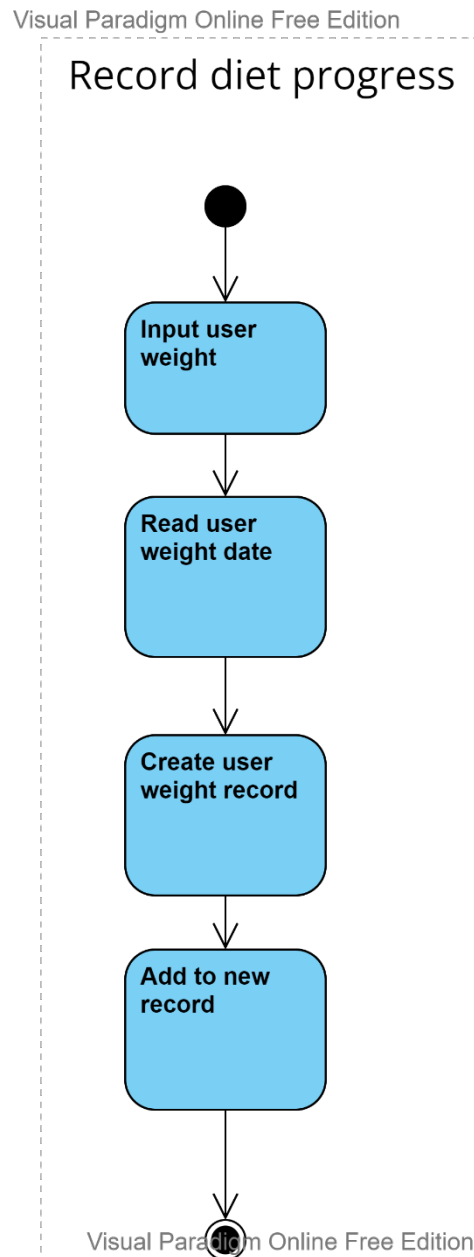
ii. Record diet progress

Figure 3. 3 Record diet progress function

The Figure 3.3 describe the record diet progress function. The process begin by user input the user weight into the app. The app then read the user weight date together with the user added weight to create a new weight record. Then the app will add and create a new weight record to the app.

iii. Read summary report

Read summary report

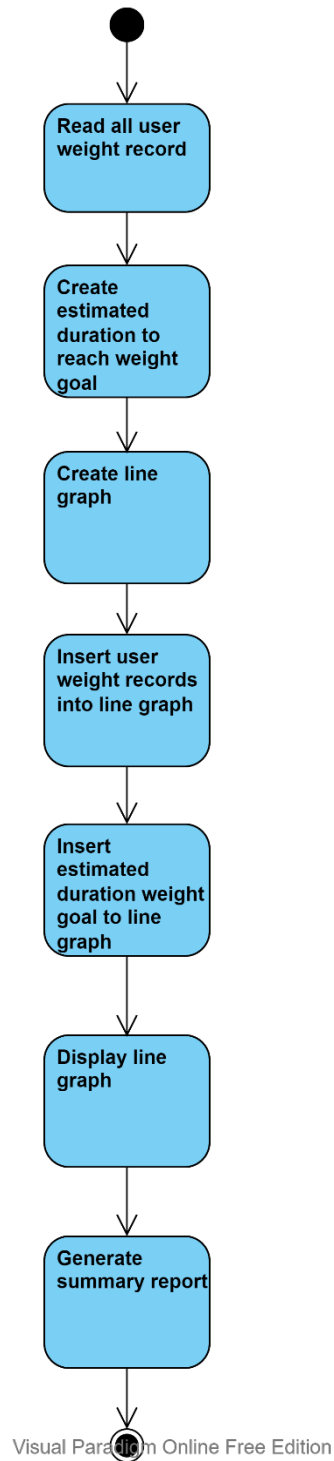


Figure 3. 4 Read summary report function

The Figure 3.4 describe the read summary report function. The app will read all the user added weight record then with it to create estimated duration for user to reach weight goal. Then the app will create a weight graph and insert all the user added weight and also the estimated estimated date for user to targeted weight goal into the line graph. The line graph are displayed to the user. A short summary report will explain about the graph and the target weight goal date of the user.

iv. Remind the user to input calorie intake

Remind user input calorie intake

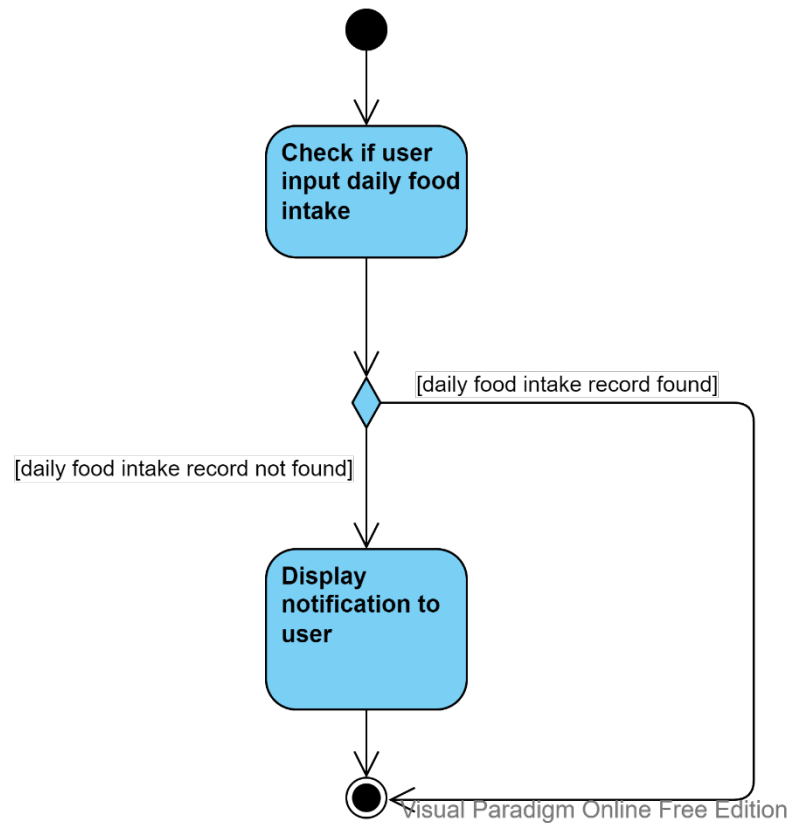


Figure 3. 5 Remind user input calorie intake function

The Figure 3.5 describe the remind user input calories intake function. The process begin the app checking if the user have inputted the daily food intake for the day. If the user did not, then the app will create a reminder notification to remind user, if user did, then nothing will happen.

v. **Create timelapse**

Create timelapse

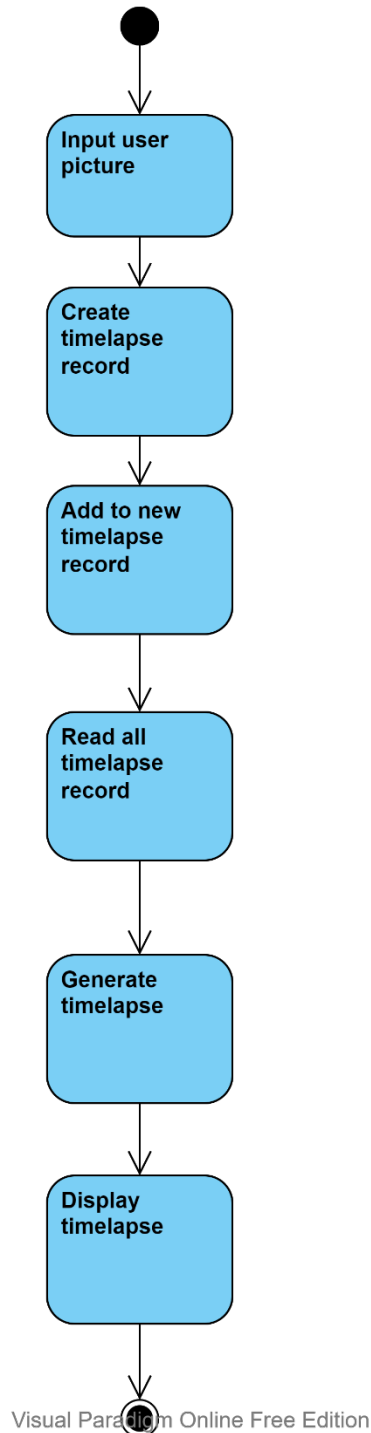


Figure 3. 6 Create a timelapse function

CHAPTER 3

The Figure 3.6 describe the create a timelpase function. The process begin by user input use picture into the app. Then will all the user inputed picture, to create and add a timelpase record. Then the app will create the timelapse video. The timelapse can be displayed.

vi. Collect streak points

Collect streak points

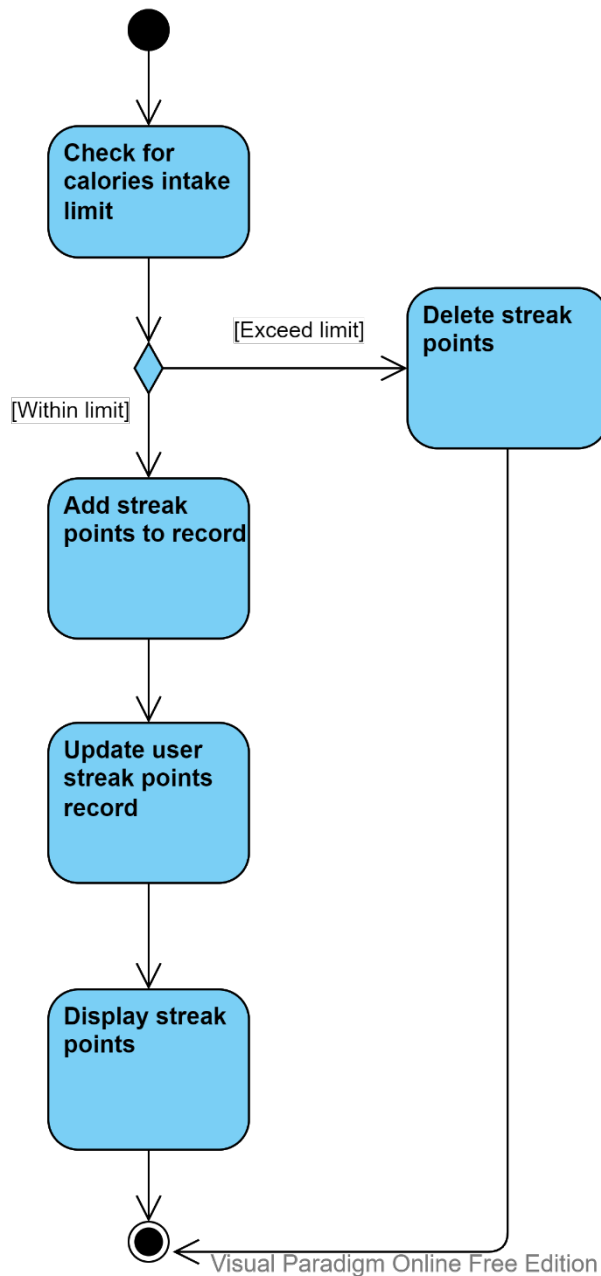


Figure 3. 7 Collect streak function

The Figure 3.7 describe the collect streak function. The process begin by the app check for calories intake limit, if the calories intake is within the limit, then user are entitled to redeem one streak point for the day, and the user's streak point record were updated

and displayed. If the user exceeded calories intake limit, then the app will deduct 5 streak points as penalties.

3.3 Project Time

The duration required for the entire development of the diet app manager will be divided into two semesters, with each version of the app for each semester to develop. The approximate duration of the first version of the app will be completed within six weeks (Refer to Figure 3.8), while the second version will require 12 weeks to complete (Refer to Figures 3.9 & 3.10). The expected deliverables for the first semester will be the prototype of the app displaying the UI and the page navigation for all the functions in the app, as well as three prototype diet functions to be implemented into the diet app. The functions include the streak function, timelapse function, and calorie counting function. The expected deliverables for the next semester will be all six full working functions of the diet app with UI design implemented.

3.3.1 Gantt Chart

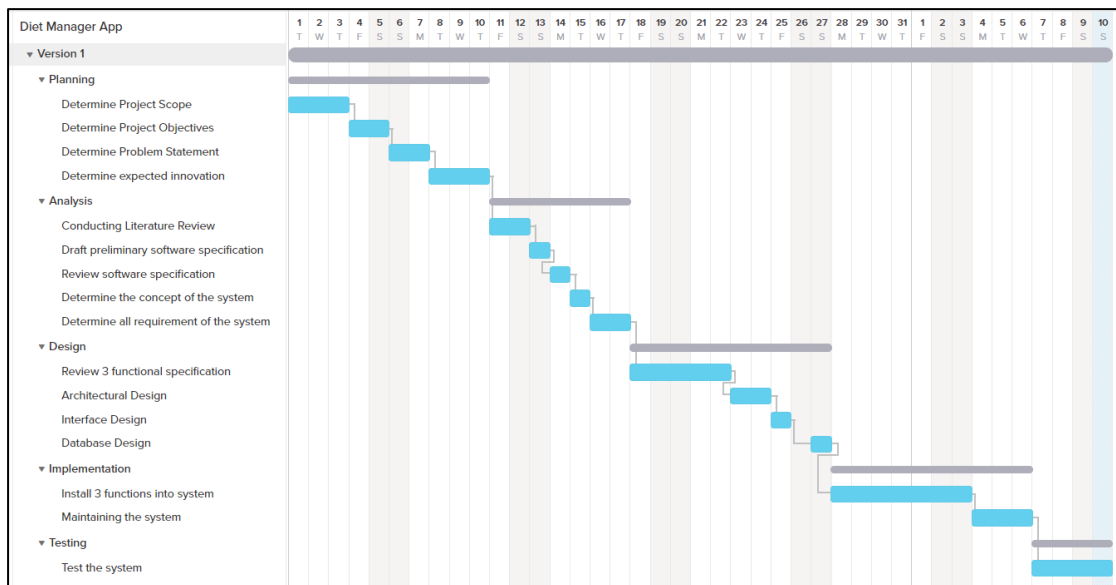


Figure 3. 8 Gantt Chart for the First Version of the app in the first semester

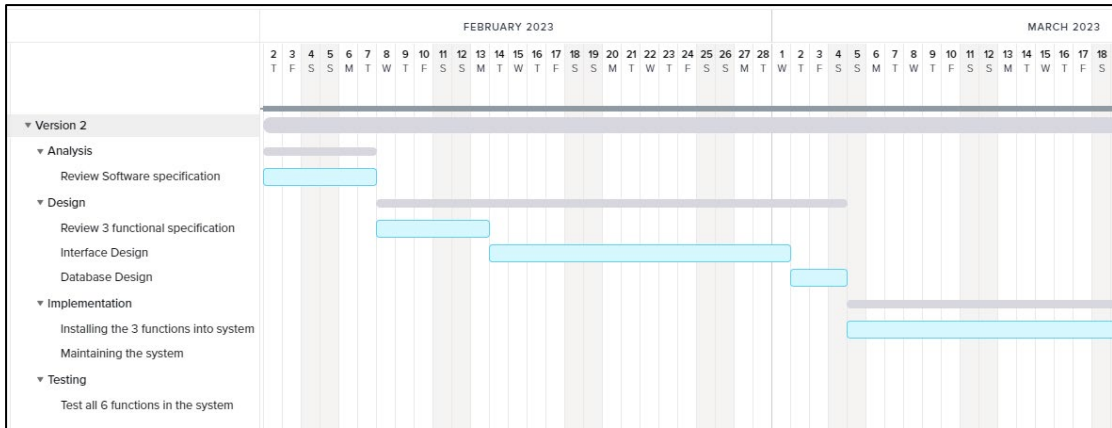


Figure 3. 9 Gantt Chart for the Second Version of the app in the second semester (part 1)

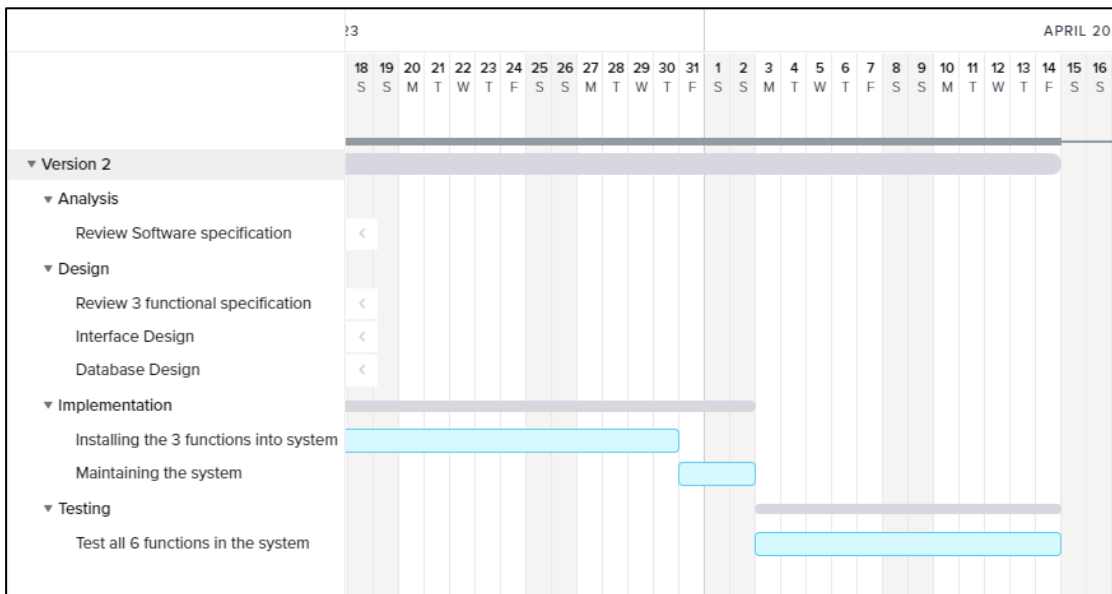


Figure 3. 10 Gantt Chart for the Second Version of the app in the second semester (part 2)

CHAPTER 4 SYSTEM DESIGN

This chapter presents the system design of the Diet Manager application, focusing on its database structure, sitemap, user interface (UI) design, and client-server architectural design. This chapter aims to provide a comprehensive understanding of the application's structure and functionalities by discussing the Firebase Firestore and Firebase Realtime Database structures in tree-like formats, outlining the sitemap and main pages, delving into the UI design of key screens, and explaining the client-server architectural design. By discussing these aspects, this chapter intends to provide a comprehensive overview of the application's structure and its underlying functionalities.

4.1 Firebase Firestore Tree-Like Structure

The database used in the project is Firebase Firestore and Firebase Realtime Database. The Firebase Firestore and Firebase Realtime Database structures were represented using Firebase Tree-Like Structure.

The diagram below shows the Firebase Firestore database structure in Tree-Like Structure.

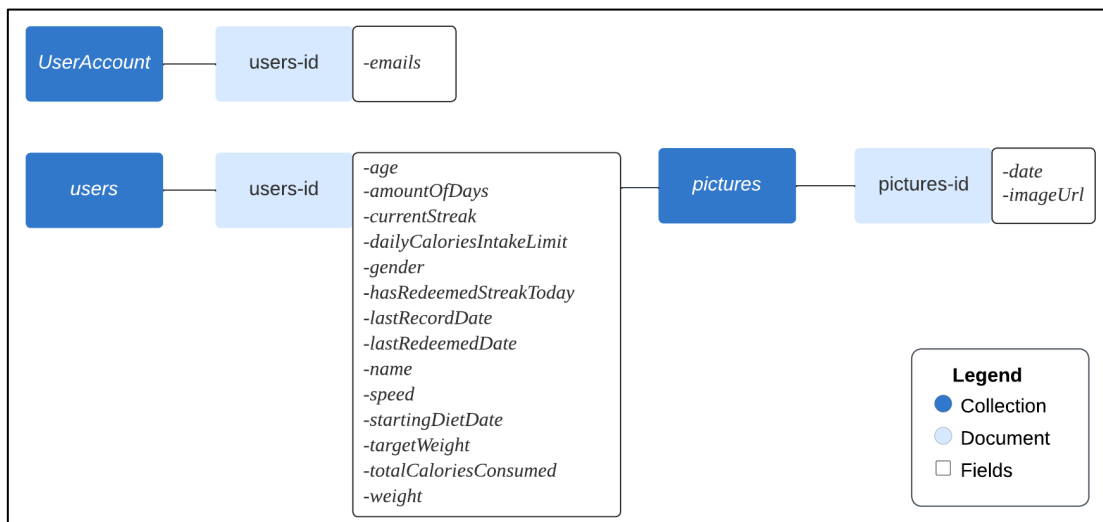


Figure 4. 1 Firebase Firestore Tree-Like

Cloud Firestore is a document-oriented, NoSQL database. There are no tables or rows like there are in a SQL database. Instead, data is saved as documents that are arranged into collections. Each document has a collection of key-value pairs. All documents are kept in collections. Documents can include subcollections and nested objects, both of which can contain simple fields like strings or complex objects like lists. In the Figure

above (Figure 4.1), the dark blue box was used to represent the Collection, and the light blue box was used to represent the Documents.

The “UserAccount” is a Collection, and within it consists of a Document called “users-id”. And within the “users-id” Document consist of the field “emails”.

The “users” is a Collection, and within it consists of a Document called “users-id”. And within the “users-id” Document consist of the fields “age”, “amountOfDays”, “currentStreak”, “dailyCaloriesIntakeLimit”, “gender”, “hasRedeemedStreakToday”, “lastRecordDate”, “lastRedeemedDate”, “name”, “speed”, “startingDietDate”, “targetWeight”, “totalCaloriesConsumed” and “weight”. Then the “pictures” Collection is nested within the “users-id” Document and has the “pictures-id” Document that contains the fields “date” and “imageUrl”.

4.2 Firebase Realtime Database Tree-Like Structure

The figure below shows the Firebase Realtime Database structure in Tree-Like Structure.

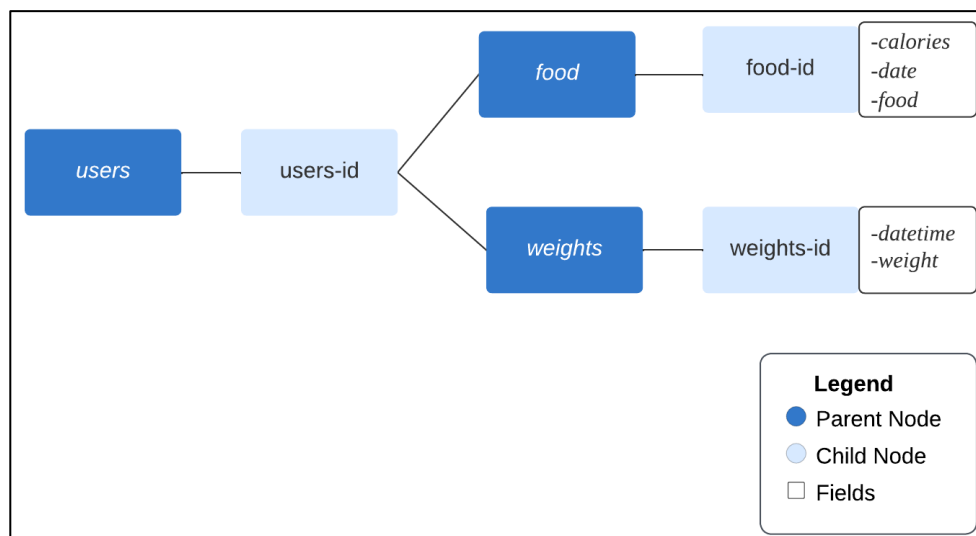


Figure 4. 2 Firebase Firestore Tree-Like

Firebase Realtime Database is a cloud NoSQL database. Data is kept in the Firebase Realtime Database as JSON objects. Each node in the tree, which is kept in a hierarchical tree-like structure, corresponds to a JSON item. Each node has the ability to have one or more child nodes, each of which can have more children of its own. Key-value pairs representing the data are kept in Firebase Realtime Database. Each value

can be any data type that is JSON-compatible, including a text, integer, Boolean, object, or array. Each key is a string that uniquely identifies a node in the tree.

The “users” is a Parent Node, and within it consists of a Child Node called “users-id”. And within the “users-id”, Child Node consist of the Parent Node “food” and “weights” of the Child Node “food-id” and “weight-id”. The “food-id” node contained the fields “calories”, “date”, and “food”. And the “weight-id” node contained the fields “datetime” and “weights”.

4.3 Sitemap of Diet Manager

The diagram below shows the sitemap of the Diet Manager application.

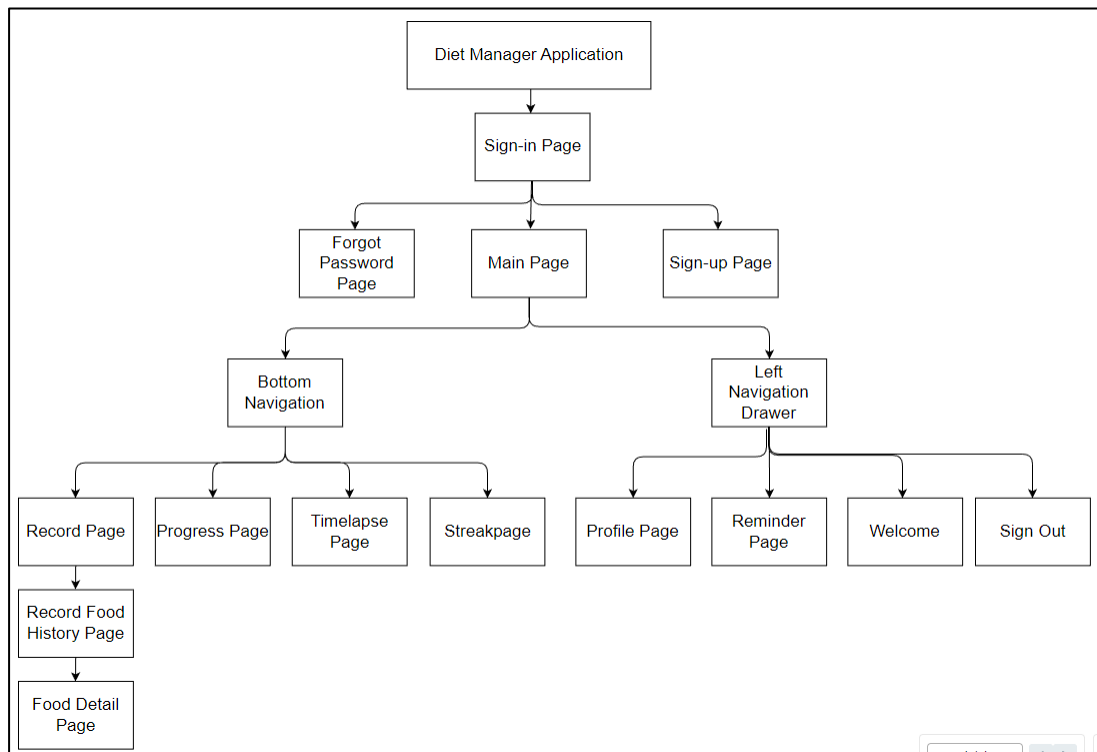


Figure 4. 3 Sitemap of Diet Manager

Figure 4.3 above presents the sitemaps of the Diet Manager Application. It provides an overview of the Diet Manager application layout, including the element hierarchy and the link between content and pages. Figure 4.3 above presents the sitemaps of the Diet Manager Application. The application contains some of the main pages, which consist of the application's main functions such as “Record Page”, “Progress Page”, “Timelapse Page”, and “Streak Page” under the “Bottom Navigation”, as well as another one main function which is “Reminder Page”, and “Welcome Page” under the “Left Navigation Drawer”.

Below is the breakdown of how each page fulfilled the project sub-objectives; please refer to Chapter 1 1.2 Project Sub-Objectives:

- The “Record Page” consist of the functionality of the first project sub-objective. It also can navigate to view past consumed food in the “Record Food History Page” and further can view each food item in detailed in the “Food Detail Page”.

- The “Progress Page” consist of the functionality of the second and third project sub-objective.
- The “Reminder Page” consists of the functionality of the fourth project sub-objective.
- The “Timelapse Page” consists of the functionality of the fifth project sub-objective.
- The “Streak Page” consists of the functionality of the fourth project sub-objective.

Other pages, such as the “Sign-in Page”, “Sign-up Page”, and “Forgot Password Page”, are the application user authentication pages, which let users sign up for an account and sign in to their account in the app as well as enable the user to reset their password if in an event where the user forgets their account password. The user is also able to sign out by going to the “Sign Out” under the “Left Navigation Drawer” of the app. As well as the “Welcome Page” provides new users with the main key features of the Diet Manager upon signing up for an account, as well as provides an explanation of how dieting calculation works by including the Harris-Benedict equation used for weight loss.

4.4 System UI Design

This sub-section discussed the UI design for the screens of each of the main functions of the Diet Manager.

4.4.2 UI Design of Record Page screen

The following screen is the UI Design of the Record Page.

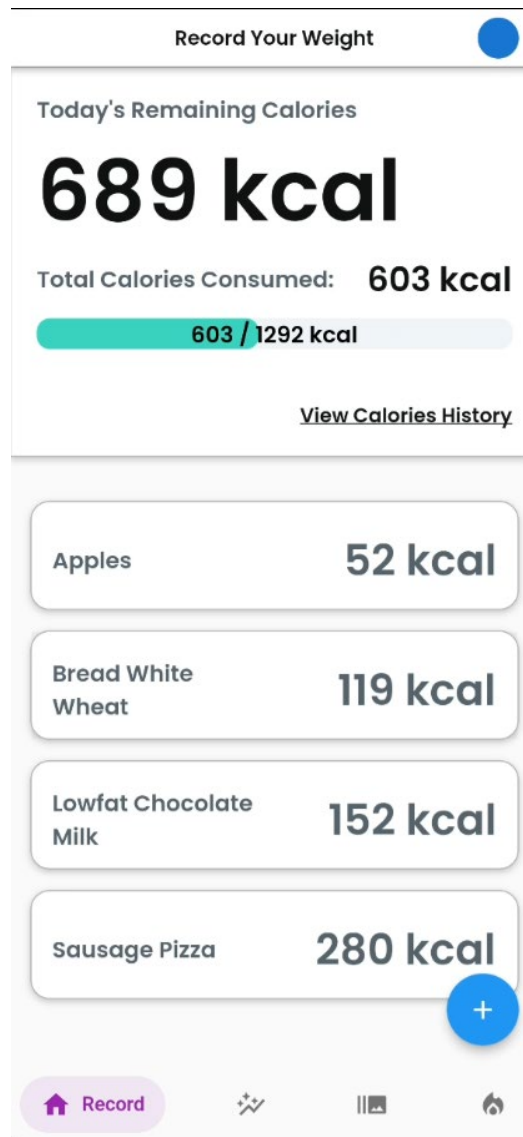


Figure 4. 4 UI Design of Record Page

The Progress Page screen contained these elements:

1. Target Weight, which is the user-specified target weight goal
2. Weight Goal Date, which is the estimated date the user will achieve the diet goal

3. The Weight Graph is a graph that plots all the weight records with dates added by the user and the estimated weight goal date at most further dates.
4. Weight Record List, which is a list of all user-recorded weight lists.
5. Add Weight Button, which lets the user add a new weight record.
6. Progress Bar to track the amount of weight loss against the total weight to lose.

The following screen is the UI Design for the Food History List page and Food Details Page.

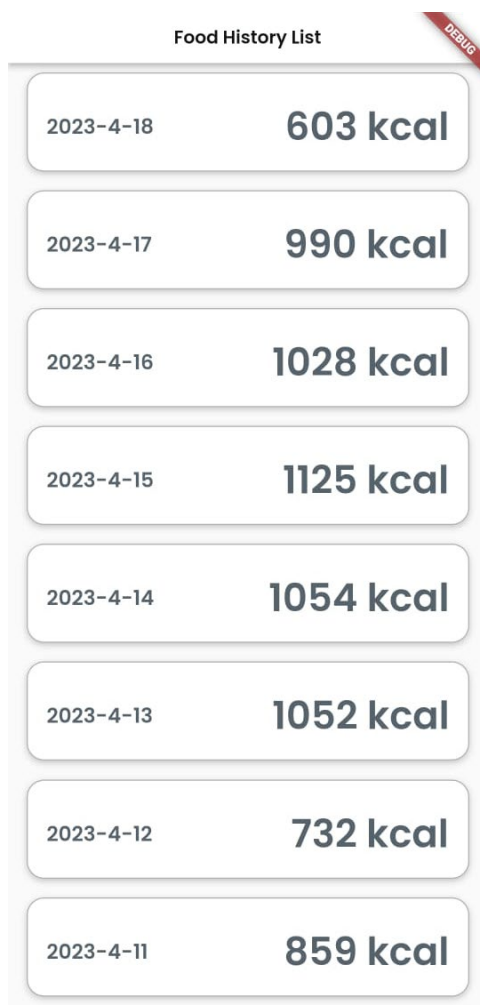


Figure 4. 5 UI Design of Food History List Page from Record Page

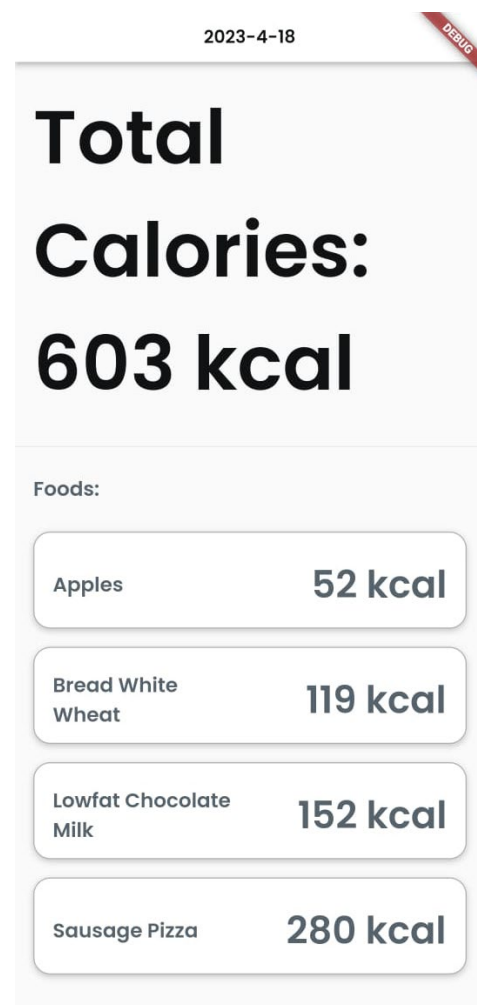


Figure 4. 6 UI Design of Food History Details Page from Food History List Page

The View Calories History navigates to the Food History List, where it lists all the past consumed calories item arranged by the dates.

Selecting any of the consumed calorie items will display a breakdown of all the foods consumed and their calories for the selected day.

4.4.3 UI Design of Progress Page screen

The following screen is the UI Design for the Progress Page page.



Figure 4. 7 UI Design of Progress Page

The Progress Page consists of these elements:

1. Target Weight, which is the user-specified target weight goal
2. Weight Goal Date, which is the estimated date the user will achieve the diet goal
3. The Weight Graph is a graph that plots all the weight records with dates added by the user and the estimated weight goal date at most further dates.
4. Weight Record List, which is a list of all user-recorded weight lists.
5. Add Weight Button, which lets the user add a new weight record.
6. Progress Bar to track the amount of weight lost against the total weight to lose.

4.4.4 UI Design of Reminder Page screen

The following screen is the UI Design for the Reminder Page page.

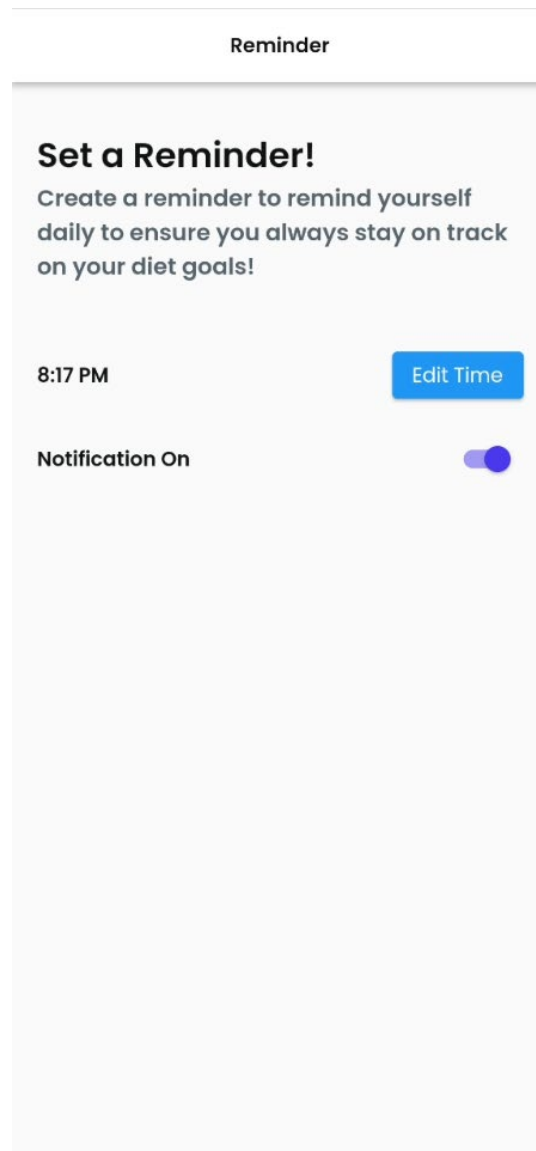


Figure 4. 8 UI Design of Reminder Page

The Reminder Page consists of these elements:

1. Edit Time button, for the user set a time for daily reminders.
2. Notification On toggle, to enable of disable

4.4.5 UI Design of Timelapse Page screen

The following screen is the UI Design for the Timelapse Page page.

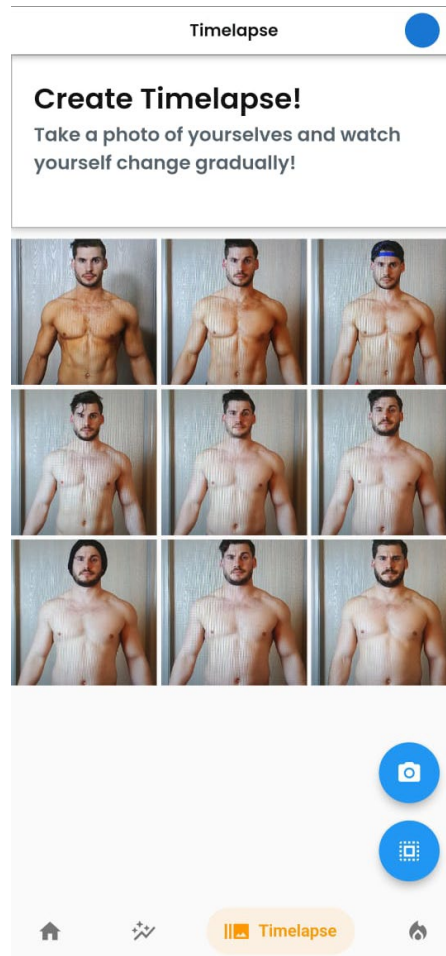


Figure 4. 9 UI Design of Timelapse Page

The Timelapse Page consists of these elements:

1. The Thumbnail Photos Gallery, which displays all the photos taken by the user reverse chronological order in a grid view.
2. The Take Photo button, which lets user takes a photo and add to the gallery.
3. The Select All Photo button, which lets user to select all the photos in the gallery to create the Timelapse video.
4. The Download Pictures button, which only appears when pictures are selected and lets user to download the selected pictures.
5. The Create Timelapse Video button, which only appears when pictures are selected and lets user to create timelapse video using all the selected photos.
6. The Cancel Selections button, which cancels the photo selection mode.

4.4.6 UI Design of Streak Page screen

The following screen is the UI Design for the Streak Page page.

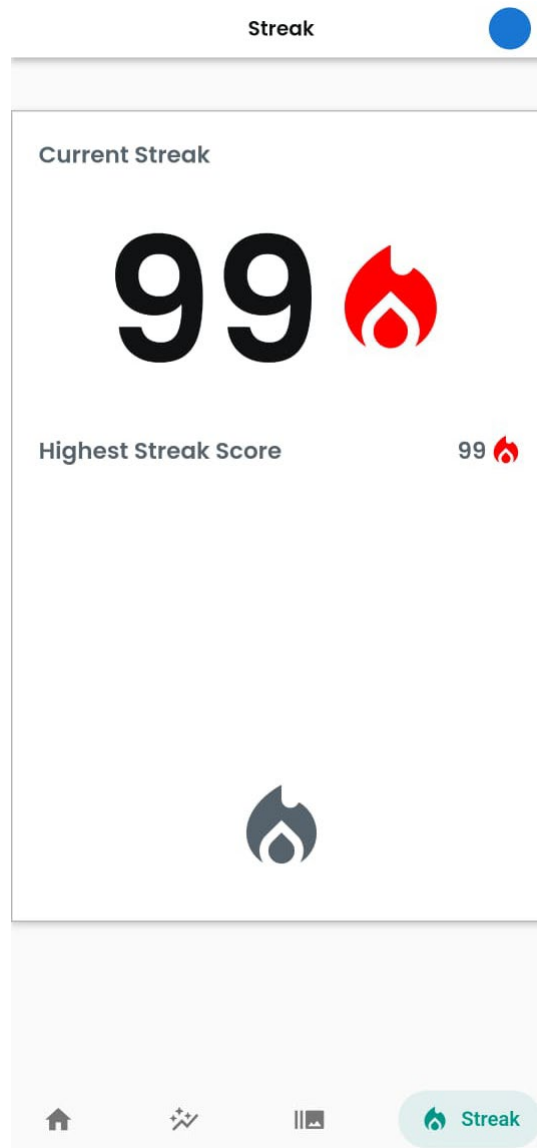


Figure 4. 10 UI Design of Streak Page

The Streak Page consists of these elements:

1. Current Streak count, which displays the total cumulative streak count the user has collected using the app daily.
2. The Highest Streak Score, which displays the highest streak cumulative streak count the user has ever achieved.
3. The Collect Streak icon button, which limits the user to collecting only one streak point daily.

4.4.7 UI Design of User Profile Page screen

The following screen is the UI Design for the User Profile Page page.

User Details

Hi, I'm **Chee Wah**, **25 years old, male**, and my current weight is **55.0 kg**. I aim to achieve **50.0 kg** within **70 days** by limiting my calories intake to **1268 kcal** daily. My diet journey begins on **19/4/2023**, and this is my story!

Name

Gender

Age

Current Weight

Target Weight Goal

Physical Activity Level ⓘ

Starting Diet Date 

Figure 4. 11 UI Design of User Profile Page

The User Profile Page consists of these elements:

1. User Diet Goal dialog, a simple SMART diet goal created for user to get an overview of their dieting journey.
2. Name, for user to enter their name
3. Gender, for user to select gender
4. Age, for user to enter their age
5. Current Weight, for user enter their current weight
6. Target Weight Goal, for user to enter their targeted weight goal
7. Physical Activity Level, for user to select their Physical Activity Level
8. Starting Diet Date, for user to select the starting diet day
9. Save Button, to save all user details.

4.5 Client Server Architectural Design

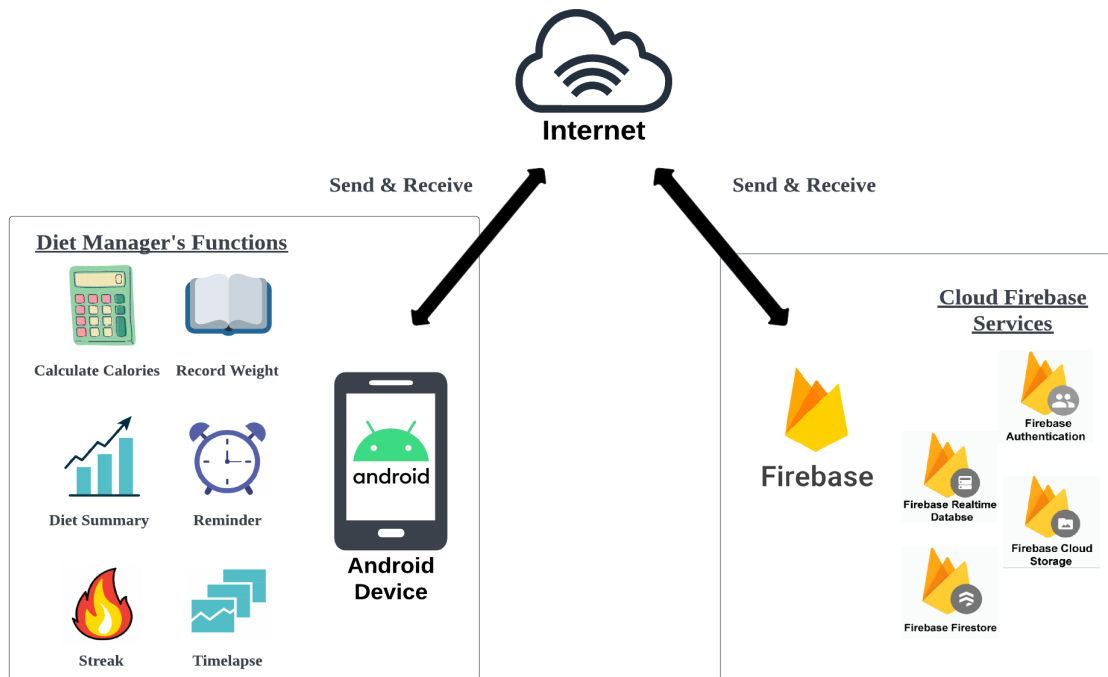


Figure 4. 12 Client Server Architectural Design of the Diet Manager application

The Client, which is the Android Device running the Diet Manager application, were responsible for making requests for data from the Firebase server through the Internet, processing or otherwise modifying the requested data and updating the Android Device's user interface (UI) as necessary. The Client retrieves data from the Firebase server and processes the data within the Client, which is the Diet Manager functions.

The Diet Manager's functions that send and receive the data for processing from the Firebase are Calculate Calories Function, Record Weight Function, Diet Summary Function, Reminder Function, Streak Function and Timelapse Function. (Refer to Chapter 5.4 for details of each of the Diet Manager's functions)

And Firebase sends and receives the data from the Diet Manager's functions to its cloud services which are Firebase Realtime Database, Firestore Authentication, Firebase Storage, and Firebase Firestore.

The Firestore Authentication was mainly used for authenticating the user before the user accessed the application. The user authentication process takes place within the

CHAPTER 4

Firebase Authentication service. (Refer to Chapter 5.4.1 for details of the User Authentication of the Diet Manager)

The Firebase Cloud Storage was mainly used for storing and receiving media files for the Timelapse Function within the Diet Manager application. (Refer to Chapter 5.4.7 for details of the Timelapse function)

The Firebase Realtime Database and Firebase Firestore were mainly used for storing user data for the Calculate Calories Function, Record Weight Function, Diet Summary Function, Streak Function and Timelapse Function of the Diet Manager. (Refer to Chapter 5.4 for details of the Diet Manager's functions)

CHAPTER 5 SYSTEM IMPLEMENTATION

5.1 Hardware Setup

The hardware that will be used in this project is a computer and mobile device running Android OS. The computer is required to run Android Studio, which is an android development environment for the Android operating system to create the mobile application for the Diet Manager android application. The android mobile device is required to simulate the real-life experience of users when using the mobile application on a physical device and to utilize the functions that are only available on the phone, such as the touch screen.

The android mobile device that was used were connected to the computer using a USB Type-C cable throughout the development and testing of the Diet Manager app.

Table 5.1 Specifications of Laptop

Description	Specifications
Model	Acer Nitro AN515-52
Processor	Intel Core i5-8300H
Operating System	Windows 11
Graphic	NVIDIA GeForce GTX 1050 2GB GDDR5 Intel UHD Graphics 630
Memory	8GB DDR4 RAM
Storage	1 TB M.2 NVMe SSD

Table 5.2 Specifications of Mobile Phone

Description	Specifications
Model	Samsung Galaxy Note 10 Lite
Processor	Exynos 9810 SoC
Operating System	Android 12
Graphic	Mali-G72 MP18
Memory	8GB RAM
Storage	128GB

5.2 Software Setup

This section discussed all the software required for the implementation of the Diet Manager project.

5.2.1 Flutter Set-up

The Flutter SDK were required to be installed on the Windows computer. The Flutter SDK files were downloaded from Flutter's official SDK download page [4].

You may refer to Chapter 5.3.1 for further details on the settings and configurations required for Flutter to be set-up for running the project.

5.2.2 Java Set-up

The Java JDK 11 software is required to be installed on the computer. The Java JDK 11 can be downloaded from Java's official download website [5].

You may refer to Chapter 5.3.2 for further details on settings and configurations required for Java to be set-up for running the project.

5.2.3 Android Studio Set-up

The Android Studio will be the IDE used for the development of the Diet Manager android application. The Android Studio can be downloaded from the Android Studio's official download page [4]. The Android Studio version used for the project is Android Studio Electric Eel 2022.1 Canary 10.

You may refer to Chapter 5.3.3 for further details on settings and configurations required for Android Studio to be set-up for running the project.

5.2.4 Firebase Set-up

Firebase is a backend cloud computing service that will be used for the Diet Manager app databases, authentications, and storage. The Firebase services can be accessed on the Firebase's official website, a Firebase account is required.

You may refer to Chapter 5.3.4 for further details on the settings and configurations required for Firebase to be set-up for running the project.

5.2.5 Mobile Device Set-up

Connect the android mobile device to the computer using a USB cable, ensuring that the computer can connect and detect the connect mobile devices. Certain mobile devices are required to install the Android USB Driver for the connected mobile device to function properly. In this case, the project mobile device used is a Samsung Note 10 Lite Android device, which is required to install the Samsung Android USB Driver from the Samsung Developers website [7].

You may refer to Chapter 5.3.5 for further details on settings and configurations required for mobile devices to be set-up for running the project.

5.3 Setting and Configurations

This section describes each of the software settings and configurations required for all the software mentioned earlier in Chapter 5.2.

5.3.1 Flutter Set-up

Extract the contents of the downloaded Flutter SDK zip file to a new folder named src, and place it in the root folder of Local Disk C. The Flutter SDK files directory should be C:\src\flutter.

Add the Flutter SDK file to the PATH environment variable by following these steps:

Click on the Start menu and search for "environment variables."

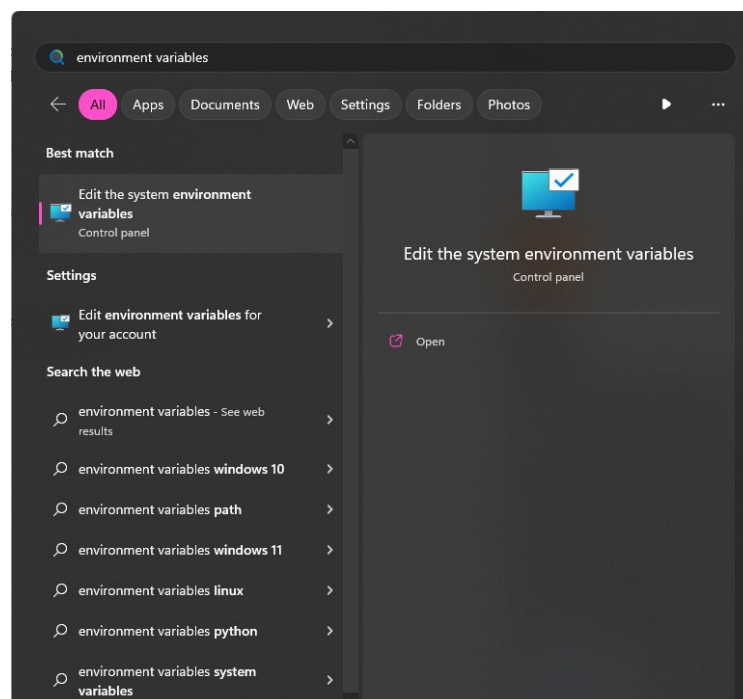


Figure 5. 1 Search "environment variables" in the start menu

The System Properties window will appear; on the Advanced tab, click on the "Environment Variables" button

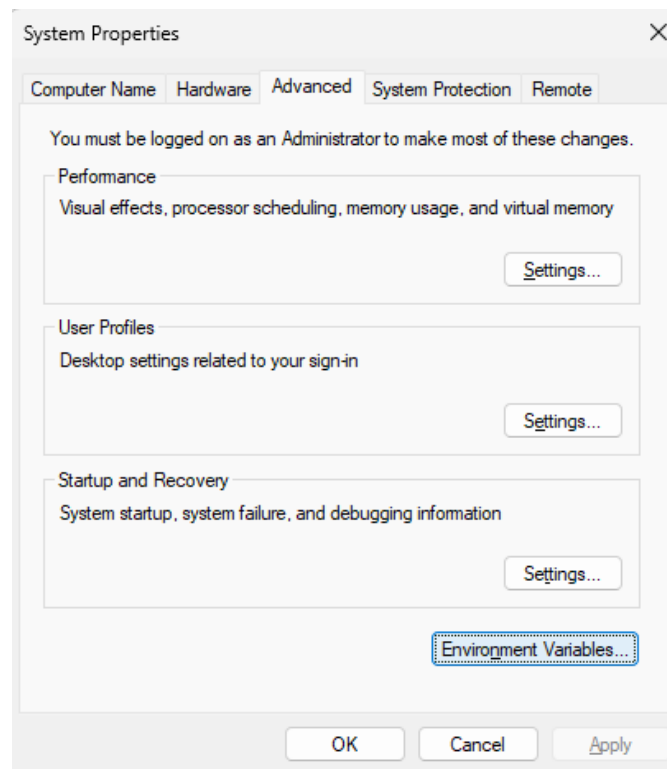


Figure 5. 2 System Properties Window

The Environmental Variables Window will appear. Under "User Variables," find the "Path" variable and click on "Edit."

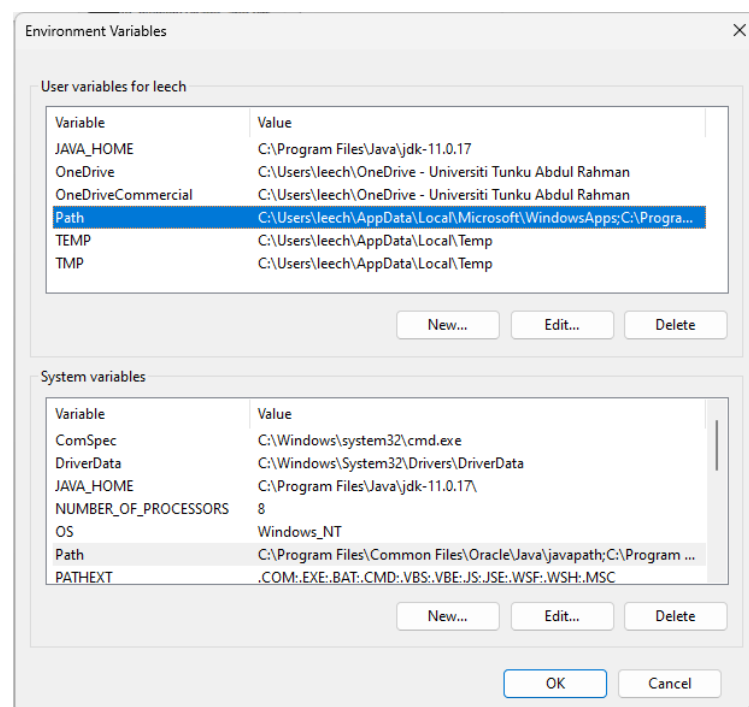


Figure 5. 3 Environmental Variables Window

The Edit environment variable Window will appear. Click on "New" and add the path to the Flutter bin folder, which is located at C:\src\flutter\bin.

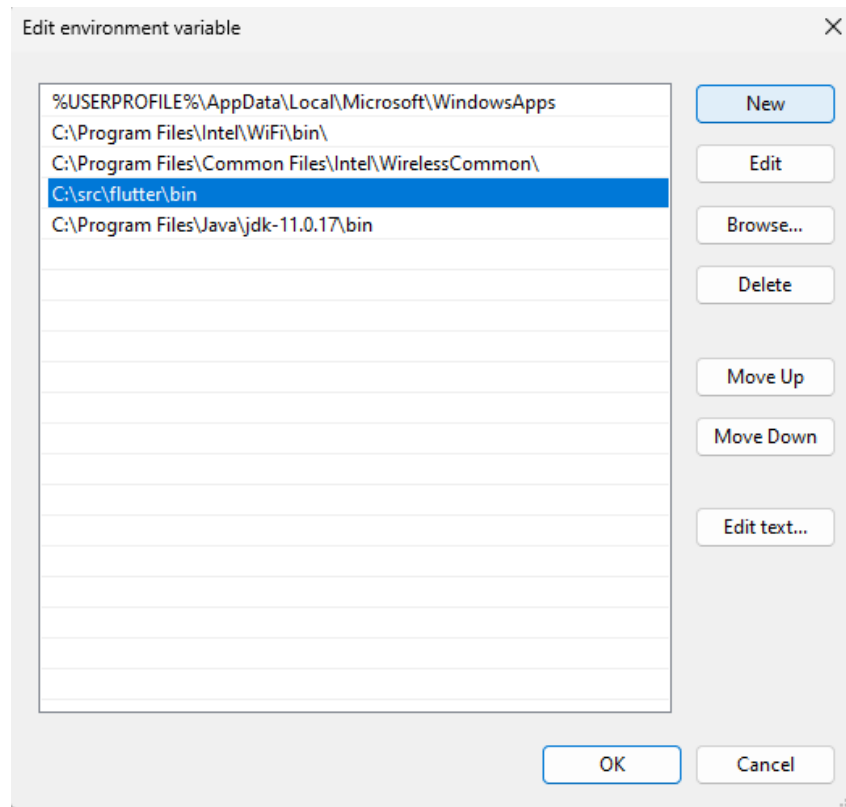


Figure 5. 4 Edit environment variable Window

5.3.2 Java Set-up

The environmental variables are required to be set up following these steps:
Click on the Start menu and search for "environment variables."

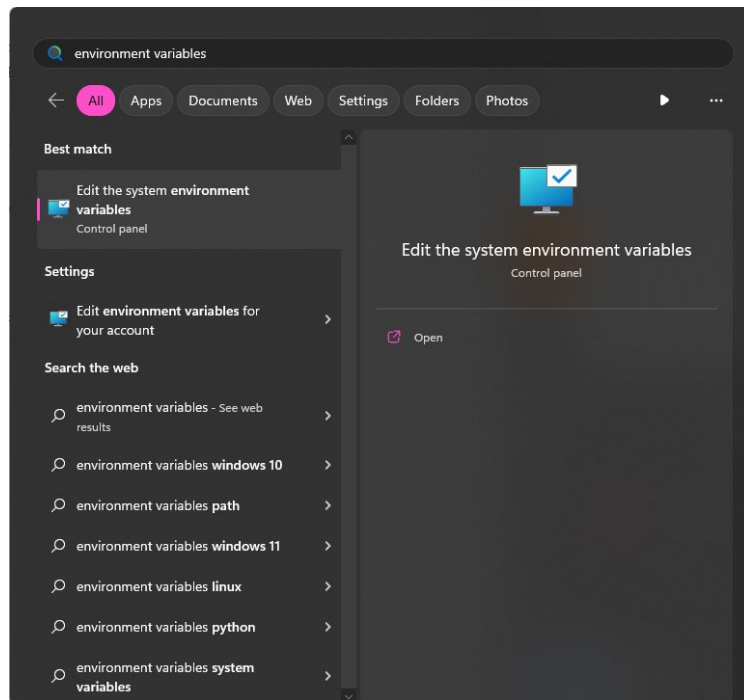


Figure 5. 5 Search "environment variable" in the start menu

The System Properties Window will appear. On the Advanced tab, click on the "Environment Variables" button.

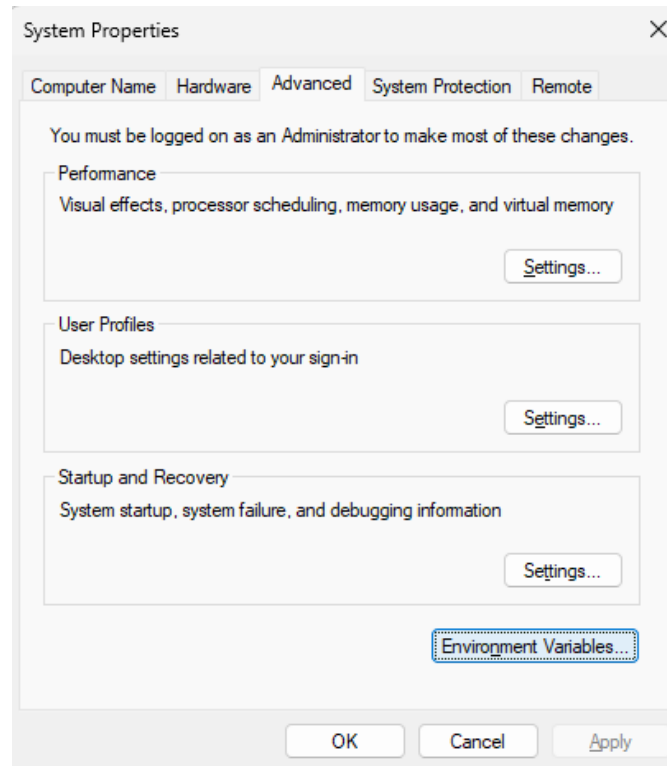


Figure 5. 6 System Properties Window

The Environment Variables Window will appear. Under "User Variables," on "New...",

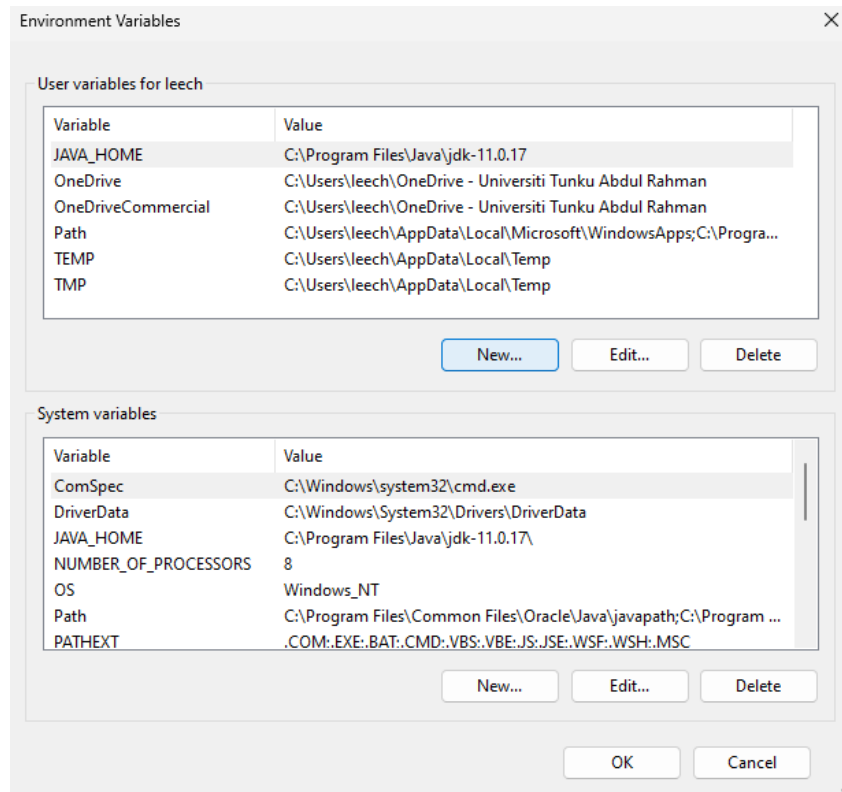


Figure 5. 7 Environment Variables Window

The Edit User Variable Window will appear. Add the new variables as follows, and click "OK" to save the environmental variable:

Variable name: JAVA_HOME

Variable value: C:\Program Files\Java\jdk-11.0.17

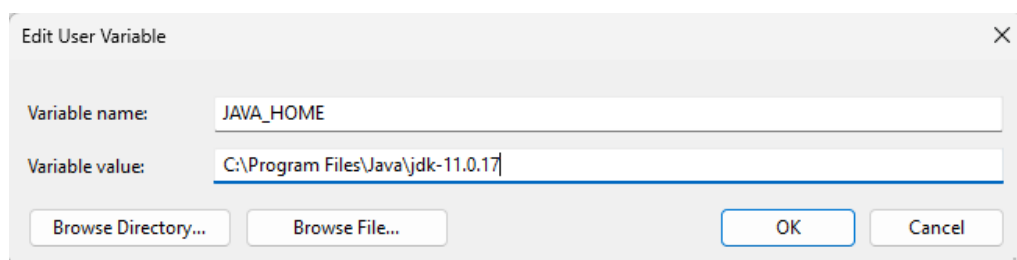


Figure 5. 8 Edit User Variable Window

5.3.3 Android Studio Set-up

Implementing Flutter SDK into Android Studio

Run the Android Studio, and a welcome page will appear, navigate to the Plugins tab on the left side of the window, and under the Marketplace tab, search for “Flutter” and click on install. This will install the Flutter plugins in Android Studio.

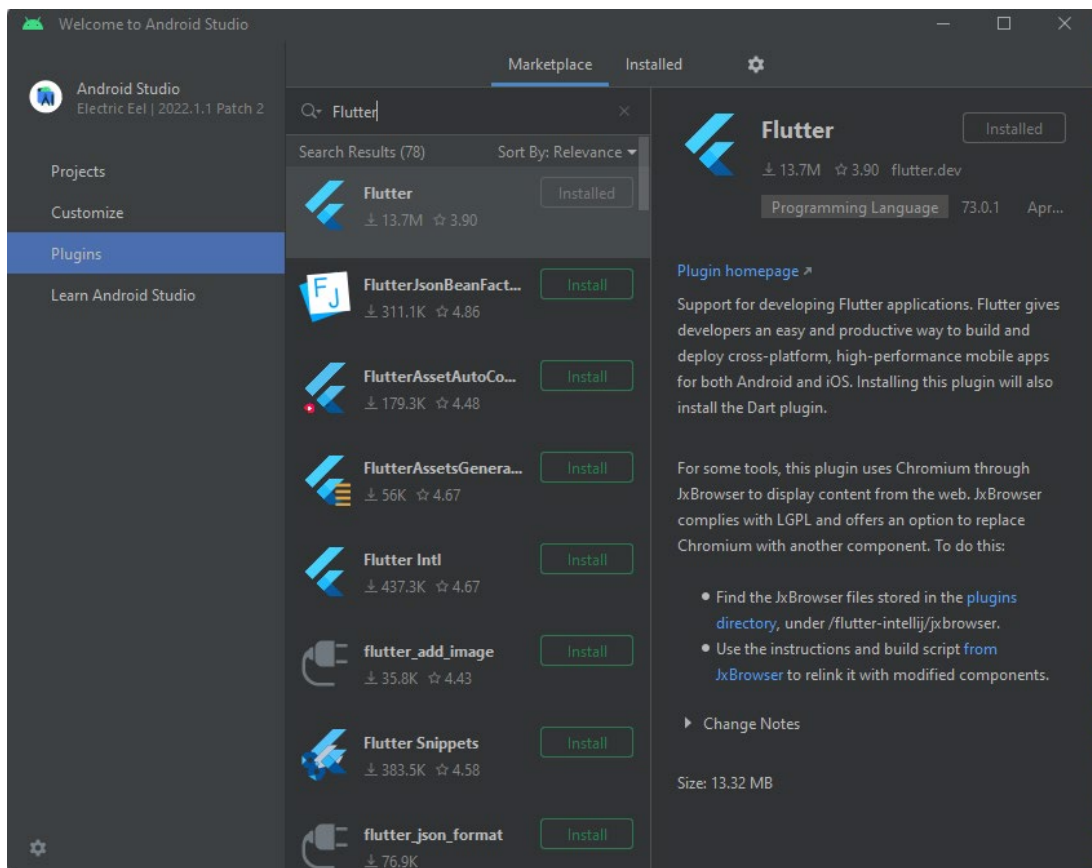


Figure 5. 9 Search Flutter in the Plugins tab of Welcome to Android Studio Screen

Do the same for the “Dart”.

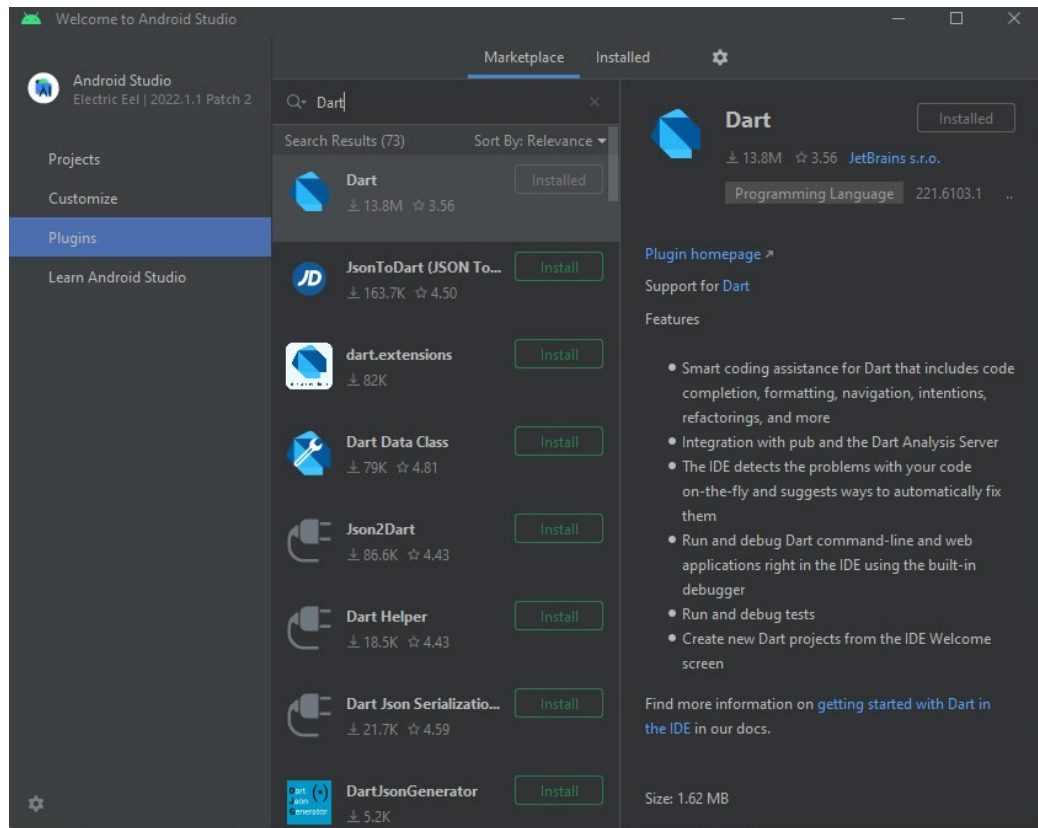


Figure 5. 10 Search Dart in the Plugins tab of Welcome to Android Studio Screen

Next, go to the command prompt. And type in “flutter doctor – android-licenses.” to complete the Flutter SDK installation.

 The screenshot shows a Windows Command Prompt window titled 'Command Prompt - flutter d'. The prompt displays the following text:


```
Microsoft Windows [Version 10.0.22621.1555]
(c) Microsoft Corporation. All rights reserved.

C:\Users\leech>flutter doctor --android-licenses
[=====] 100% Computing updates...

All SDK package licenses accepted.

C:\Users\leech>
```

Figure 5. 11 Type “flutter doctor – android-licenses.” in Command Prompt Screen

On the command prompt again, type in “flutter doctor” and ensure the it displayed ticked on everything to show that flutter had been installed successfully set up on the computer.


```

C:\Windows\system32\cmd.e: X + v
Microsoft Windows [Version 10.0.22621.1555]
(c) Microsoft Corporation. All rights reserved.

C:\Users\leech>flutter doctor
Doctor summary (to see all details, run flutter doctor -v):
[✓] Flutter (Channel stable, 3.7.11, on Microsoft Windows [Version
10.0.22621.1555], locale en-MY)
[✓] Windows Version (Installed version of Windows is version 10 or higher)
[✓] Android toolchain - develop for Android devices (Android SDK version
33.0.2)
[✓] Chrome - develop for the web
[✗] Visual Studio - develop for Windows
    ✗ Visual Studio not installed; this is necessary for Windows
    development.
      Download at https://visualstudio.microsoft.com/downloads/.
      Please install the "Desktop development with C++" workload,
      including all of its default components
[✓] Android Studio (version 2022.1)
[✓] Connected device (3 available)
[✓] HTTP Host Availability

! Doctor found issues in 1 category.

C:\Users\leech>

```

Figure 5. 12 Type "flutter doctor" in Command Prompt Screen

Then go to Android Studio, File - > Settings -> Appearance & Behavior -> System Settings -> Android SDK -> SDK Tools, and ensure that the Android SDK Command-line Tools is installed.

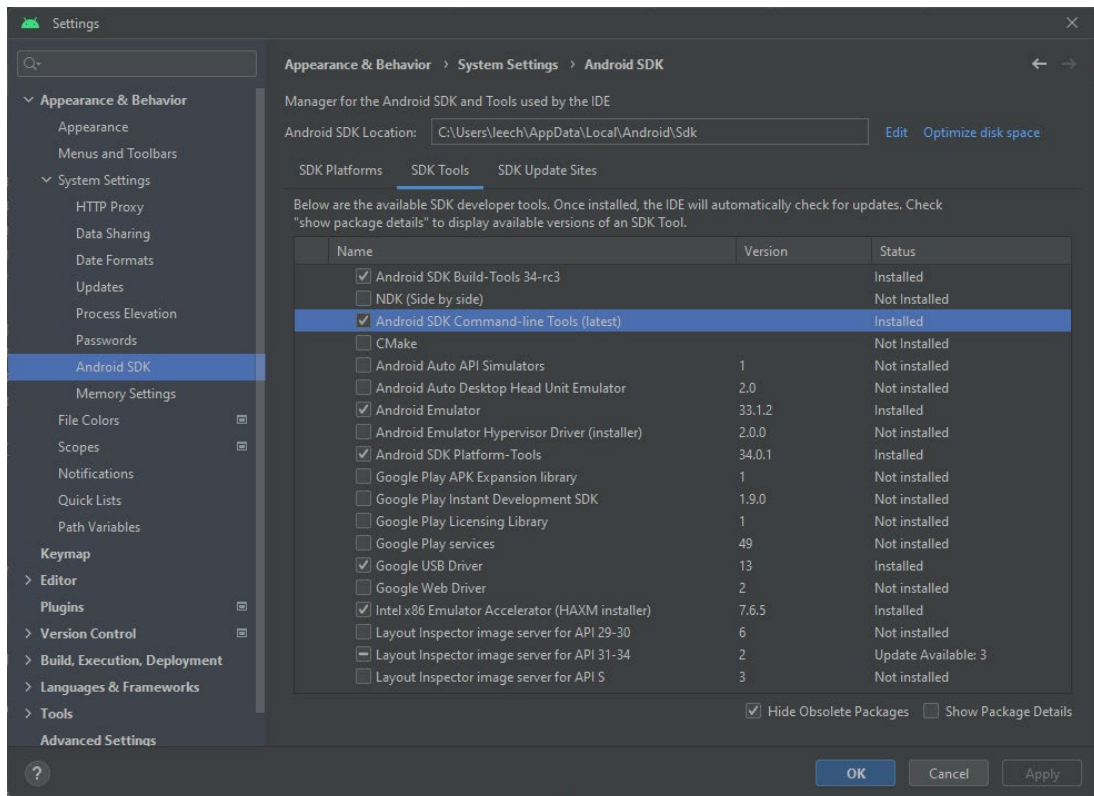


Figure 5. 13 SDK Tools Screen in Android Studio Settings window

Importing the provided Diet Manager project files into the Android Studio

Extract the provided project files zip file.

On the Android Studio, select “Open” and browse to the extracted project folder. The project folder should be “crudfirestore”.

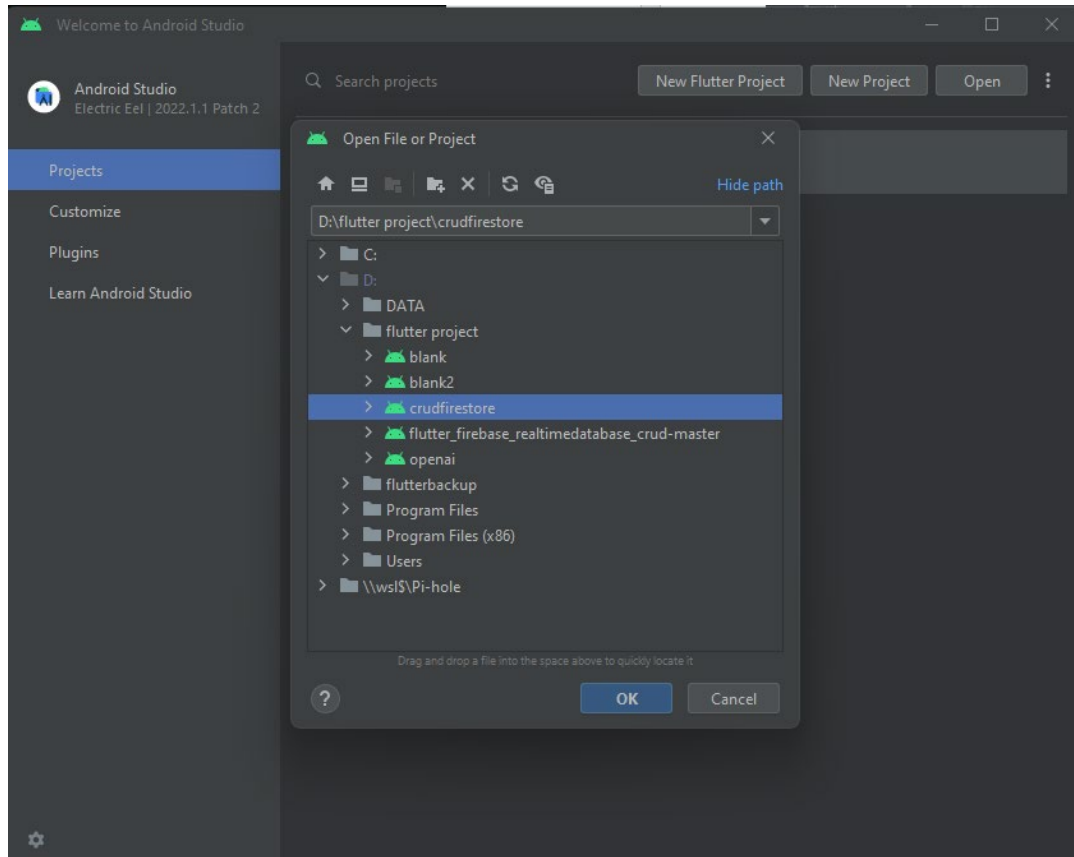


Figure 5. 14 Open files in the Project screen in Android Studio

5.3.4 Firebase Set-up

At the Firebase website, add Project and name the project to any name, e.g. crudfirestore

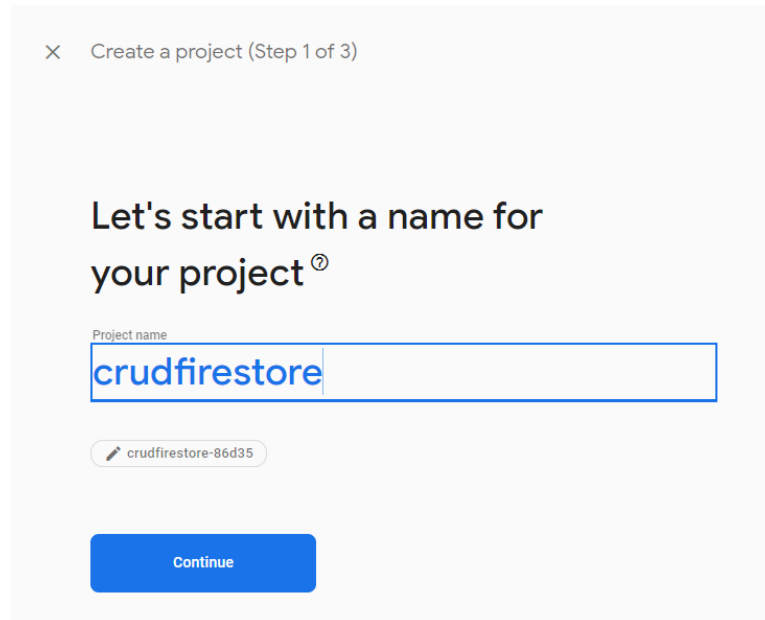


Figure 5. 15 Add Project screen on the Firebase website

Disable Google Analytics, as it will not be required for this project, and click on the “Create Project” button.

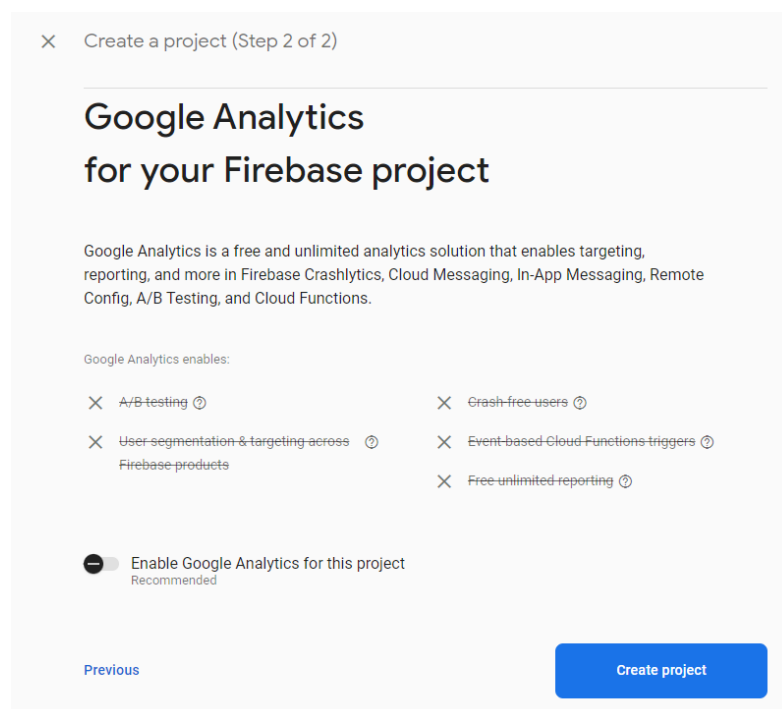


Figure 5. 16 Add Project Screen 2 to the Firebase website

On the left side of the tab, select “All Products” to navigate to the Firebase products and features page.

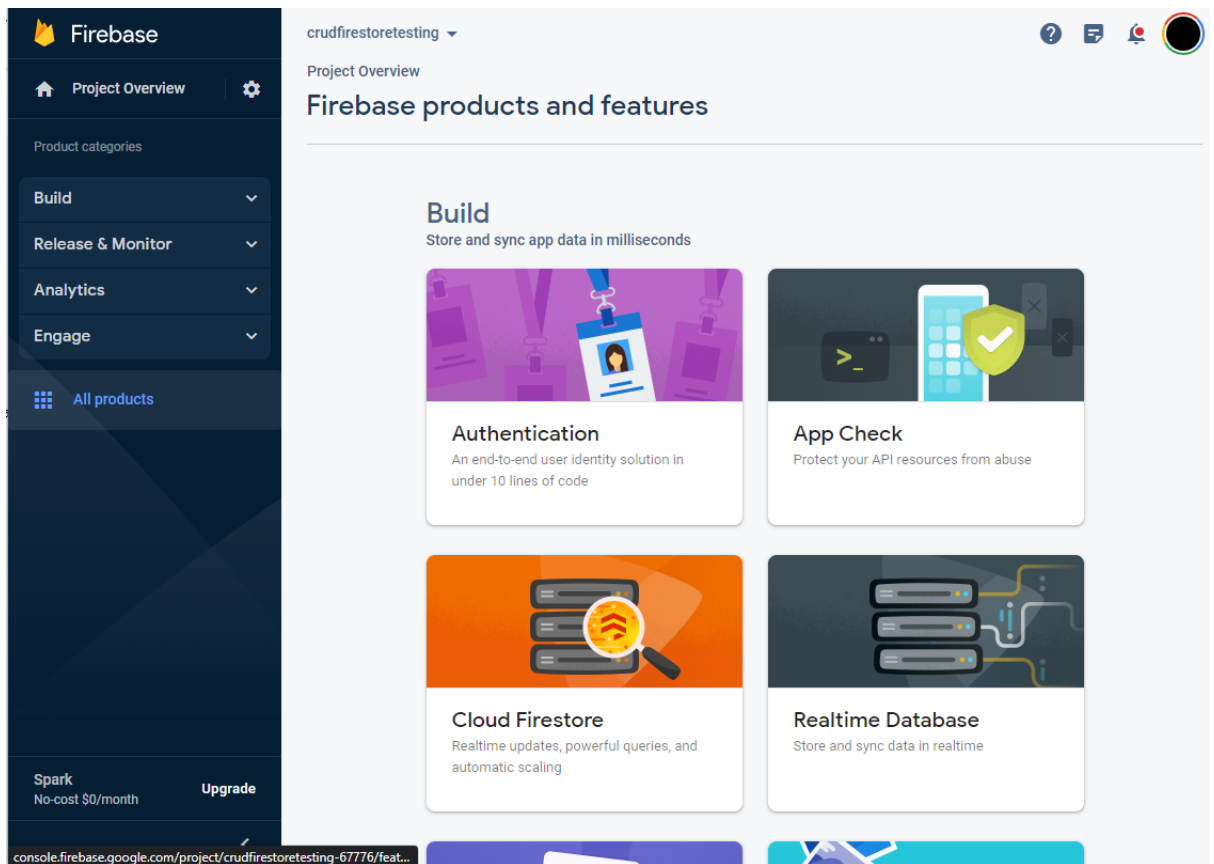


Figure 5. 17 Firebase main page

Firebase Authentication set-up

On the Firebase products and features page, select Authentication to set up an Authentication service for the project.

Under the Sign-in method tab, select “Email/Password”.

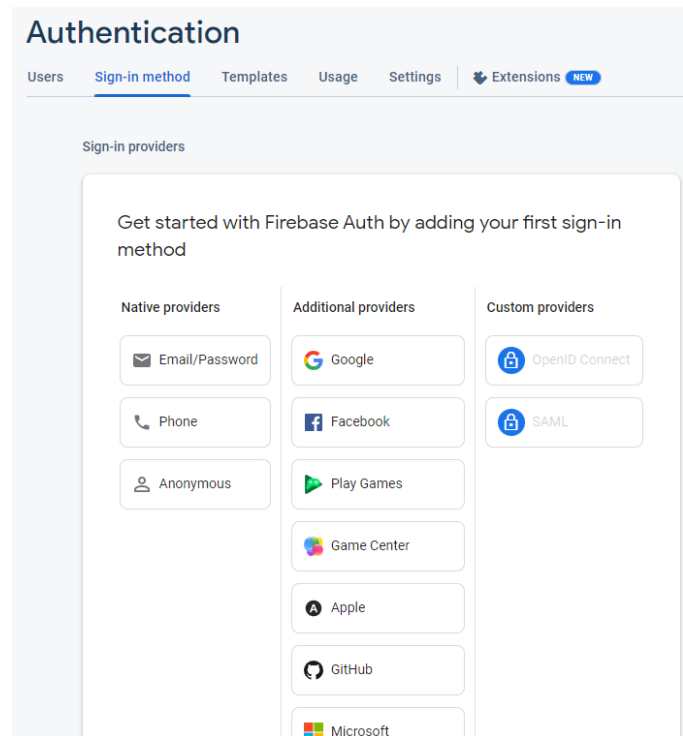


Figure 5. 18 Firebase Authentication page

Then enable Email/Password toggle, and click “Save” to enable Email/Password as a authentication method for the Diet Manager app.

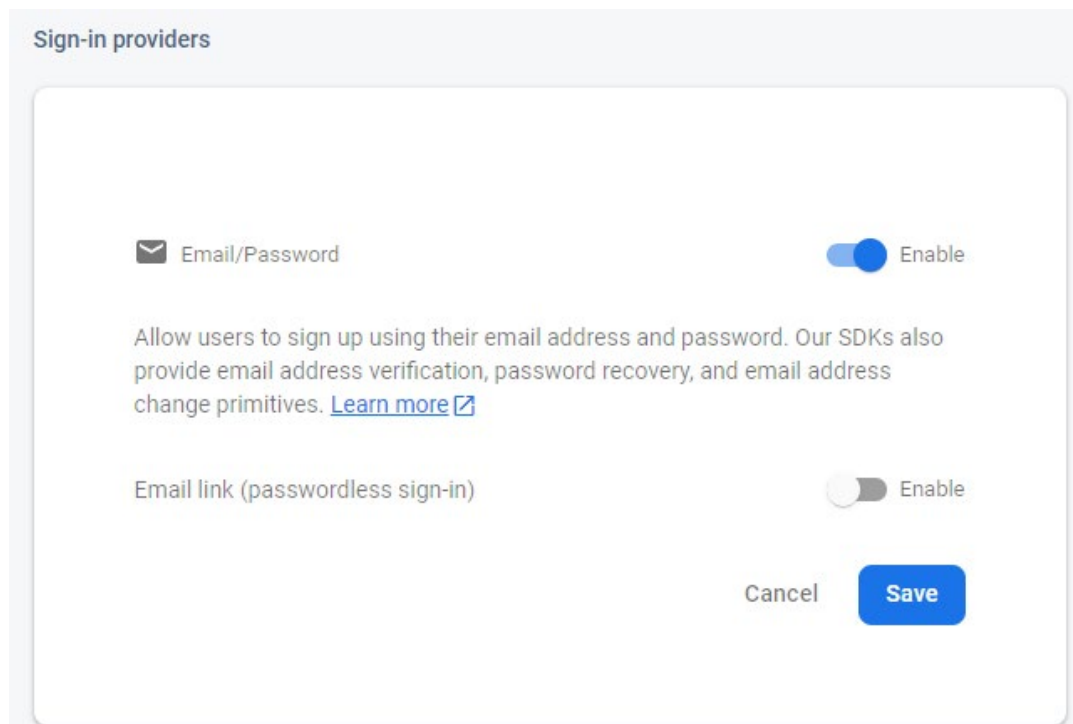


Figure 5. 19 Firebase Authentication Sign-in providers page

The green ticked status “Enabled” means it has been set up successfully.

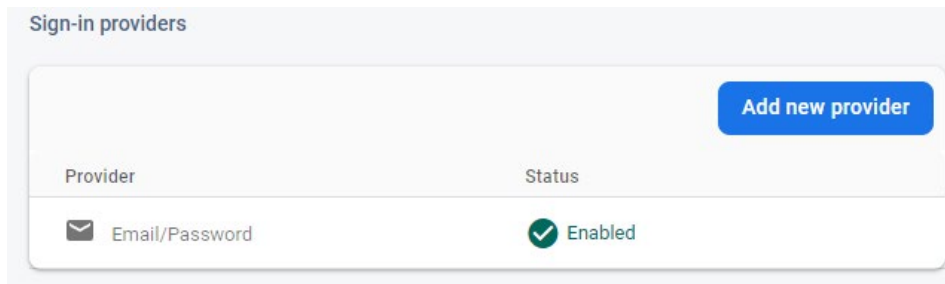


Figure 5. 20 Firebase Authentication Sign-in Provider Status

Firestore Set-up

The Firebase Firestore is one of the firebase database services that will be used for storing data for the Diet Manager app.

On the Firebase products and features page, select Cloud Firestore to set up Firestore service for the project.

A pop-up will appear; select “Start in Production Mode”, and click “Next”

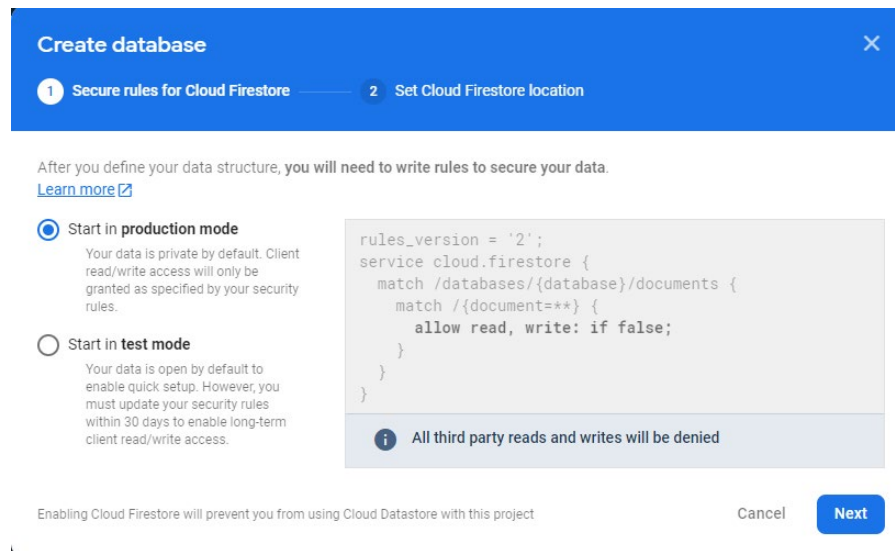


Figure 5. 21 Cloud Firestore Create database page

Choose the location to anywhere. Ensure to take note of the chosen location. Then click “Enable” to start creating the database.

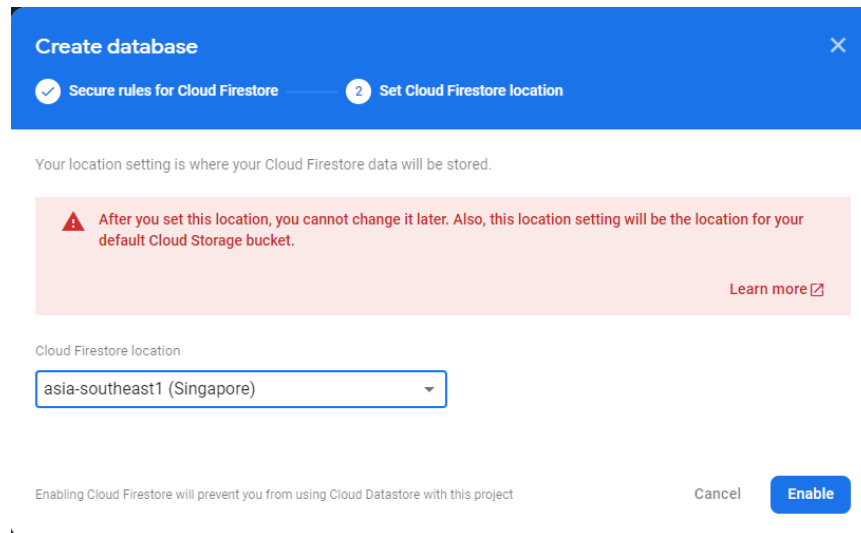


Figure 5. 22 Cloud Firestore Create database page 2

On the Cloud Firestore page, navigate to the “Indexes” tab, and click on “Add Index”,

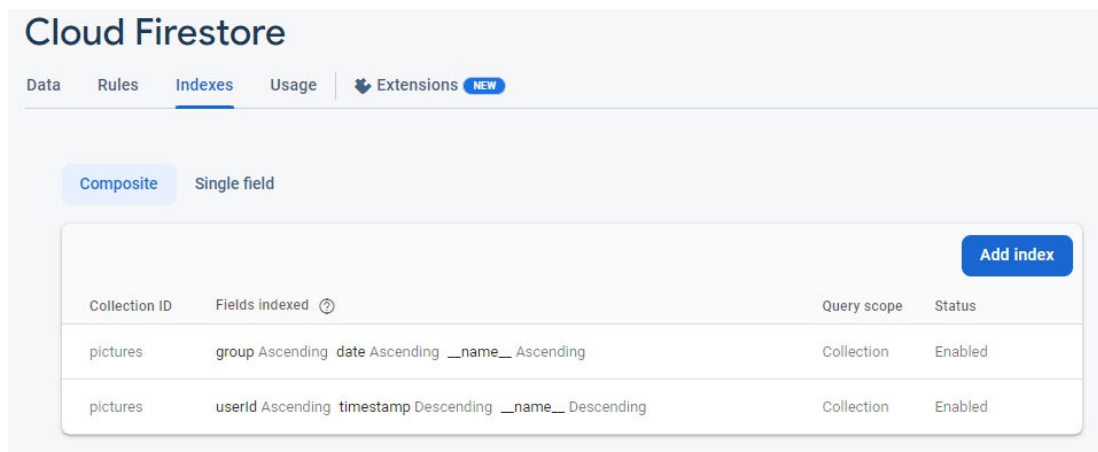


Figure 5. 23 Indexes Tab on the Cloud Firestore page

Add the index according to the details below, and click “Create Index”:

Create a composite index ✕

Cloud Firestore uses composite indexes for compound queries not already supported by single field indexes (ex: combining equality and range operators).

Collection ID

Fields to index
 At least two fields required*

1	userId	Ascending
2	timestamp	Ascending

Query scopes

Collection
 For queries within a specific collection path

Collection group
 For queries across all collections with the same collection ID

Creation time depends on the amount of data being indexed

Figure 5. 24 Composite Index Details page

Firestore Realtime Database Set-up

The Firestore Realtime Database is one of the databases used for the Diet Manager to store ser data in the app.

On the Firestore products and features page, select Realtime Database to set up Firestore Realtime database service for the project.

Select the Realtime Database location,

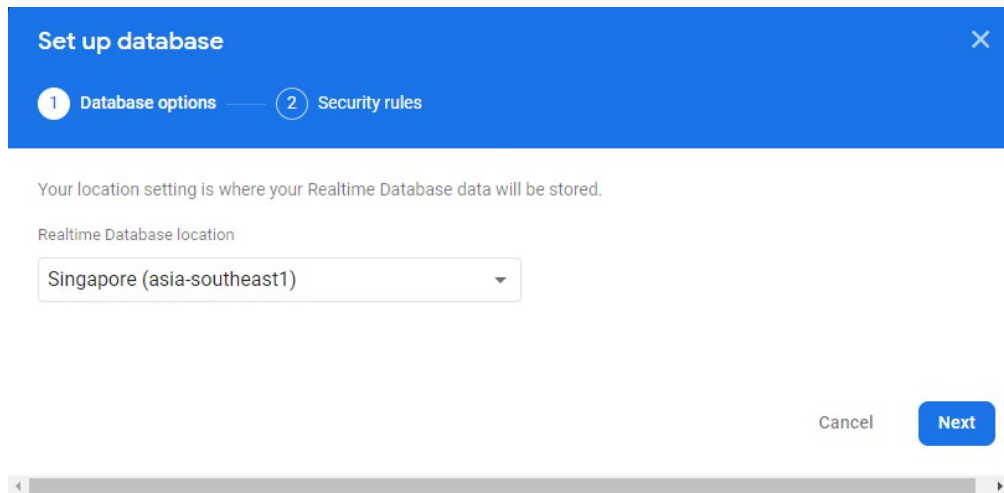


Figure 5. 25 Firebase Realtime Database Set up database page

Select “Start in locked mode”, then click “Enable”.

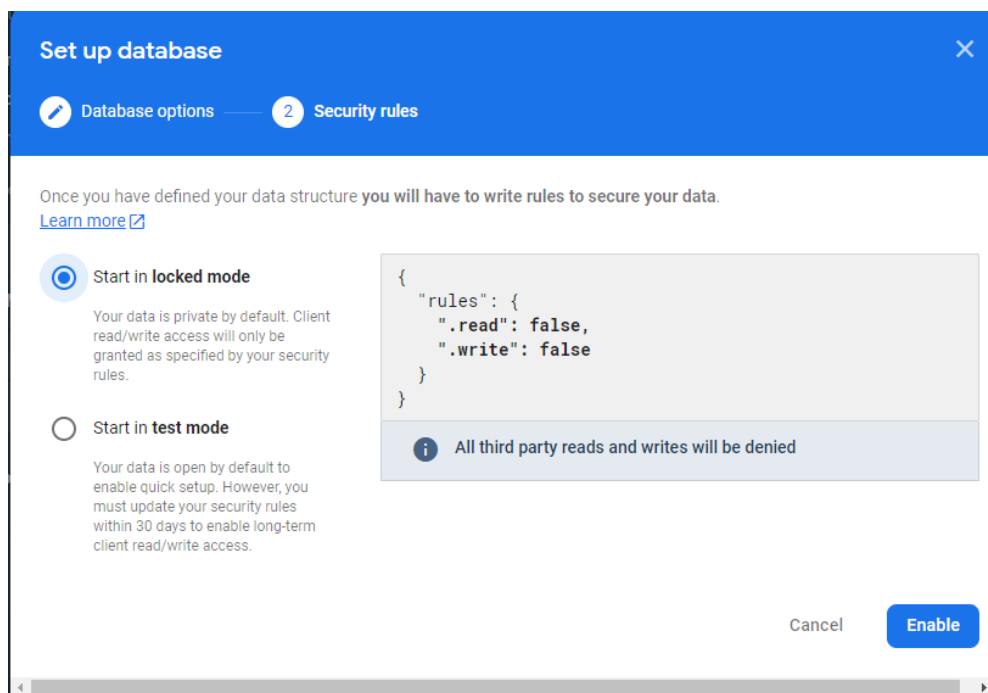


Figure 5. 26 Firebase Realtime Database Set up database page 2

On the Realtime Database page, navigate to the “Rules” tab and edit and save the rules as follows:

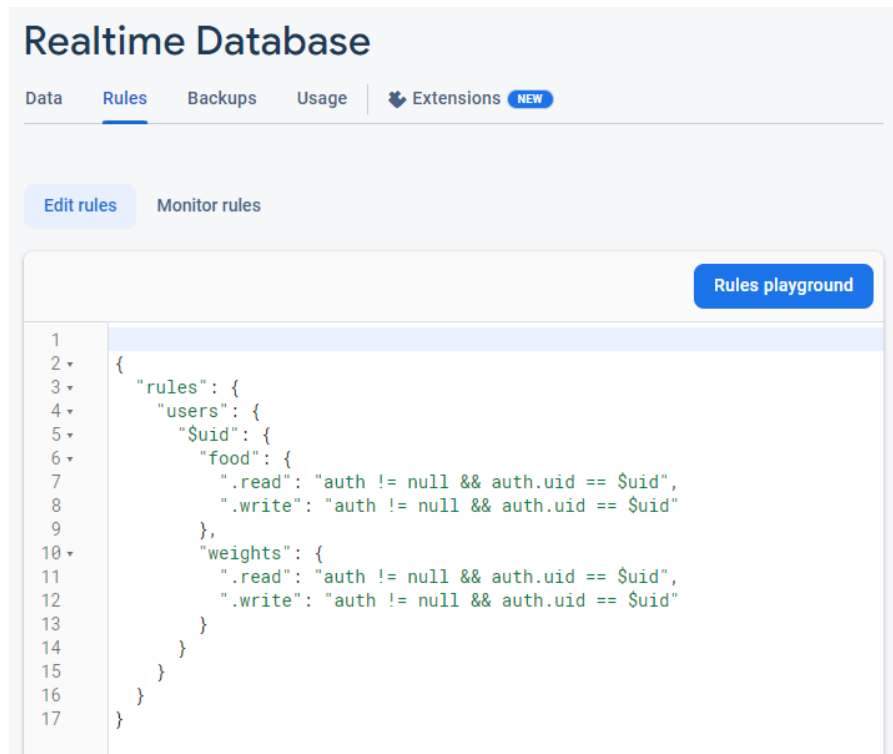


Figure 5. 27 Rules Tab on the Realtime Database page

Firestore Storage

Firestore Storage is one of the cloud storage used for the Diet Manager to store user data, such as media files in the app.

On the Firebase products and features page, select Cloud Storage to set up the Firestore Storage service for the project.

Select “Start in production mode and click on “Next””.

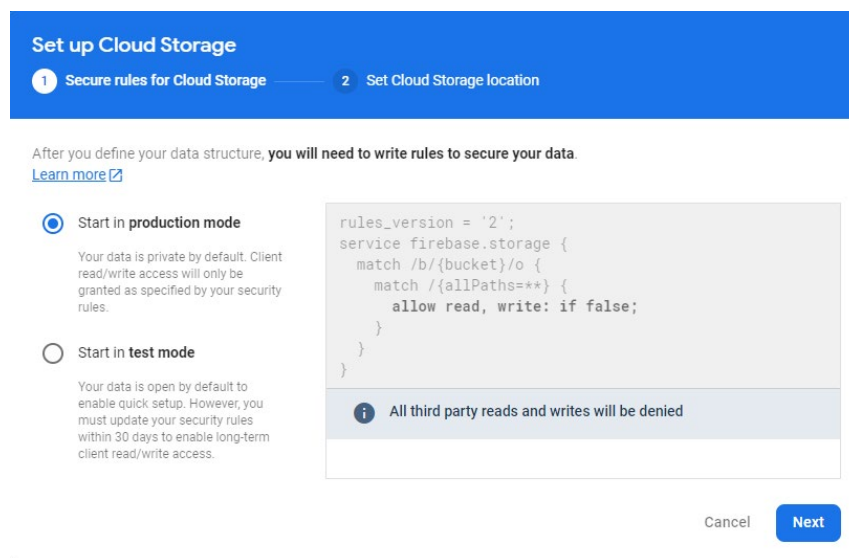


Figure 5. 28 Firebase Set up Cloud Storage page

The Cloud Storage location will be set automatically according to the previous location set in other Firebase services; click on “Done” to complete the set up.

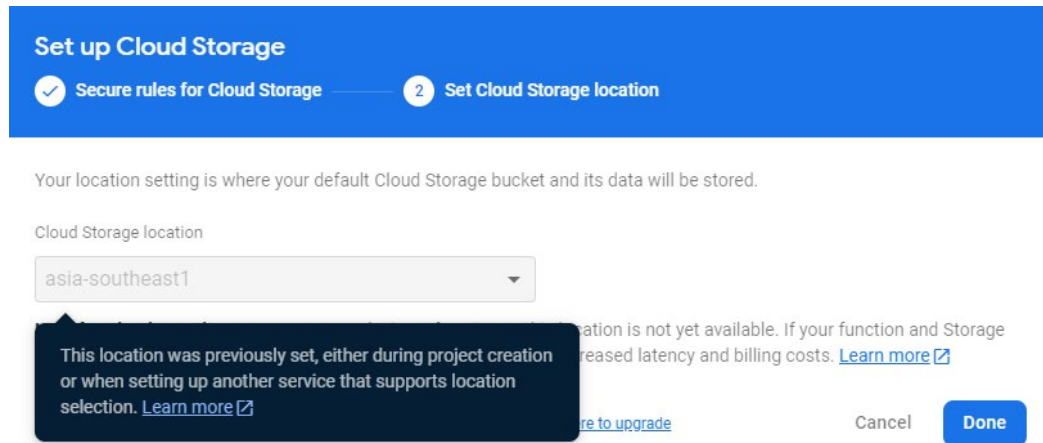


Figure 5. 29 Firebase Set up Cloud Storage page 2

Implementing Firebase into the Android Studio project

This section should be the final step of setting up the Diet Manager project when all the required Firebase services for the project are set-up correctly and the provided Android Studio’s project files containing the Diet Manager app has been imported into the Android Studio successfully. The Firebase services will be implemented into the Android Studio project to enable the Firebase services in the Diet Manager app. On the Firebase project’s page, go to Project Overview on the left tab and select Project settings to Navigate to the Project Settings.

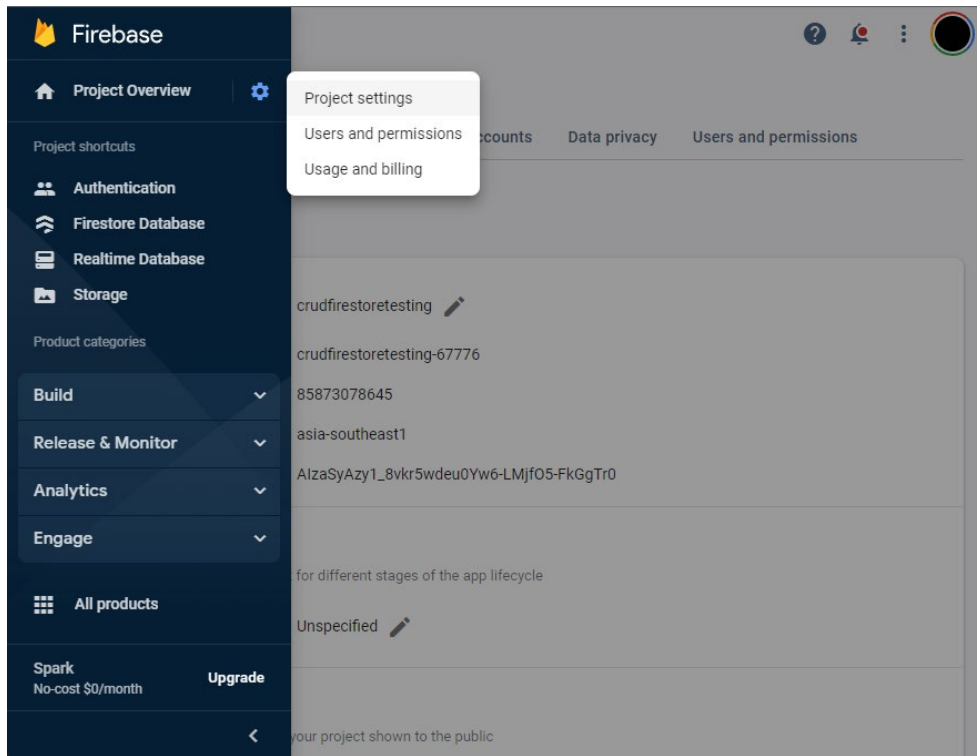


Figure 5. 30 Project settings in the Project Overview tab of the Firebase project page

Navigate to Your apps section under the General Tab, and select the Android icon,



to add an Android as the new platform for the Firebase project.

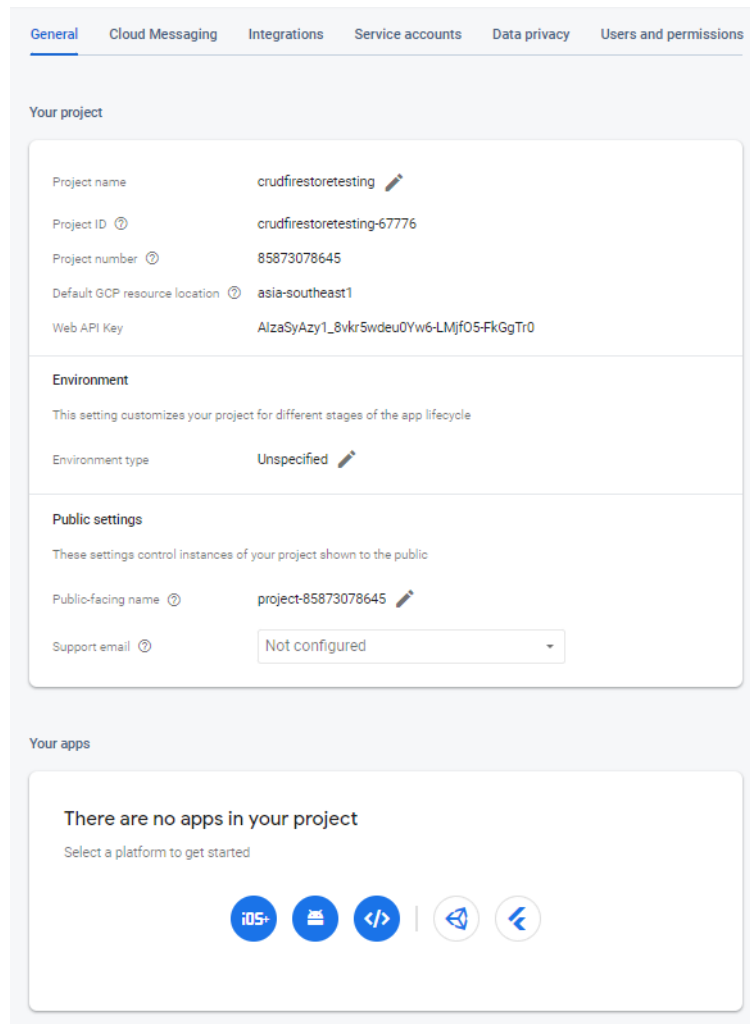


Figure 5. 31 Your apps section in General Tab

Enter the Android package name from the Android Studio project, which contains the Diet Manager app; in this case should be: `com.example.crudfirestore`, then click on “Register app” to continue.

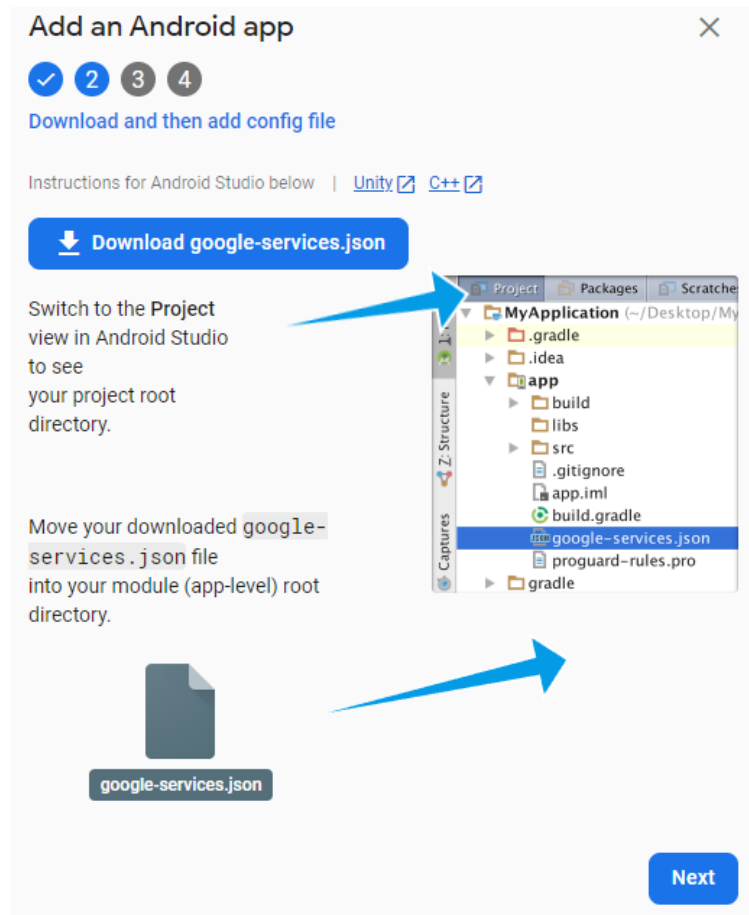


Figure 5.33 Add Android app page Step 2

And move google-services.json file into the Android Studio module (app-level) root directory. Which will be:

...\crudfirestore\android\app\google-services.json

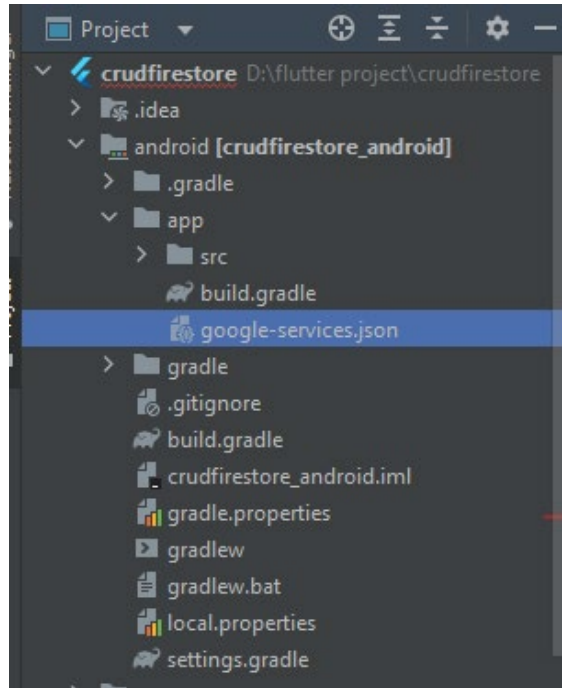


Figure 5. 34 google-services.json location in the Android Studio project file directory

Then ensure to have the Firebase SDK is set-up according to the provided steps:
(The provided Android Studio project files containing the Diet Manager have implemented the following steps)

3 Add Firebase SDK

Instructions for Gradle | [Unity](#) | [C++](#)

- To make the `google-services.json` config values accessible to Firebase SDKs, you need the Google services Gradle plugin.

Add the plugin as a buildscript dependency to your **project-level** `build.gradle` file:

Root-level (project-level) Gradle file (`<project>/build.gradle`):

```
buildscript {
  repositories {
    // Make sure that you have the following two repositories
    google() // Google's Maven repository
    mavenCentral() // Maven Central repository
  }
  dependencies {
    ...
    // Add the dependency for the Google services Gradle plugin
    classpath 'com.google.gms:google-services:4.3.15'
  }
}

allprojects {
  ...
  repositories {
    // Make sure that you have the following two repositories
    google() // Google's Maven repository
    mavenCentral() // Maven Central repository
  }
}
```

Figure 5. 35 Add Android app page Step 3 (part 1)

- Then, in your **module (app-level)** `build.gradle` file, add both the `google-services` plugin and any Firebase SDKs that you want to use in your app:

Module (app-level) Gradle file (`<project>/<app-module>/build.gradle`):

```
plugins {
  id 'com.android.application'
  // Add the Google services Gradle plugin
  id 'com.google.gms.google-services'
  ...
}

dependencies {
  // Import the Firebase BoM
  implementation platform('com.google.firebase:firebase-bom:31.5.0')

  // TODO: Add the dependencies for Firebase products you want to use
  // When using the BoM, don't specify versions in Firebase dependencies
  // https://firebase.google.com/docs/android/setup#available-libraries
}
```

By using the Firebase Android BoM, your app will always use compatible Firebase library versions. [Learn more](#)

- After adding the plugin and the desired SDKs, sync your Android project with Gradle files.

Previous Next

Figure 5. 36 Add Android app page Step 3 (part 2)

5.3.5 Mobile Device Set-up

After the mobile device is connected and detected by the computer successfully, enable Developer Options on the mobile phone, and check the mobile device manufacturer for the steps.

When Developer Options are enabled, navigate to Settings -> Developer Options -> Enable USB Debugging.

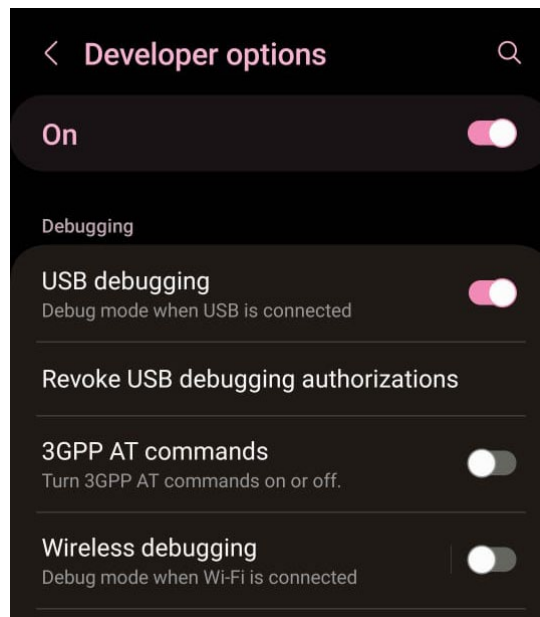


Figure 5. 37 Developer options screen in mobile device's Settings

Then on the USB Settings on the mobile phones, ensure that the USB is connected using the “USB tethering” mode.

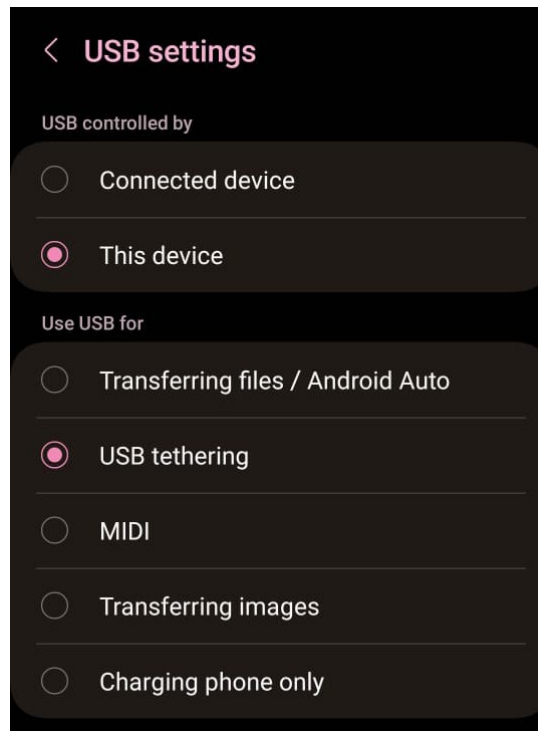


Figure 5. 38 USB Settings screen

The device will be connected successfully for the Android Studio to perform running and testing the Diet Manager app.

The connected device will be detected by the Android Studio and will be shown on the top of the screen.

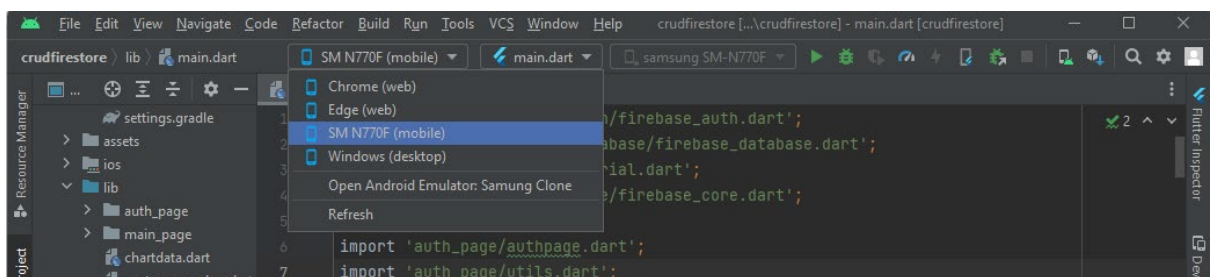


Figure 5. 39 Connected device at the top of the screen of Android Studio

5.4 System Operations

In this subsection, all Diet Manager's operations and user interactions with the app were discussed. The operations will include User Authentication, such as Sign-Up user for a new account, Sign-In user account, Reset the User Password, and Page Navigations operations that navigate the user to all functions of the app.

As well as the major functions of the app were discussed, consisting of all the six sub-objectives accordingly of the project, which are the Record Page functions, Progress Page functions, Reminder Page function, Timelapse Page function and Streak Page function. The other functions, such as the User Profile Page function and Welcome Page function, will be discussed as well.

5.4.1 User Authentication

i. Sign-In

The Sign In screen allows user to enter their Email and Password and click "Sign in" to sign-in to their Diet Manager account, and then it will navigate to the Diet Manager app. The password field has a hide and unhide password to view or hide the entered password. The screen has Forgot Password and Sign Up text link that will navigate to the Reset Password Page and Sign Up page.

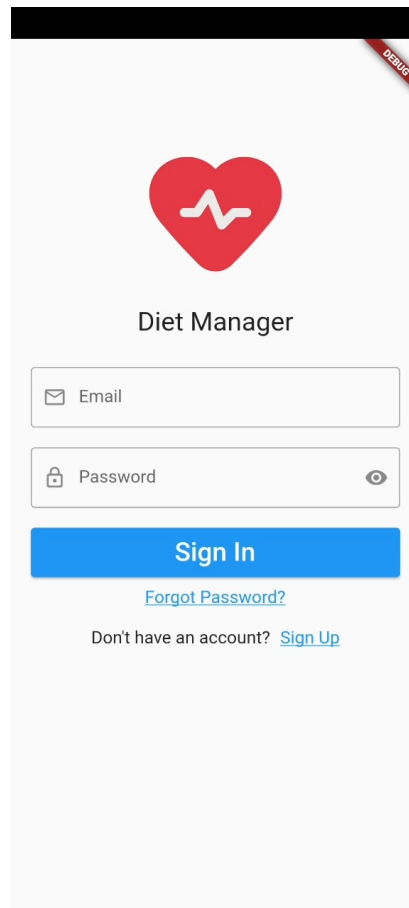


Figure 5. 40 Diet Manager's Sign In screen

ii. Sign-Up

The Sign-up screen allows user to enter their Email and Password and click “Sign Up” to create a Diet Manager account, and then it will navigate to the Diet Manager app. The password field has a hide and unhide password to view or hide the entered password. The screen has Log In text link that will navigate to the Sign In page.

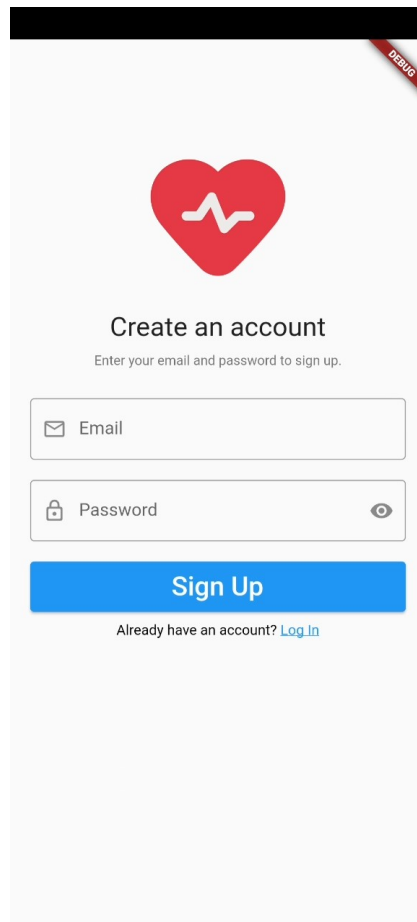


Figure 5. 41 Diet Manager's Sign Up screen

After the user has successfully Sign-Up for an account, the user will be navigated to User Profile Page to set up their user profile by collecting the user's personal information to create their diet plan. (Refer to Chapter 5.4.9 for details on User Profile Page)

iii. Reset User Password

The Reset Password screen enables users to enter their account email and click "Reset Password" to send an email to reset their account password.

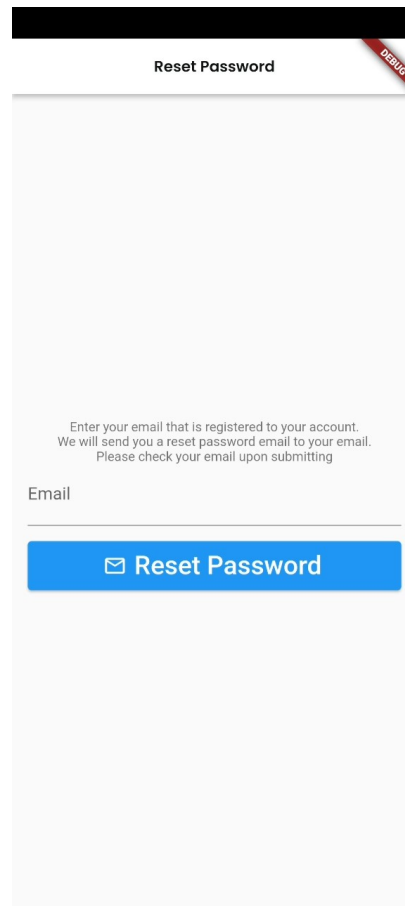


Figure 5. 42 Diet Manager’s Reset Password screen

The Reset Password will be emailed to the user.

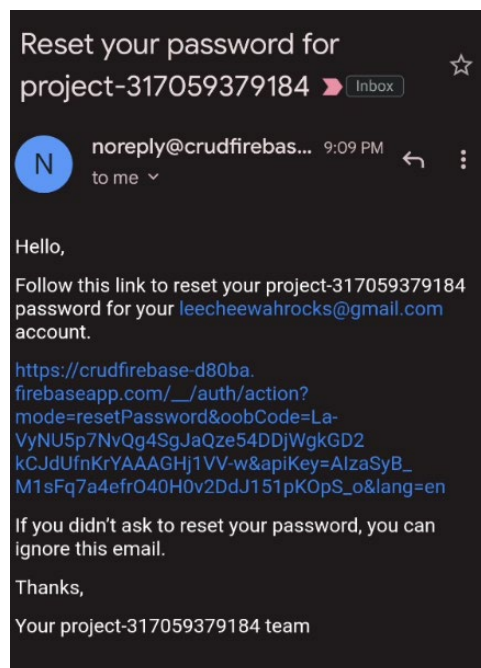


Figure 5. 43 Reset Password email in Inbox

Clicking on the link will navigate the user to the webpage to enter their new password.

Users will need to enter their new password and click on the “SAVE” button to change to a new password.

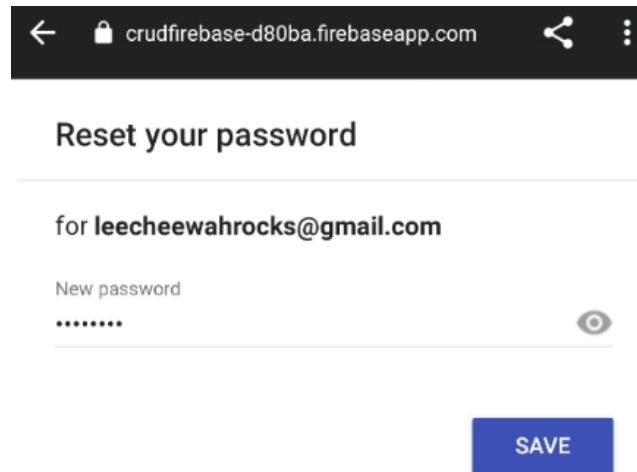


Figure 5. 44 Reset Password webpage

5.4.2 Page Navigation

The Diet Manager app has a Bottom Navigation Bar for navigating between the main functionality page of the app and a Navigation Drawer on the right side of the screen for navigating between other functionalities pages.

i. Bottom Navigation Bar

The Bottom Navigation Bar is displayed automatically at the bottom screen of the app. It contains four tabs in the bottom navigation bar, which are Record, Progress, Timelapse, and Streak, with each tab having its own distinctive icon to represent each tab.

Tapping on any of the tabs will navigate the user to the page, and the selected tab will display the name of the tab next to the icon when the user is viewing the current page.

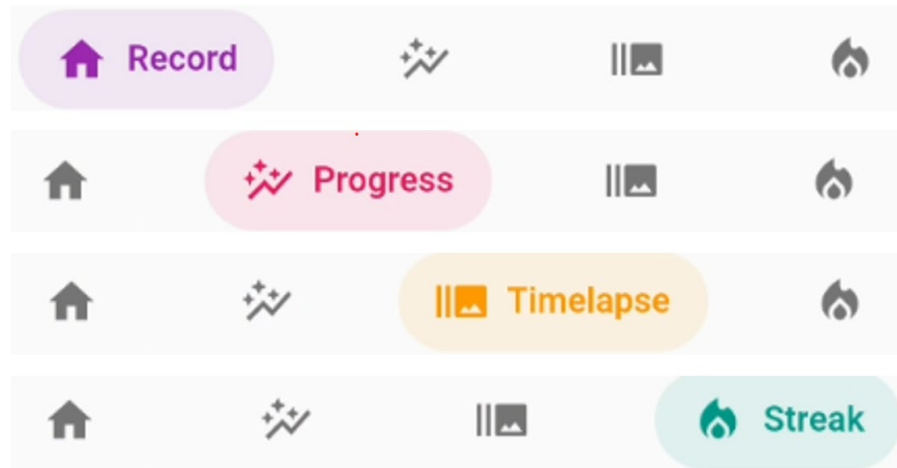


Figure 5. 45 Diet Manager's Bottom Navigation Bar

ii. Navigation Drawer

The Navigation Drawer will be displayed when the user taps on the blue Profile Icon located at the top right corner of the screen in the app.



Figure 5. 46 Diet Manager's Profile Icon

The Navigation Drawer will be displayed on the right side of the screen. The navigation drawer contains a profile icon with the username, and four navigation tabs, which are Profile, Reminder, How It Works, and Sign Out.

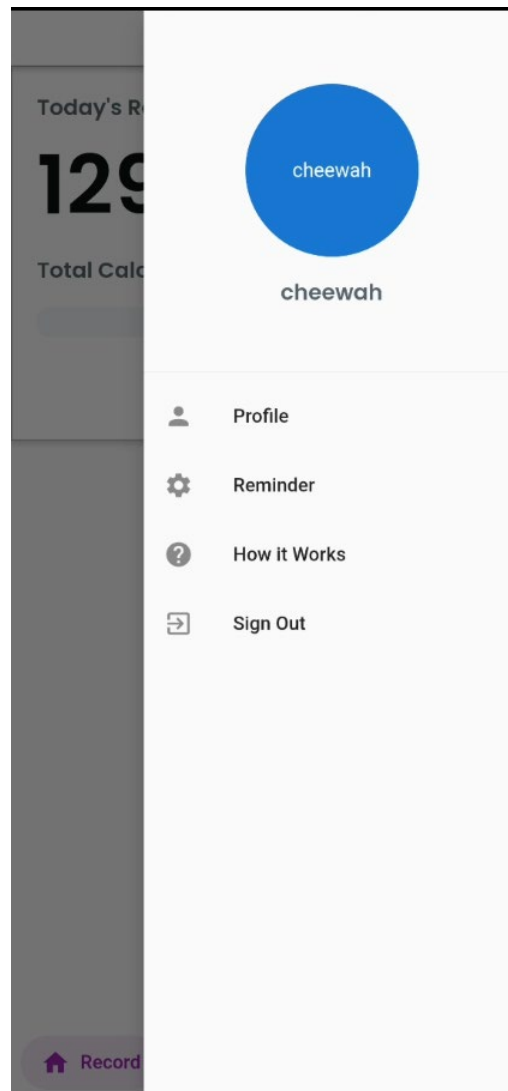
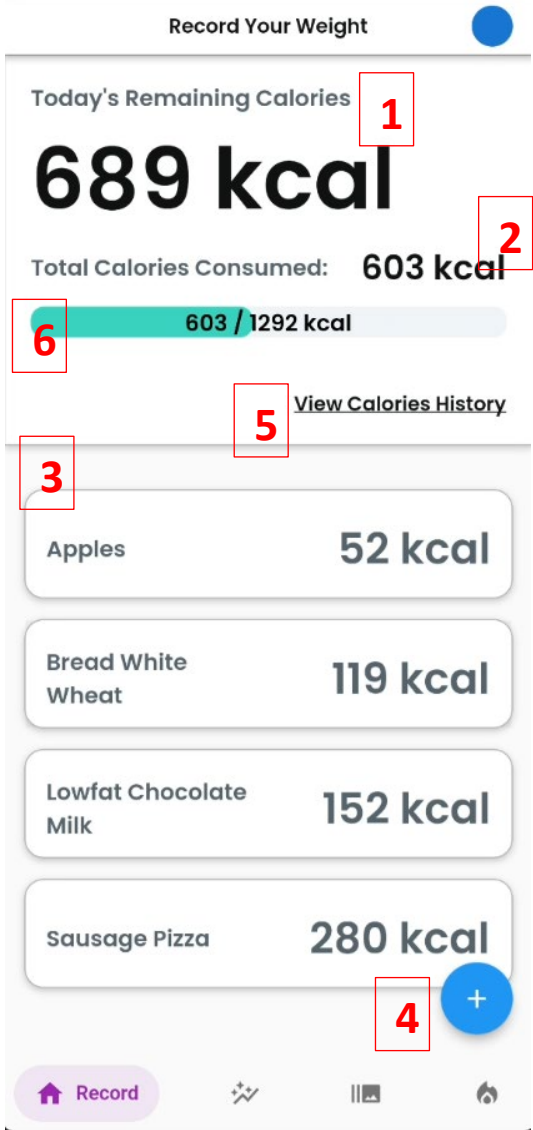


Figure 5. 47 Diet Manager's Navigation Drawer

5.4.3 Record Page

The Record Page is the first screen displayed to the user when the user launches the app. The Record Page is the first sub-objectives of the project, which is to calculate the user's food calorie intake in every meal. (Refer to Chapter 1.2, Sub-objectives 1)

Before the user is able to begin using the Diet Manager's app functionalities, the user's personal information, such as age, gender, current weight, target weight goal, physical activity level and starting diet date, will be collected after signing up for a new user account to be used as input to produce Remaining Calories, and Daily Calories Limit for the Record Page. (Refer to Chapter 5.4.9 for further details on collected user personal information)

Record Page Details	Record Page Screen
<p>The Record Page consists of a few crucial key elements:</p> <p>(refer to the numbering on the screen)</p> <ol style="list-style-type: none"> 1. Remaining calories intake for the day, which displays the limited amount of calories that the user can consume for the day to diet. 2. Total calories consumed for the day, which displays the sum of all the calories of the added food items in the list below. 3. List of consumed food and its calories, which displays all the user-added food items for the day. 4. Add a food button for the user to add food items to list 5. View Calories History to view all past records of consumed food. 6. Progress Bar to track the amount of calories consumed against the total calorie limit for the day. 	 <p>Figure 5. 48 Diet Manager's Record Page</p>

Users begin using the Record Page by clicking on the blue + button at the bottom right of the screen to add food. The “Add food item” dialog box will appear; user can add the Food item by searching and selecting the Food in the search bar.

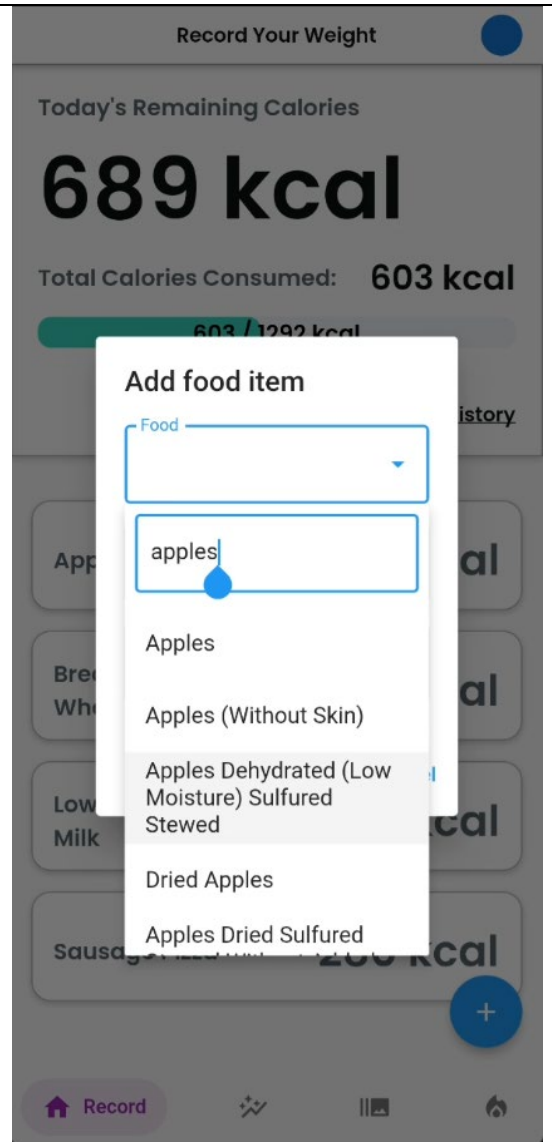
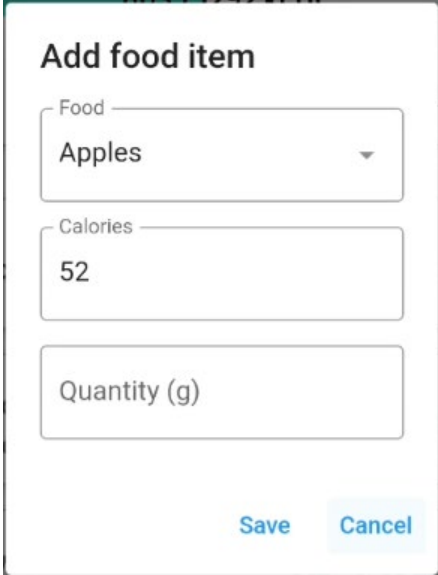
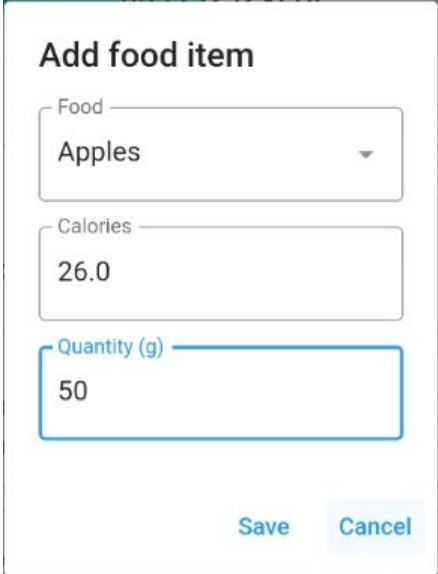


Figure 5. 49 Add food item dialogue box

<p>The selected food calories will appear automatically in the Calories text fields. By default, the number of Calories is set by default with a weight of 100g.</p>	 <p>Figure 5. 50 Calories values in Add food item dialogue box</p>
--	--

<p>Users can specify the quantity of the food in the units of grams, and the value in the Calories fields will be adjusted automatically to the specified amount of calories entered.</p> <p>Users can click on the “Save” button to add the food item.</p>	 <p>Figure 5. 51 Quantity values in Add food item dialogue box</p>
---	---

All the user-added food items and their number of calories will be displayed in a list on the bottom half of the screen. (Refer to number 3 in Figure 5.52)

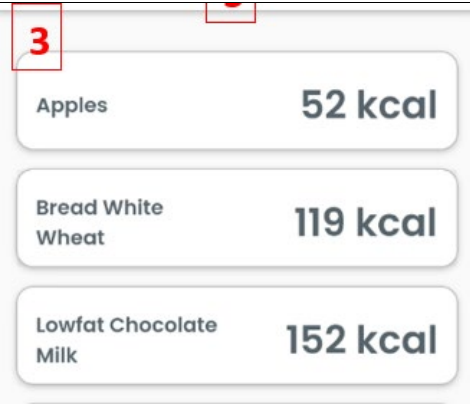


Figure 5. 52 Food items listed food list

Users can tap on any of the food items in the list, and an Edit food item dialogue will appear. Users can modify the food item, calories, and quantity by changing the values in each of the text field boxes.

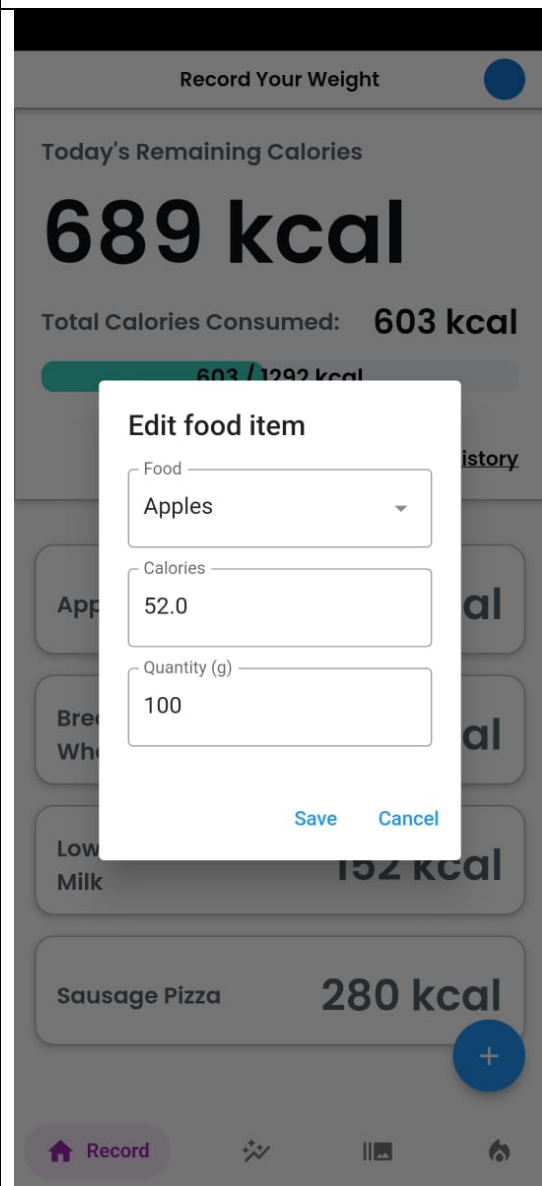


Figure 5. 53 Edit food item dialog box

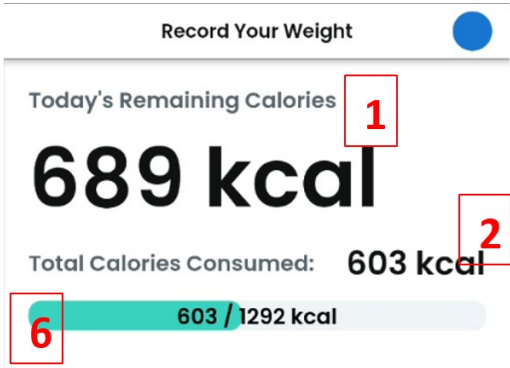
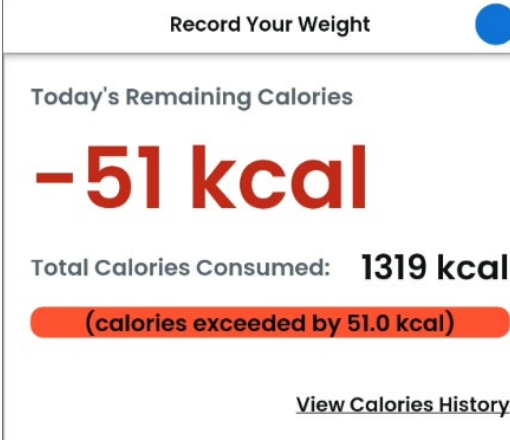
<p>The newly added food item will cause the Remaining Calories for the day to be updated automatically. (Refer to number 1 in the figure)</p> <p>The Total Calories Consumed will be updated automatically. (Refer to number 2 in the figure)</p> <p>The Progress Bar will also be updated. (Refer to number 6 in the figure)</p>	 <p>Record Your Weight</p> <p>Today's Remaining Calories 689 kcal</p> <p>Total Calories Consumed: 603 kcal</p> <p>603 / 1292 kcal</p>
<p>If the user's daily calories intake limit is exceeded, the Remaining Calories intake will display the number of calories it exceeded in negative value and in the red colour font.</p> <p>The Progress Bar colour will turn red, and the text "calories exceeded" will be displayed to indicate to the user that the calorie intake limit has been exceeded.</p>	 <p>Record Your Weight</p> <p>Today's Remaining Calories -51 kcal</p> <p>Total Calories Consumed: 1319 kcal</p> <p>(calories exceeded by 51.0 kcal)</p> <p>View Calories History</p>

Figure 5. 54 Record Page top half screen when calories are within the limit

Figure 5. 55 Record Page top half screen when calories exceed the limit

The View Calories History text, when tapped, will navigate the user to the Food History List page, which displays all past recorded consumed food and calories by date.

Food History List	
2023-4-18	603 kcal
2023-4-17	990 kcal
2023-4-16	1028 kcal
2023-4-15	1125 kcal
2023-4-14	1054 kcal
2023-4-13	1052 kcal
2023-4-12	732 kcal
2023-4-11	859 kcal

Figure 5. 56 Food History List screen

<p>Users can tap on any of the dates, and it will navigate the user to a Food History Details page that displays all the consumed foods for the selected day.</p>	<div style="text-align: right; font-size: small;">2023-4-18 DEBUG</div> <div style="text-align: center; font-size: x-large; font-weight: bold;"> <p>Total Calories: 603 kcal</p> </div> <p>Foods:</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 5px;">Apples</td> <td style="text-align: right; padding: 5px; font-weight: bold;">52 kcal</td> </tr> <tr> <td style="padding: 5px;">Bread White Wheat</td> <td style="text-align: right; padding: 5px; font-weight: bold;">119 kcal</td> </tr> <tr> <td style="padding: 5px;">Lowfat Chocolate Milk</td> <td style="text-align: right; padding: 5px; font-weight: bold;">152 kcal</td> </tr> <tr> <td style="padding: 5px;">Sausage Pizza</td> <td style="text-align: right; padding: 5px; font-weight: bold;">280 kcal</td> </tr> </table> <p>Figure 5. 57 Food History Details screen</p>	Apples	52 kcal	Bread White Wheat	119 kcal	Lowfat Chocolate Milk	152 kcal	Sausage Pizza	280 kcal
Apples	52 kcal								
Bread White Wheat	119 kcal								
Lowfat Chocolate Milk	152 kcal								
Sausage Pizza	280 kcal								

Table 5. 1 Record Page Screen and Details

5.4.4 Progress Page

The Progress Page consisted of the second and third sub-objectives of the project, which is to monitor user dieting progress to keep track of user diet goals. (Refer to Chapter 1.2, Sub-objectives 2 & 3)

Before the user is able to begin using the Diet Manager's app functionalities, the user's personal information, such as age, gender, current weight, target weight goal, physical activity level and starting diet date, will be collected after signing up for a new user account to be used as input to produce Target Weight, Weight Goal and Weight Goal

Date for the Progress Page. (Refer to Chapter 5.4.9 for further details on collected user personal information)

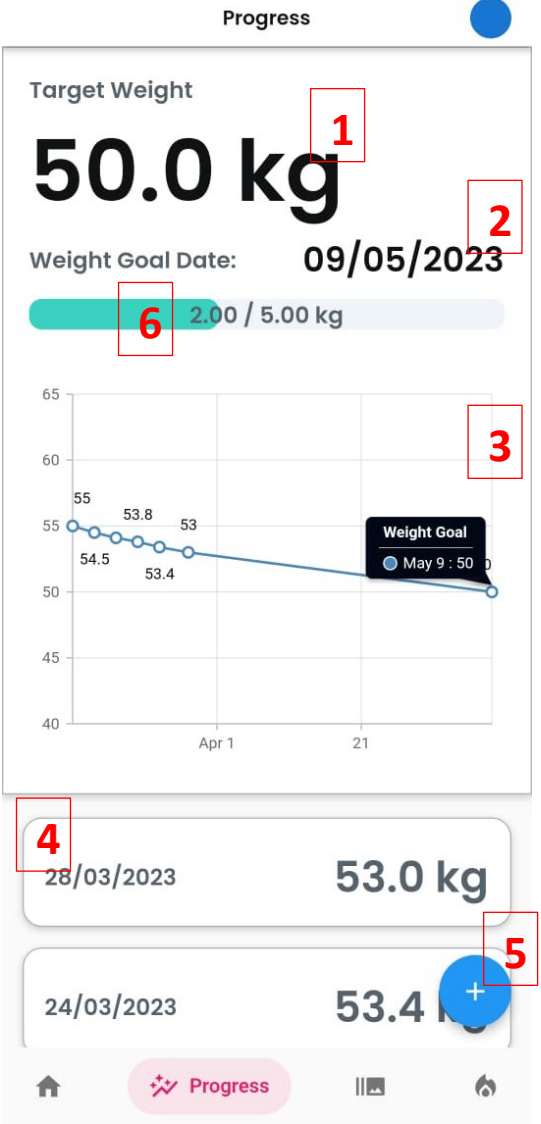
Progress Page Details	Progress Page Screen
<p>The Progress Page consists of a few crucial key elements:</p> <p>(refer to the numbering on the screen)</p> <ol style="list-style-type: none"> 1. Target Weight, which is the user-specified target weight goal 2. Weight Goal Date, which is the estimated date the user will achieve the diet goal 3. The Weight Graph is a graph that plots all the weight records with dates added by the user and the estimated weight goal date at most further dates. 4. Weight Record List, which is a list of all user-recorded weight lists. 5. Add Weight Button, which lets the user add a new weight record. 6. Progress Bar to track the amount of weight loss against the total weight to lose. 	 <p>The screenshot shows the 'Progress' screen with the following elements:</p> <ul style="list-style-type: none"> 1: Target Weight: 50.0 kg 2: Weight Goal Date: 09/05/2023 3: Weight Graph showing a downward trend from 55 kg to 50 kg. 4: Weight Record List showing 28/03/2023 at 53.0 kg. 5: Add Weight Button (+) next to 24/03/2023 at 53.4 kg. 6: Progress Bar showing 2.00 / 5.00 kg.

Figure 5. 58 Diet Manager's Progress Screen

Users begin using the Progress Page by clicking on the blue + button at the bottom right of the screen to record a new weight. The “Add a new weight” dialogue will appear; the user can add a new Weight record by entering the user's current weight in the input field.

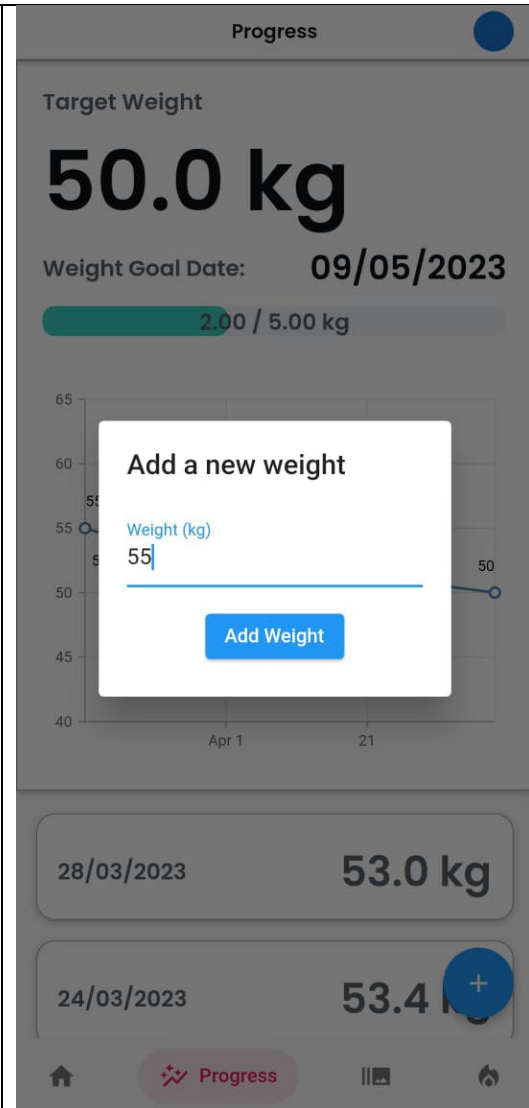


Figure 5. 59 Add a new weight dialogue box

All the user-added weight items and their number of calories will be displayed in a list on the bottom half of the screen. (Refer to number 4 in the figure)

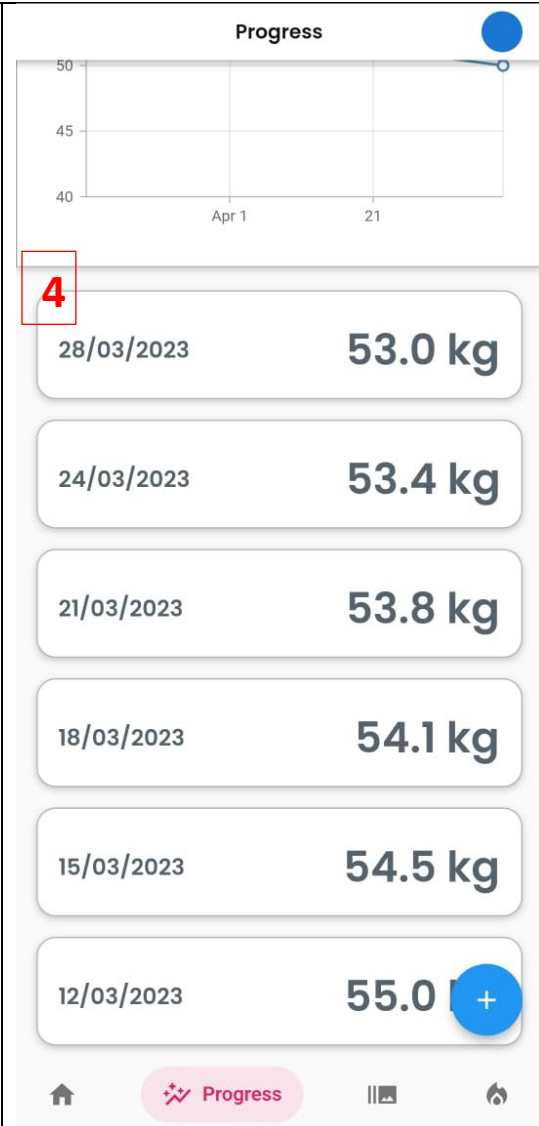


Figure 5. 60 Weight item list in Progress Screen bottom half screen

The user can delete the weight record by swiping left or right on the selected weight record in the list. The trash icon with red background will appear as the user swipes the weight record away to either side, which indicates that the weight will be removed.

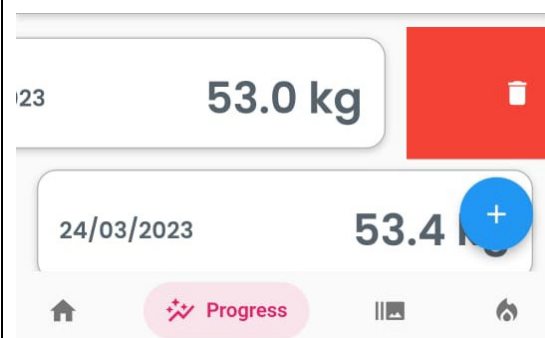


Figure 5. 61 Swiping weight items


<p>At the top half screen of the Progress Page,</p> <p>When a new weight record has been added, the Weight Goal Date will be updated automatically to create a new estimate based on the latest weight record.</p> <p>The Progress Bar will be updated automatically as well to reflect the total weight lost.</p> <p>The Weight Graph will be updated automatically by plotting a newly added weight record to the graph as well as plotting the new estimated weight goal date on the graph, which is the further date.</p>	 <p>Figure 5. 62 The top half screen of the Progress Page Screen</p>
---	--

Table 5. 2 Progress Page Screen and Details

5.4.5 Welcome Page

The Welcome Page is crucial for the Diet Manager app. The Welcome Page will be displayed to the user right after the user has signed up for a new account. And the Welcome Page can be accessed again in the Navigation Drawer for the user to view and update the user details. (Refer to Chapter 5.4.2 for details on accessing the Welcome Page)

<p>Welcome Page Details</p>	<p>Welcome Page Screen</p>
------------------------------------	-----------------------------------

The Welcome Page consists of a slideshow that explains the Diet Manager app to new users. It helps to guide the user through the important core features of the Diet Manager.

Within the Slideshow it contains the main method used for weight loss and its calculation.

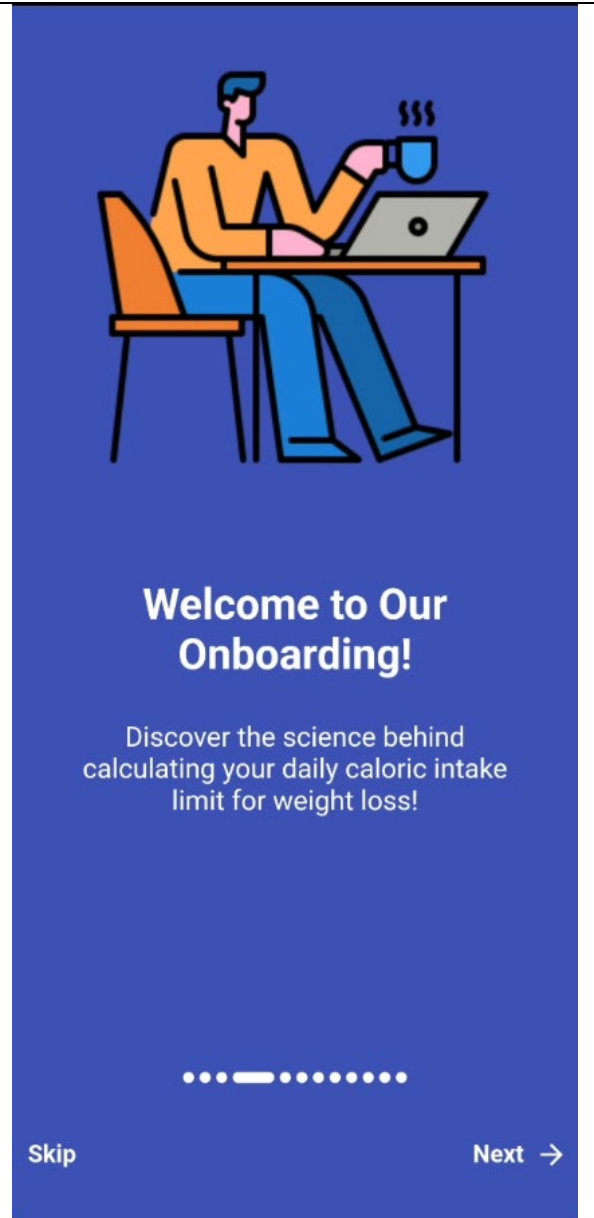
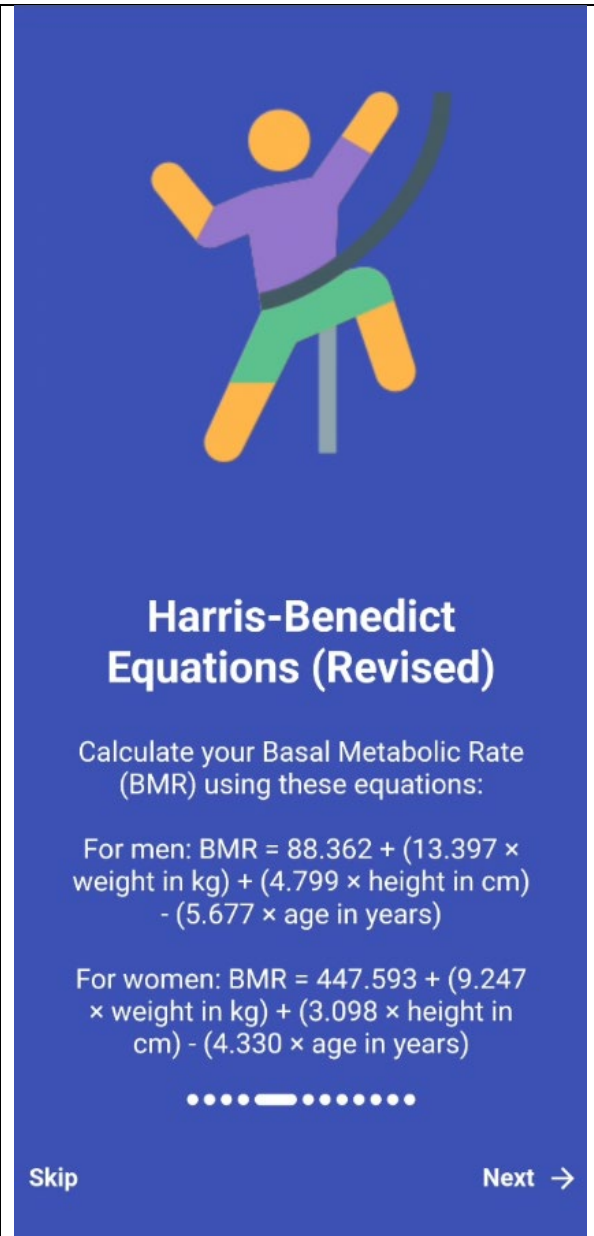


Figure 5. 63 Diet Manager's Welcome Page

It explains the Harris–Benedict equation to let users understand how the Diet Manager helps the user to diet and achieve their weight goal.

(Refer to Chapter 5.4.3, User Profile Page, for further details on the calculations)



Harris-Benedict Equations (Revised)

Calculate your Basal Metabolic Rate (BMR) using these equations:

For men: $BMR = 88.362 + (13.397 \times \text{weight in kg}) + (4.799 \times \text{height in cm}) - (5.677 \times \text{age in years})$

For women: $BMR = 447.593 + (9.247 \times \text{weight in kg}) + (3.098 \times \text{height in cm}) - (4.330 \times \text{age in years})$

Skip Next →

Figure 5. 64 Harris–Benedict equation slide screen

(Refer to Chapter 5.4.3, User Profile Page for further details on the calculations)

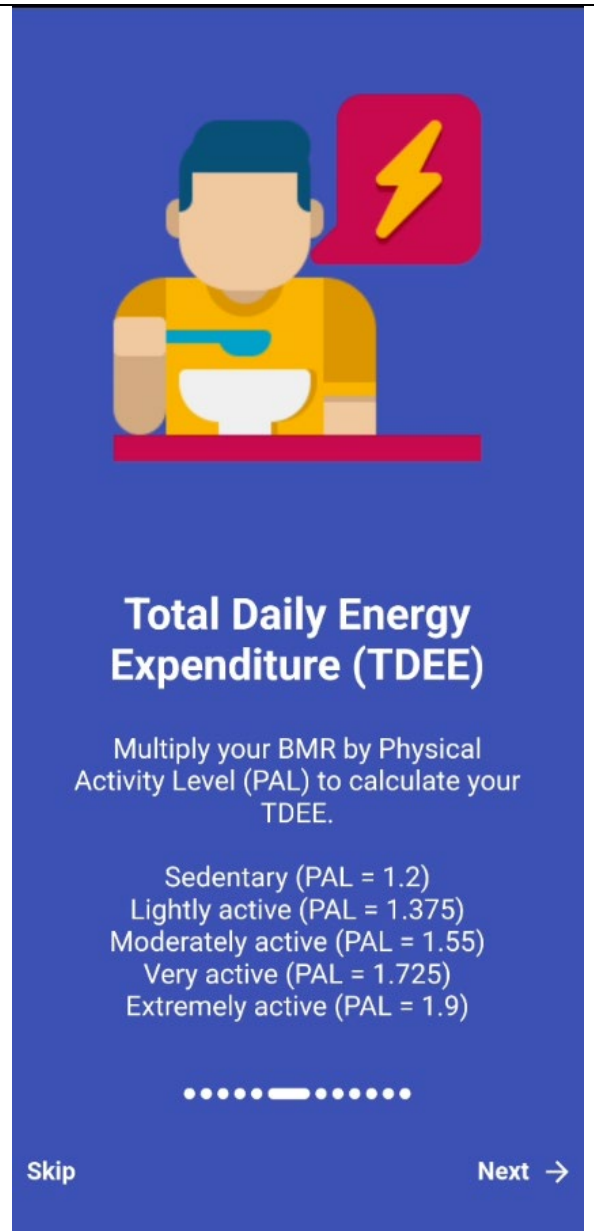


Figure 5. 65 TDEE slide screen

(Refer to Chapter 5.4.3, User Profile Page for further details on the calculations)

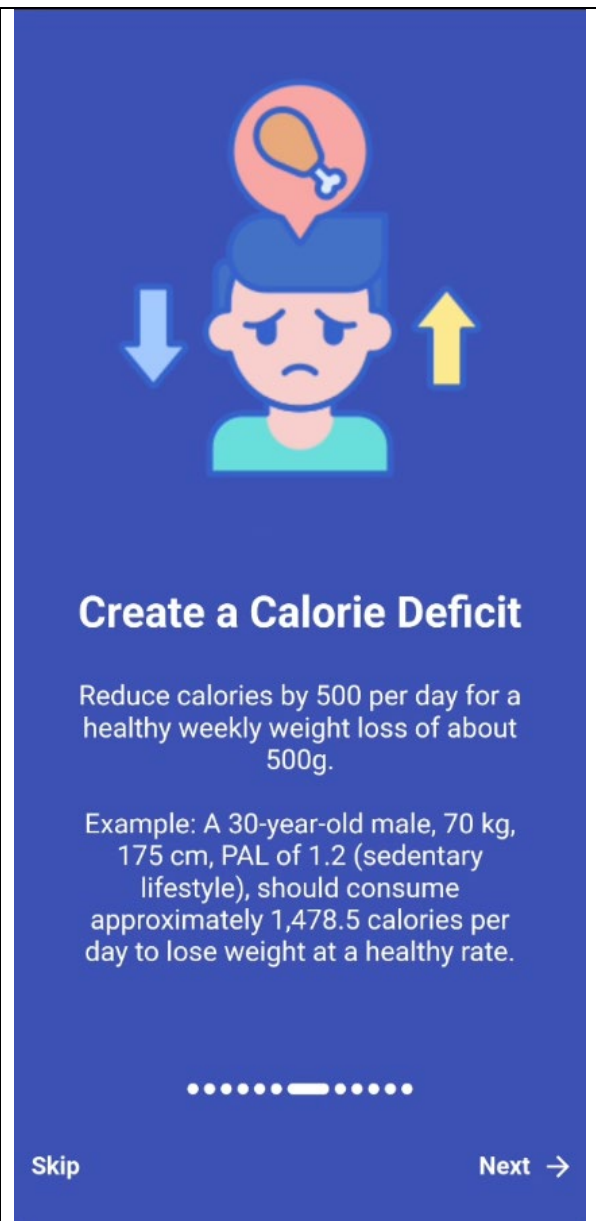


Figure 5. 66 Create Calories Deficit slide screen

Table 5. 3 Welcome Page Screen and Details

5.4.6 Reminder Page

The Reminder Page is the fourth sub-objectives of the project, which is to remind the user to input food calorie intake when the user forgets to. (Refer to Chapter 1.2, Sub-objectives 4)

Reminder Page Details	Reminder Page Screen
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The Reminder Page consists of a few crucial key elements:

(refer to the numbering on the screen)

1. Edit Time button, for the user set a time for daily reminders.
2. Notification On toggle, to enable or disable

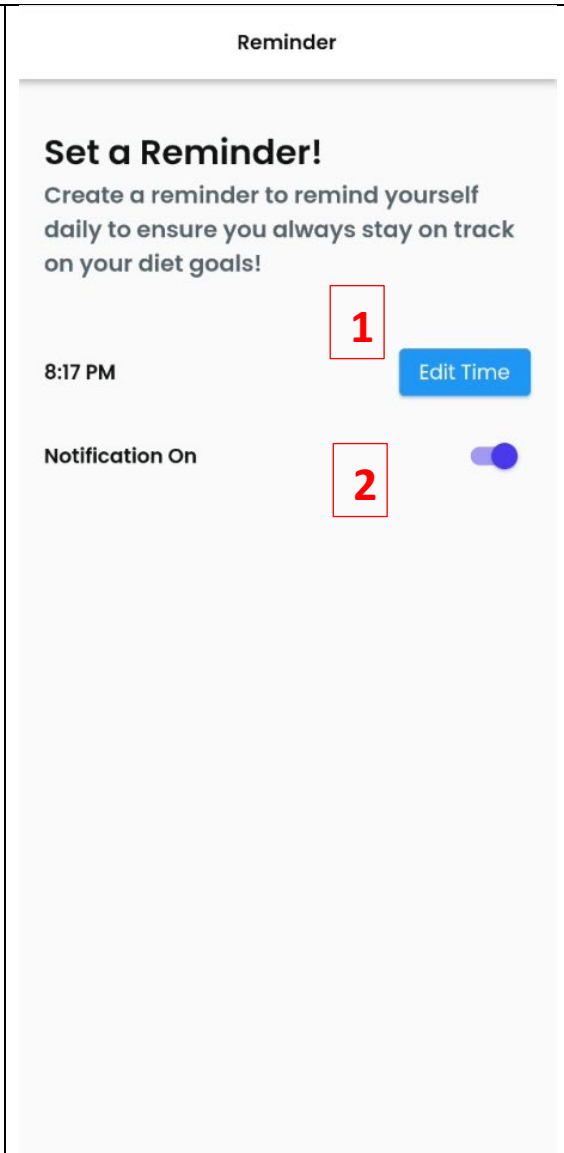


Figure 5. 67 Diet Manager's Reminder screen

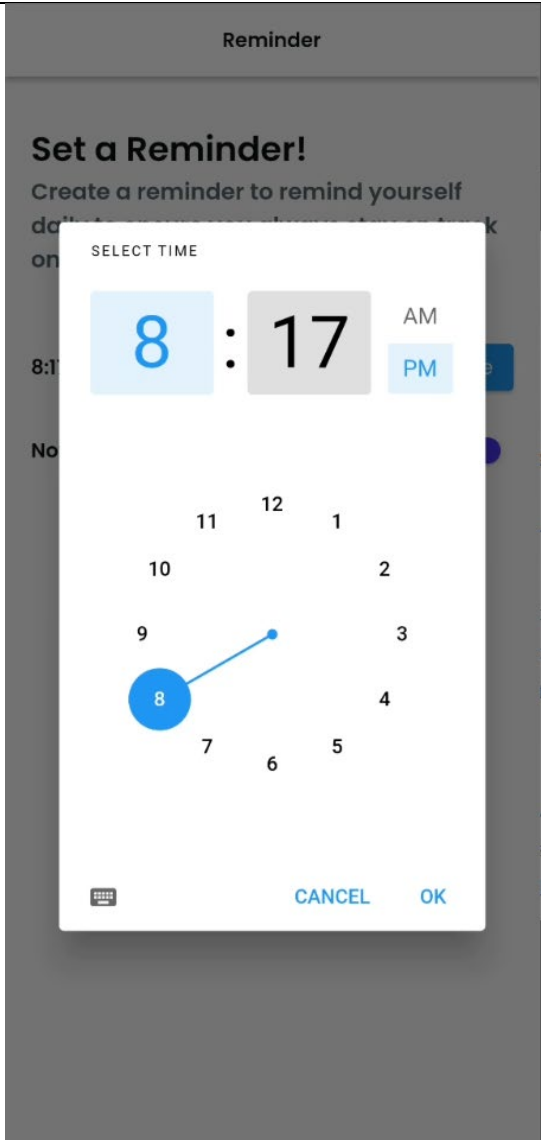

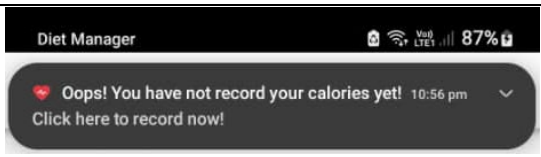
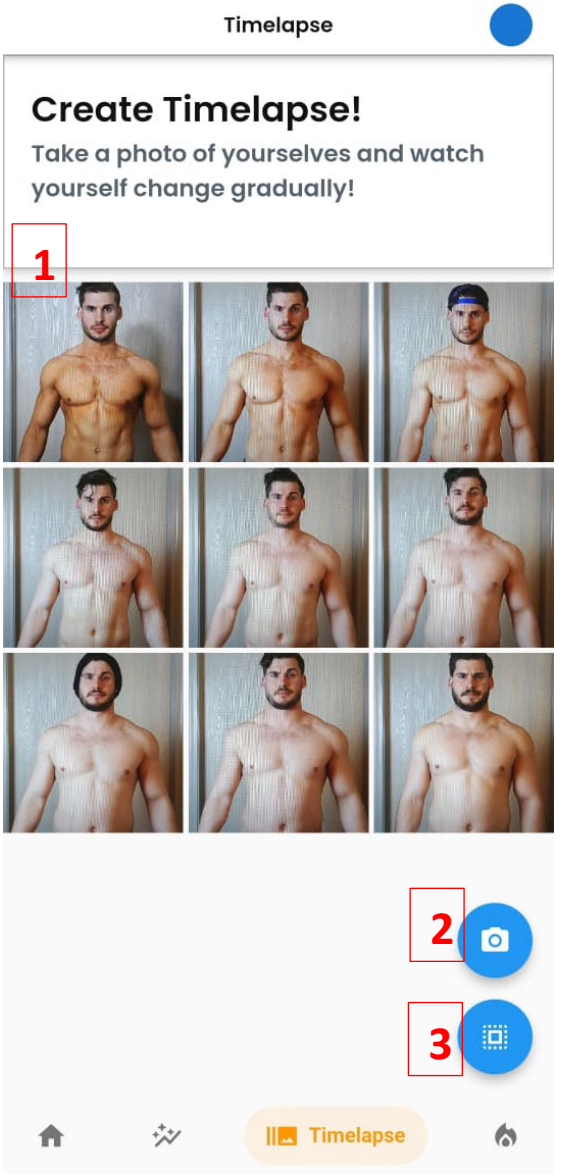
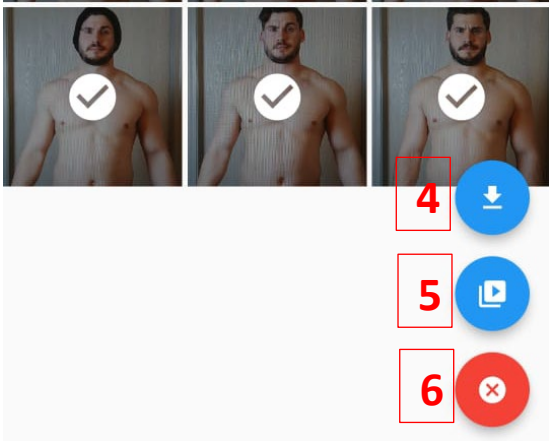
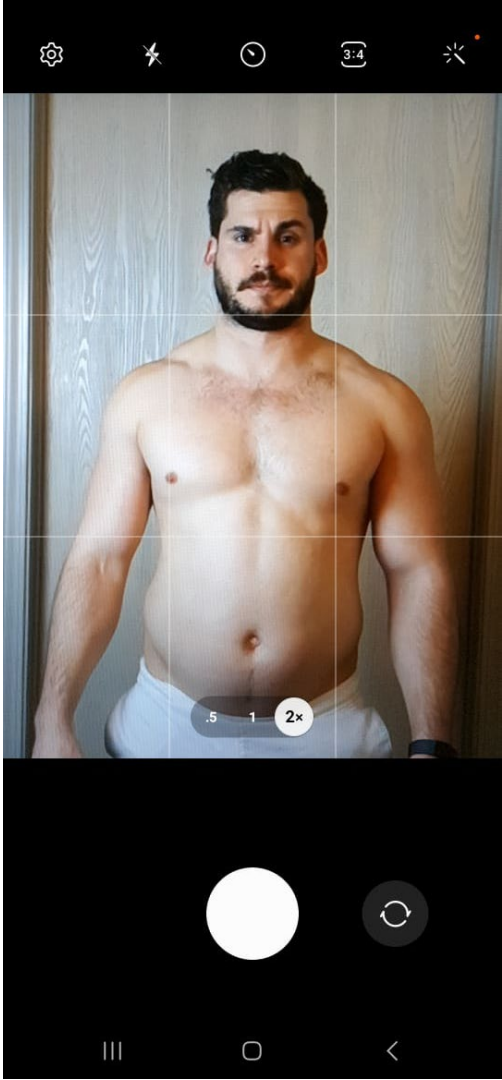
<p>Users begin using the Reminder Page by clicking on the “Edit Time” button to begin setting a daily Reminder time.</p> <p>When the user taps on the “Edit Time” button, a Time Picker will dialogue will appear for the user to select the desired time for a reminder.</p> <p>Users can tap the “OK” button to confirm the selected time.</p>	 <p>The screenshot shows a mobile application interface titled 'Reminder'. A dialog box titled 'Set a Reminder!' is displayed, prompting the user to 'Create a reminder to remind yourself'. Overlaid on this is a 'SELECT TIME' dialog box. The time is set to 8:17 AM. The hour '8' is highlighted with a blue circle and a line pointing to the center of a clock face. The minutes '17' are shown in a grey box. There are 'AM' and 'PM' buttons. At the bottom of the time picker are 'CANCEL' and 'OK' buttons.</p>
<p>Users can toggle the “Notification On” button on or off to either enable or disable the daily reminder.</p>	 <p>The screenshot shows a toggle switch labeled 'Notification On'. The switch is currently turned on, indicated by a blue slider.</p>
<p>The Reminder will be displayed in the form of a notification, display a text message to remind users to record daily calories.</p>	 <p>The screenshot shows a notification banner from 'Diet Manager'. The notification text reads: 'Oops! You have not record your calories yet! 10:56 pm Click here to record now!'. The notification is displayed against a dark background with a red heart icon on the left and a dropdown arrow on the right.</p>

Table 5. 4 Reminder Page Screen and Details

5.4.7 Timelapse Page

The Timelapse Page is the fifth sub-objectives of the project, which is to develop a timelapse of the user's diet progress using pictures that the user saves daily for the user to have an overview of their diet progress. (Refer to Chapter 1.2, Sub-objectives 5)

Timelapse Page Details	Timelapse Page Screen
<p>The Timelapse Page consists of a few crucial key elements:</p> <p>(refer to the numbering on the screen)</p> <ol style="list-style-type: none"> 1. The Thumbnail Photos Gallery, which displays all the photos taken by the user in reverse chronological order in a grid view. 2. The Take Photo button, which lets user takes a photo and add to the gallery. 3. The Select All Photo button, which lets the user select all the photos in the gallery to create the Timelapse video. 4. The Download Pictures button, which only appears when pictures are selected and lets the user to download the selected pictures. 5. The Create Timelapse Video button, which only appears when pictures are selected and lets the user to create a timelapse video using all the selected photos. 6. The Cancel Selections button, which cancels the photo selection mode. 	 <p>Figure 5. 71 Diet Manager's Timelapse screen</p>

	 <p>Figure 5. 72 Timelapse screen when pictures selected</p>
<p>Users begin using the Timelapse Page by clicking on the blue camera icon button at the bottom right of the screen to take photos of themselves. The screen will switch to a built-in camera for the user to take photos.</p> <p>The pictures taken were uploaded and stored into the Firebase Cloud Storage database.</p>	 <p>Figure 5. 73 Built-in camera function screen</p>

Users can tap on any of the Thumbnail to view the photos in Fullscreen



Figure 5. 74 Pictures view in Fullscreen screen

User can select multiple photos and click on the Download Pictures Button. Then the app will navigate user to a screen to browse the location to save the selected pictures. The app will request for user permission to access the phone devices files.

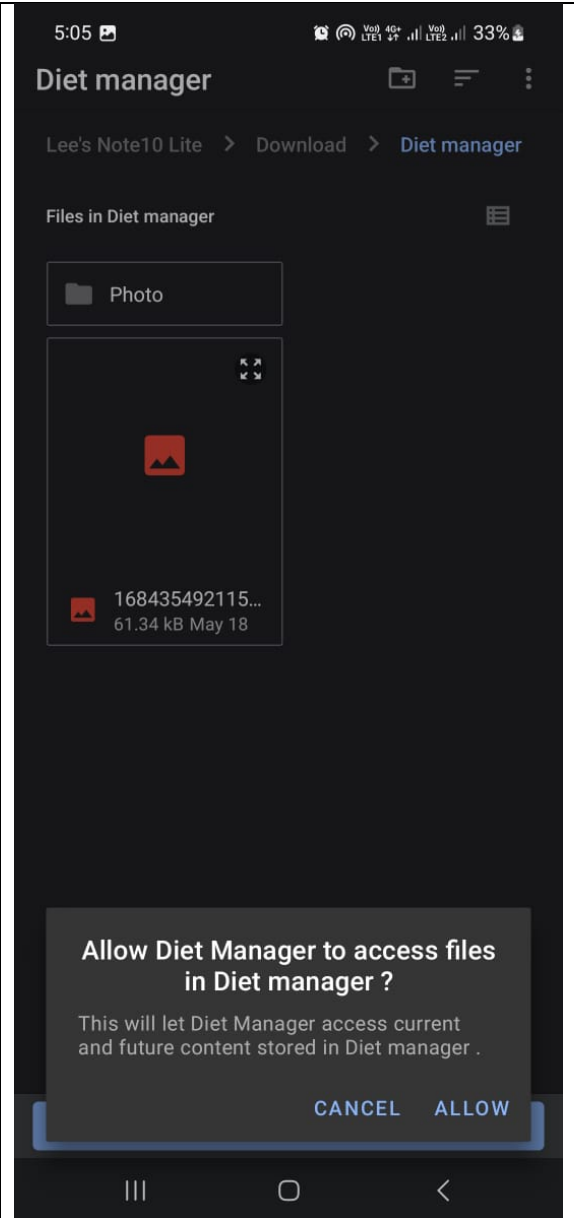


Figure 5. 75 Files Permission request when downloading Pictures to phone storage

The downloaded pictures will be saved in the user's mobile device in png file format. User can open and view the download pictures.

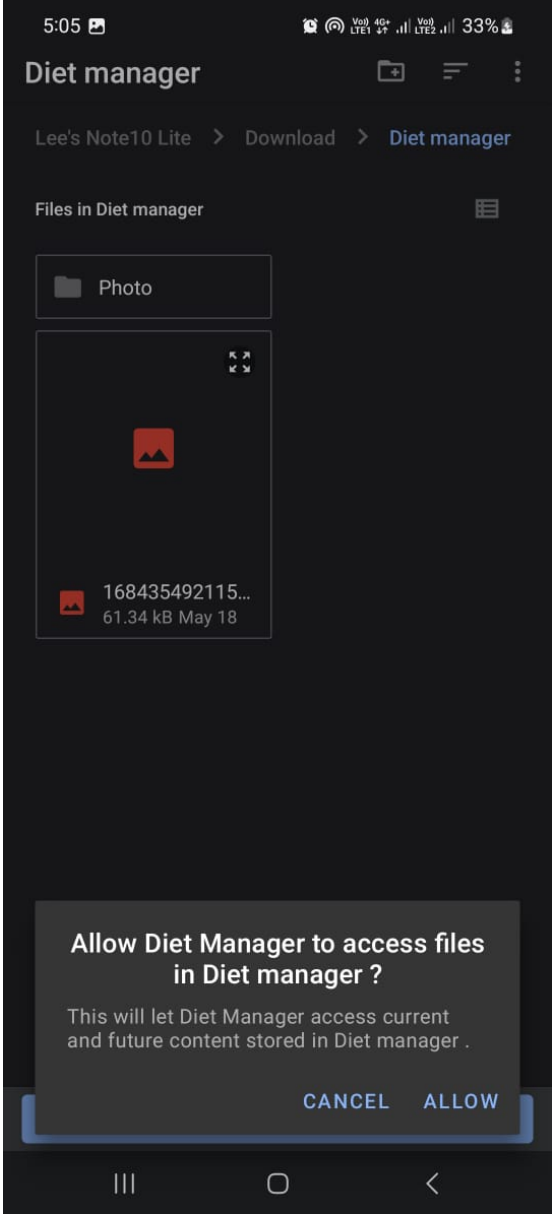
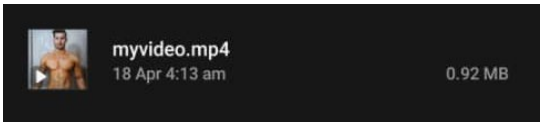
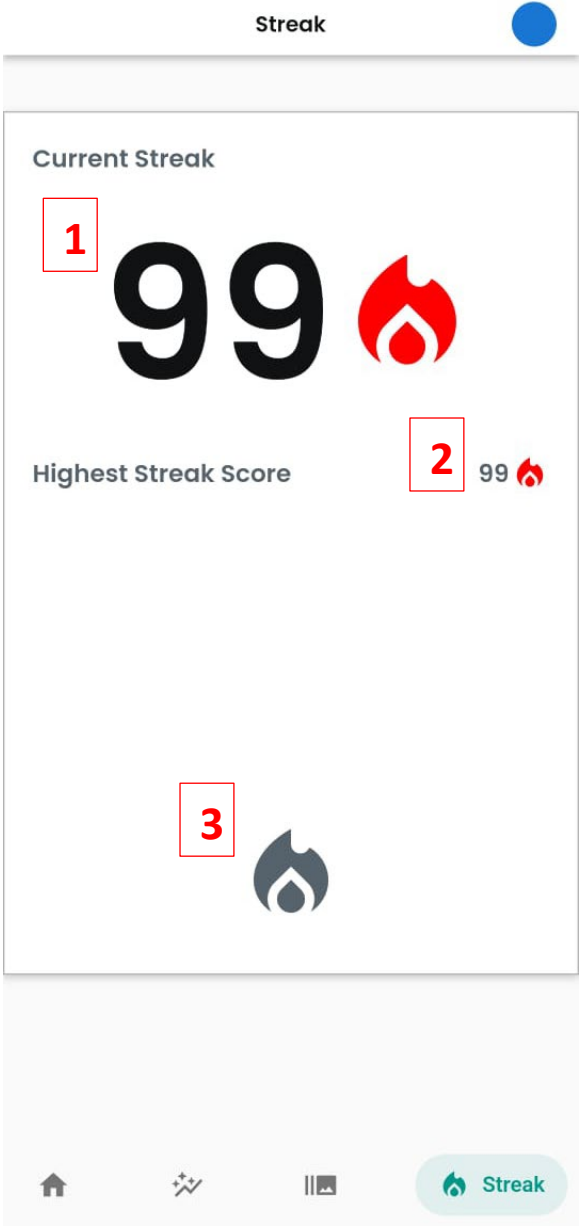
<p>User can select multiple photos and click on the Create Timelapse Video.</p> <p>Then the app will navigate user to a screen to browse the location to save the timelapse video.</p> <p>The app will request for user permission to access the phone devices files.</p>	 <p>Figure 5. 76 Files Permission request when creating and saving Timelapse video to phone storage</p>
<p>The timelapse video created will be saved in the user's mobile device in mp4 format. User can open and view the created timelapse video.</p>	 <p>Figure 5. 77 Created Timelapse video file</p>

Table 5. 5 Timelapse Page Screen and Details

5.4.8 Streak Page

The Streak Page is the sixth sub-objectives of the project which is to collect streak points when user did not exceed their daily calories intake limit. (Refer Chapter 1.2, Sub-objectives 2)

Streak Page Details	Streak Page Screen
<p>The Streak Page consists of few crucial key elements:</p> <p>(refer numbering on the screen)</p> <ol style="list-style-type: none"> 1. Current Streak count, which displays the total cumulative streak count the user have collected using the app daily. 2. The Highest Streak Score, which displays the highest streak cumulative streak count the user have ever achieved. 3. The Collect Streak icon button, which limits user to collecting only one streak point daily. 	 <p>Figure 5. 78 Diet Manager's Streak screen</p>

User begin using the Streak Page by clicking on the Collect Streak fire icon button at the bottom middle.

Then click on the “Redeem” on the pop-up dialog to redeem a single streak count daily.

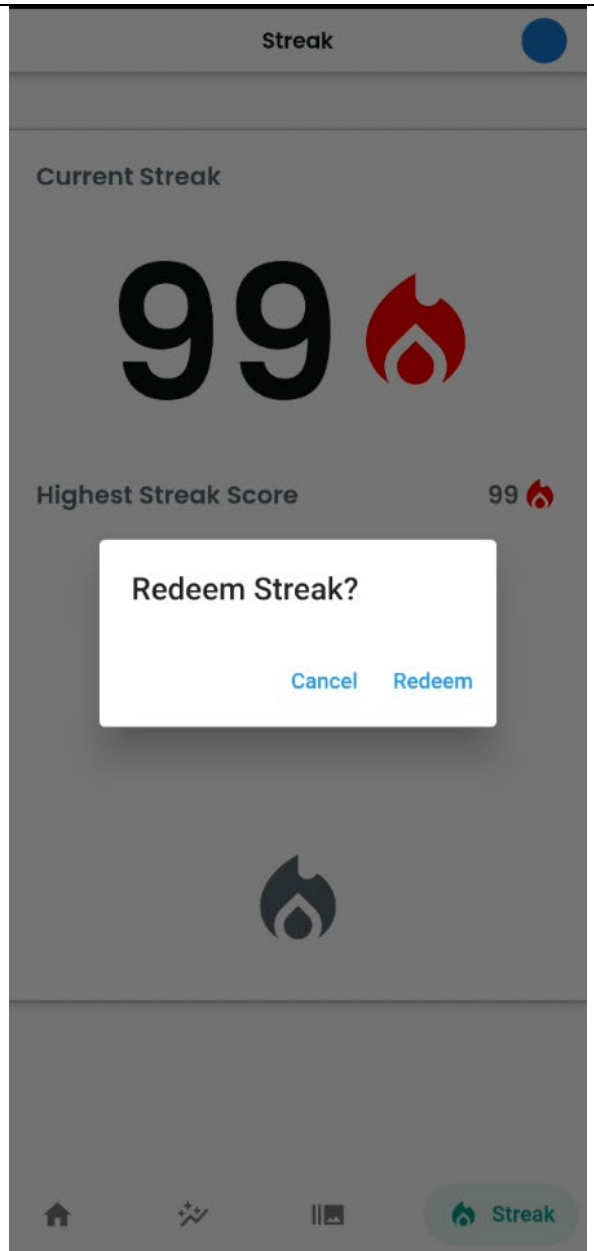


Figure 5. 79 Redeem Streak dialog box

If the Redeem is successful, the Current Streak will increment by one, and the Streak has been collected for the day.

Remember, only one Streak point can be redeemed per day.

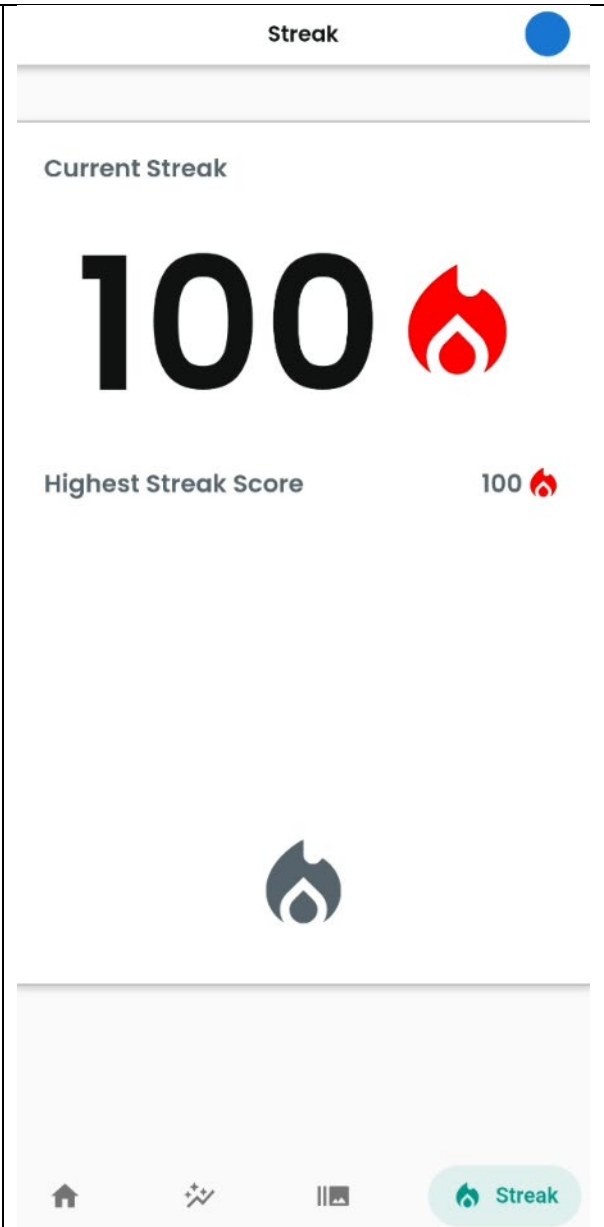


Figure 5. 80 Streak count displayed on Streak screen

If the Streak for the day has been collected, and user will be unable to collect again, a dialog box will inform user that the streak failed to redeem as the streak for the has been collected.

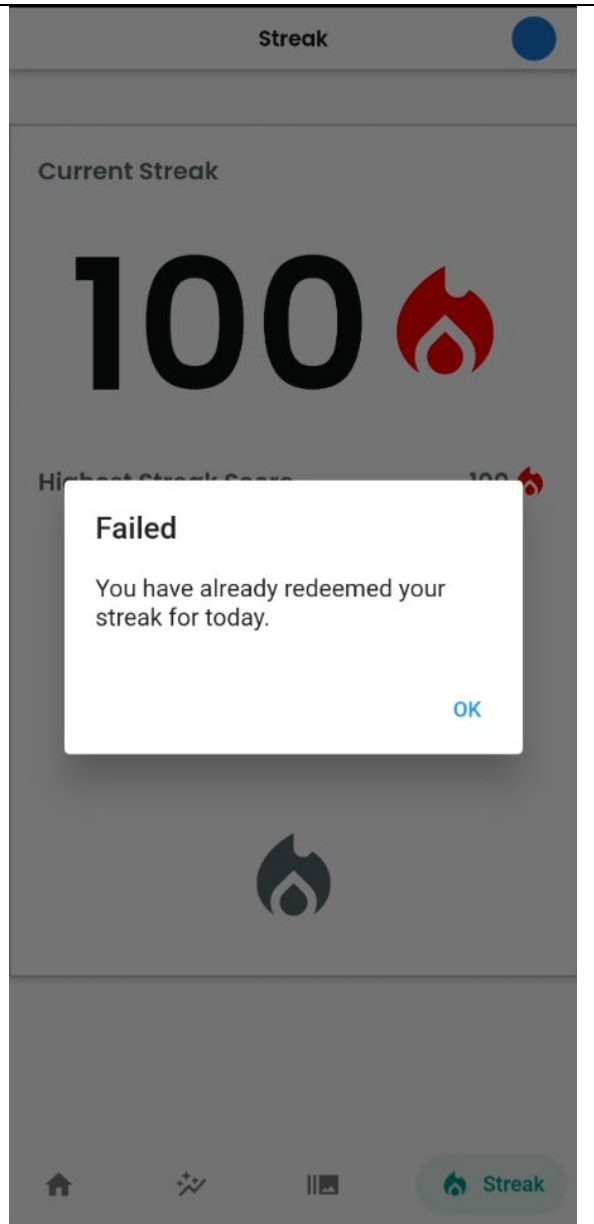


Figure 5. 81 Redeemed Failed dialog box

User must continuously redeem their Streak daily if they wish to maintain their streak point.

User that missed a day redeeming Streak, a penalty will be imposed.

The Streak will automatically be deducted 5 streak points as penalties, and the user will be informed.

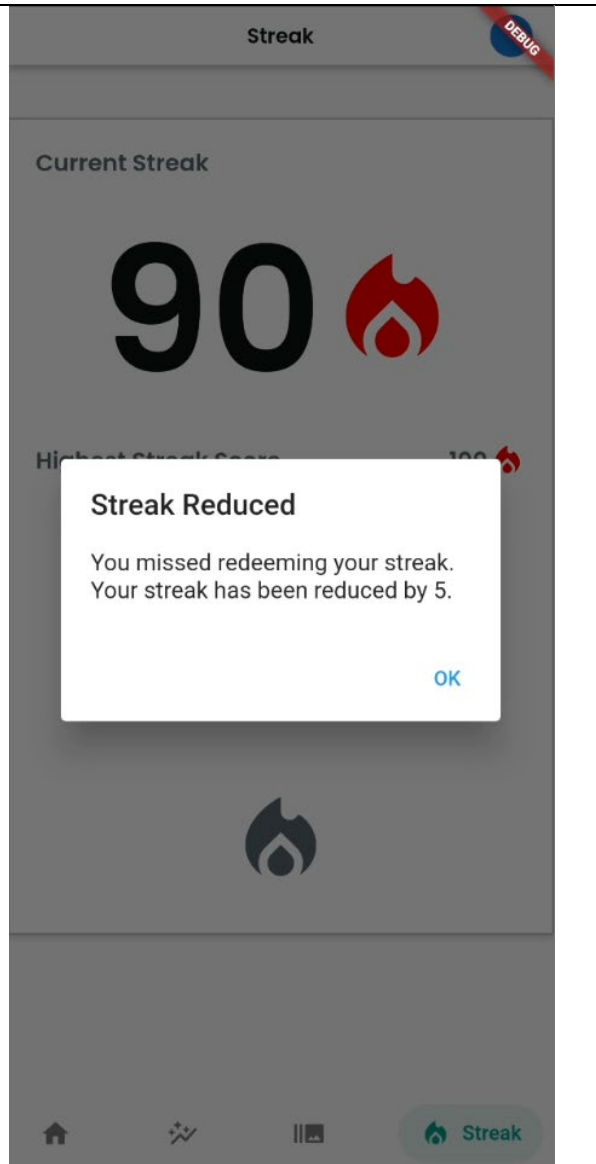


Figure 5. 82 Streak Reduced dialog box

If the user has exceeded their daily calories intake limit, a penalty will be imposed.

The Streak will automatically be deducted 5 streak points as penalties, and the user will be informed.

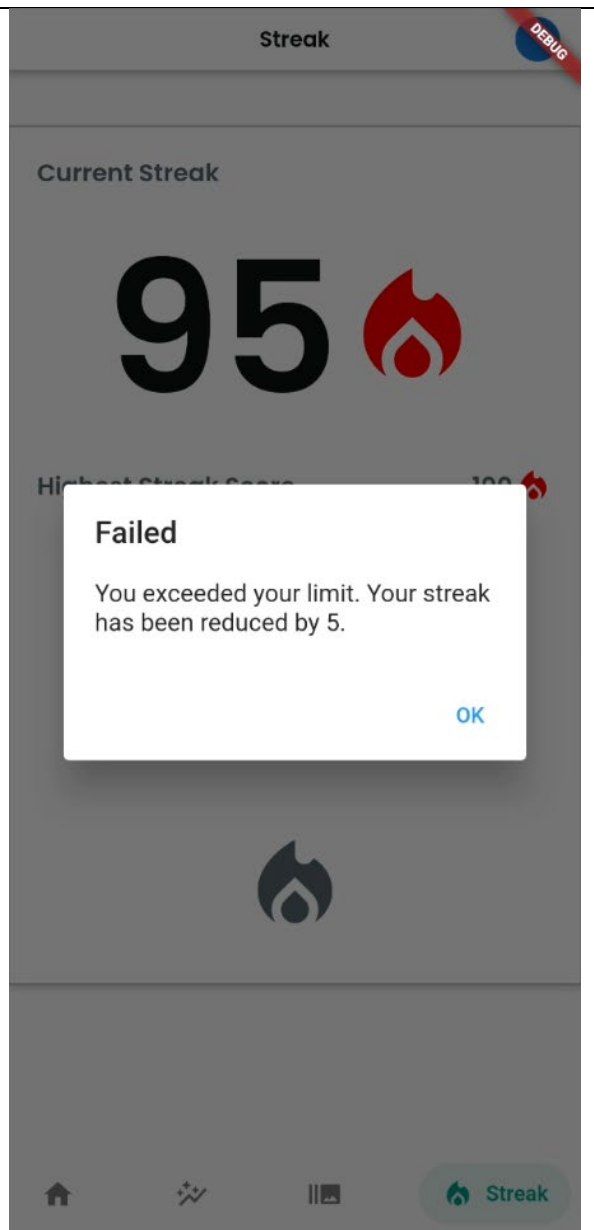


Figure 5. 83 Calories Exceeded Failed dialog box

Table 5. 6 Streak Page Screen and Details

5.4.9 User Profile Page

The User Profile Page is the most crucial page in the Diet Manager app. The User Profile Page will be displayed to user right after used had signed up for a new account. And the User Profile Page can be accessed again in the Navigation Drawer for user to view and update the user details. (Refer to Chapter 5.4.2, for details on accessing the User Profile Page)

The User Profile Page has the following main functions:

1. Collect user's personal information such as age, gender, weight, target weight etc.
2. Create personalised diet plan based on collect user information,
3. Calculate and produce data for other functions in the app such as Record Page, and Progress Page. (Refer to Chapter 5.4.3 & 5.4.3, for details on user data used)


User Profile Page Details	User Profile Page Screen
<p>The User Profile Page consists of few crucial key elements:</p> <p>(refer numbering on the screen)</p> <ol style="list-style-type: none"> 1. User Diet Goal dialog, a simple SMART diet goal created for user to get an overview of their dieting journey. 2. Name, for user to enter their name 3. Gender, for user to select gender 4. Age, for user to enter their age 5. Height, for user to enter their height 6. Current Weight, for user enter their current weight 7. Target Weight Goal, for user to enter their targeted weight goal 8. Physical Activity Level, for user to select their Physical Activity Level 9. Starting Diet Date, for user to select the starting diet day 10. Save Button, to save all user details. 	 <p>The screenshot shows a 'User Details' screen with the following elements:</p> <ul style="list-style-type: none"> 1: A text box containing a personalized message: "Hi, I'm Chee Wah, 22 years old, male, and my current weight is 55.0 kg. I aim to achieve 50.0 kg within 70 days by limiting my calories intake to 1518 kcal daily. My diet journey begins on 19/4/2023, and this is my story!" 2: A text input field for 'Name' with the value 'Chee Wah'. 3: A dropdown menu for 'Gender' with 'Male' selected. 4: A text input field for 'Age' with the value '22'. 5: A text input field for 'Height' with the value '160'. 6: A text input field for 'Current Weight' with the value '55.0'. 7: A text input field for 'Target Weight Goal' with the value '50.0'. 8: A slider for 'Physical Activity Level'. 9: A date input field for 'Starting Diet Date' with the value '19/4/2023'. 10: A blue circular 'Save' button with a white floppy disk icon.

Figure 5. 84 Diet Manager's User Details screen

User Diet Goal dialog, a simple SMART diet goal created for user to get an overview of their dieting journey.

The details which in bold, such as Name, Gender, Age, Current Weight, Target Weight Goal and Physical Activity Level (PAL) in the dialog summary are obtained from the calculation of all the user entered details in the text boxes at the second half of the screen. (Refer to the last part of the subsection to for details of the Harris–Benedict calculation)

Then the dialog summary will produce 2 important details which is the daily calories intake limit and the number of days to achieve the targeted weight goals.

The details in the dialog are constantly being updated as user entering their details in the text boxes.

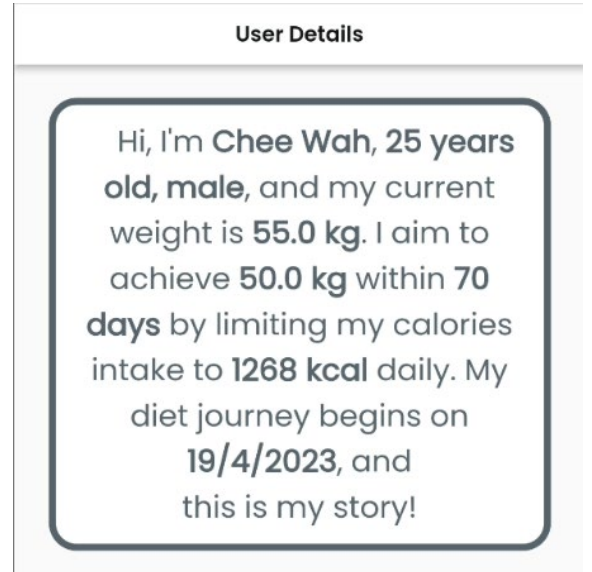


Figure 5. 85 SMART Diet Goal dialog

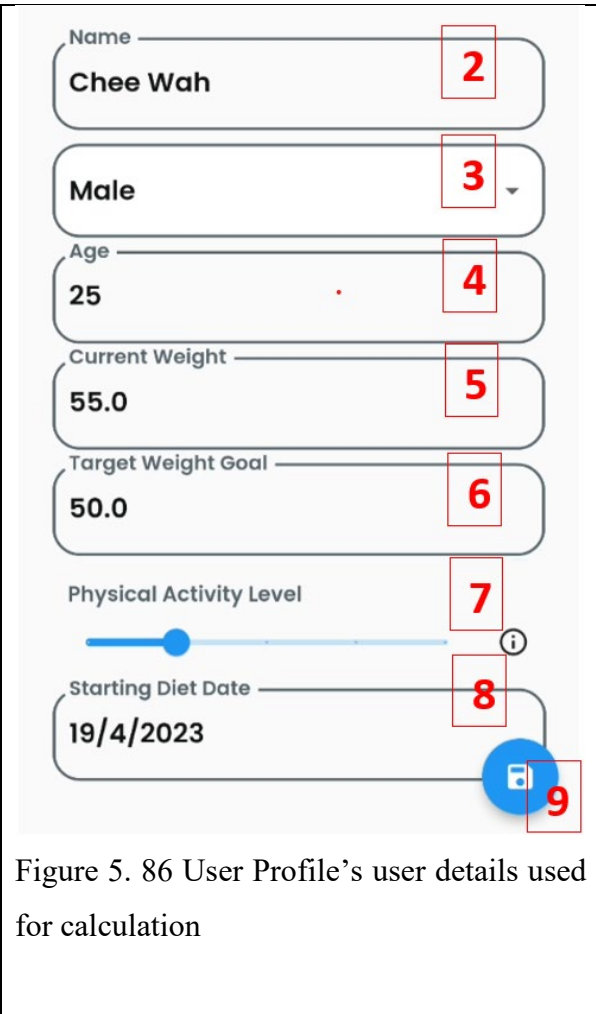
<p>The number of days to achieve diet weight goal and daily calories intake limit are produced by considering the user's age, gender weight, target weight goal, and Physical Activity Level (PAL) from the user input text boxes.</p> <p>It then calculates the user's Basal Metabolic Rate (BMR) using the Harris-Benedict equation. Then, using the user's PAL and BMR to determine the user's daily calorie intake limit.</p> <p>The number of days needed for the user to achieve their target weight goal were calculated using the differences between the weight and target weight goal and assuming a healthy weekly weight loss of 500g.</p>	
--	---

Figure 5. 86 User Profile's user details used for calculation

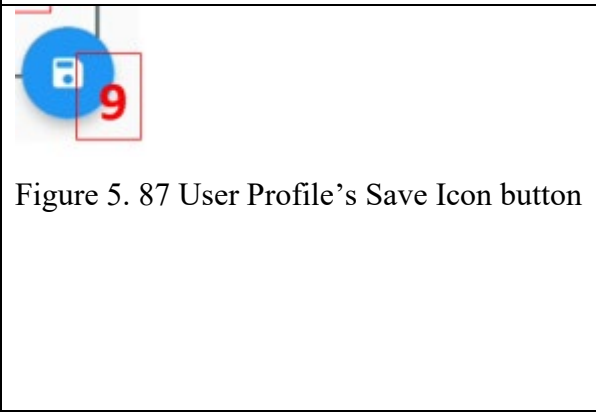
<p>The user can click on the blue disk card icon to Save the changes and details.</p> <p>The updated details will be used by other functions by the app to perform diet functionalities such as Record Page, and Progress Page. (Refer to Chapter 5.4.3 and 5.4.4)</p>	
--	--

Figure 5. 87 User Profile's Save Icon button

The Harris–Benedict equations revised by Roza and Shizgal in 1984 [5], the equations are as follows:

To determine the daily caloric intake limit for weight loss, first calculate the Total Daily Energy Expenditure (TDEE) using the Basal Metabolic Rate (BMR) and Physical Activity Level (PAL). After that, calculate the daily caloric intake needed to lose weight by creating a calorie deficit.

The procedures were outlined below in detail:

1. Calculate BMR:

For men:

$$BMR = 88.362 + (13.397 \times \text{weight in kg}) + (4.799 \times \text{height in cm}) - (5.677 \times \text{age in years})$$

For women:

$$BMR = 447.593 + (9.247 \times \text{weight in kg}) + (3.098 \times \text{height in cm}) - (4.330 \times \text{age in years})$$

2. Calculate TDEE by multiplying BMR by PAL:

$$TDEE = BMR \times PAL$$

Below displayed the value for PAL according to the user's exercise frequency:

$$PAL = 1.2$$

Sedentary (little or no exercise): This level represents people with a desk job or those who don't engage in any physical activity during the day.

$$PAL = 1.375$$

Lightly active (light exercise or sports 1-3 days/week): This level is for individuals who perform light exercise or engage in sports a few times a week.

$$PAL = 1.55$$

Moderately active (moderate exercise or sports 3-5 days/week): This level is for those who engage in moderate exercise or sports for the majority of the week.

$$PAL = 1.725$$

Very active (hard exercise or sports 6-7 days/week): This level is for people who engage in intense exercise or sports almost every day of the week.

$$PAL = 1.9$$

Extremely active (very hard exercise or sports, physical job, training twice a day): This level is for individuals who perform very intense exercise or sports, have a physically demanding job, or train multiple times a day.

3. Make a calorie deficit to lose weight. A typical strategy is to reduce calories by 500 per day, which could lead to weekly weight loss of about 500g:

Table 5. 7 User Profile Page Screen and Details

5.5 Implementation Issues and Challenges

This section discussed the issues and challenges faced during the implementation of all the functions in the Diet Manager project and the solutions on how each issue was weight and taken into consideration to overcome each of the challenges.

1. User-friendly and intuitive UI/UX

The app must have a user-friendly user interface that is simple to use and navigate. It could be difficult to create an intuitive interface that satisfies all the different demands and preferences of people. Layout, typography, colour schemes, and user interactions all need to be carefully considered when designing an interface that is both visually appealing and easy to use.

Another crucial aspect is responsiveness, which makes sure that the user interface of the app adjusts to various screens and devices without any difficulty. The use of a library like Syncfusion, which offers a scalable and adaptable charting solution, should be taken into account while building the weight chart, for instance. To ensure that users understand the data in the chart, it is also crucial to provide visual cues like tooltips or labels.

2. Integration with Firebase:

Integration with Firebase: Using the appropriate SDKs and having a thorough grasp of the documentation is essential for integrating Firebase services. For instance, managing different authentication states like sign in, sign up, and sign out and making sure the UI updates appropriately are required when integrating Firebase Authentication. Firestore may have difficulties when it comes to effectively organising the data, creating the database schema, and utilising the right queries to access and update the data. Understanding the data structure as a JSON tree and managing real-time updates might be difficult for Realtime Databases. For example, it is critical to take this into account while handling various circumstances, such as account creation, password recovery, and email verification, when implementing user authentication.

3. Calculation accuracy

The numerous factors that must be considered when determining the maximum daily caloric intake and the number of days needed to attain the desired weight. For example, the basal metabolic rate (BMR), a key component in determining the daily calorie intake limit, must be calculated using complicated calculations like the Harris-Benedict equation. Calculations were further complicated by the necessity to account for the user's age, weight, gender, and degree of exercise. Additionally, it must be sure that the calculations are correct and dependable regardless of the measuring unit used by carefully considering the measurement units used in the app, such as metric and imperial.

The success of a health and fitness app depends on the implementation of precise and reliable complex calculations; thus, attention must be taken to guarantee that these calculations are done correctly.

5.6 Concluding Remarks

To summarize this chapter, the software setup for the Diet Manager app was discussed. The software setup includes installing the Flutter SDK, Java JDK 11, Android Studio, and Firebase. Additionally, connecting the mobile device to the computer using a USB cable is also required, and in some cases, installing the appropriate USB driver for the mobile device. Then, the details on the settings and configurations required for each component of the software setup are discussed as well.

Then the next section describes the various operations and user interactions in the Diet Manager app. The User Authentication process includes Sign-In, Sign-Up, and Resetting User Password. Page Navigation is done through the Bottom Navigation Bar and the Navigation Drawer. The Record Page calculates daily food calorie intake, while the Progress Page monitors the user's dieting progress. The Welcome Page provides an explanation of the Diet Manager app, including the Harris-Benedict equation used for weight loss. The Reminder Page reminds users to input food calorie intake, and the Timelapse Page lets users create a timelapse of their diet progress. The Streak Page in the Diet Manager app allows users to collect streak points for not exceeding their daily calorie limit. The User Profile Page is the most important page and allows users to enter their personal information and create a personalized diet plan. The page calculates the

daily calorie intake limit based on user data using the Harris-Benedict equation and creates a daily calorie deficit to lose weight. The TDEE is calculated by multiplying the BMR with PAL, and a typical strategy is to reduce 500 calories per day for a weekly weight loss of 500g.

Then the implementation and challenges faced are the implementation of a user-friendly UI/UX, integration with Firebase, and accurate calculations are important considerations for building a successful health and fitness app. The UI/UX must be intuitive and responsive, and Firebase integration requires careful attention to authentication and database management. Calculating daily caloric intake and weight loss targets accurately involves complicated equations, measurement unit conversions, and careful consideration of various user factors. Precise and reliable calculations are crucial for the success of a health and fitness app.

In conclusion, the Diet Manager app provides a comprehensive solution for managing daily food intake and weight loss goals. From the software setup to the various app functionalities, every aspect is designed to help users achieve their dieting objectives. However, building a successful health and fitness app requires addressing challenges such as creating an intuitive UI/UX, integrating with Firebase, and ensuring accurate calculations. By considering these factors, we can build a reliable and effective app that helps users maintain a diet management app.

CHAPTER 6 SYSTEM EVALUATION AND DISCUSSION

6.1 System Testing and Performance Metrics

This section provides an overview of the system testing performed on the application, focusing on integration testing techniques and their role in ensuring seamless functionality between different components. The section also covers the performance metrics used to evaluate the effectiveness of the testing process.

The primary testing technique used in the application is integration testing, which focuses on verifying the functionality of different components when they work together. It helps identify any issues or inconsistencies that may arise when individual modules or components interact with each other. Integration testing is essential in this context because it ensures that the various functions of the Diet Manager application, such as the Record Page, Progress Page, Reminder Page, Timelapse Page, Streak Page, and User Profile Page, work together as intended, providing a smooth and consistent user experience. (Refer to Chapter 6.2 for details of the testing setup and results for each of the functions mentioned earlier)

To evaluate the effectiveness of the integration testing process, various performance metrics are used, including:

1. **Functionality:** Ensuring that each component of the application performs its intended function and that data flows correctly between components.
2. **User experience:** Verifying that user actions are correctly processed and lead to the expected outcomes within the system, such as inputting data, navigating through the app, and manipulating stored data.
3. **Data accuracy:** Checking that calculations and data processing within the application are accurate and consistent, such as in the case of the Record Page, where adding a food item updates the Remaining Calories Intake, Total Calories Consumed, and Progress Bar.

4. **Reliability:** Assessing the application's ability to handle different user inputs and scenarios without errors or unexpected behaviour.
5. **Efficiency:** Measuring the application's performance in terms of response times, resource usage, and overall system load.

6.2 Testing Setup and Result

The Integration testing will be performed on only the major functions of the Diet Managers. The major functions, which are the Record Page, Progress Page, Reminder Page, Timelapse Page and Streak Page, consist of all the six sub-objectives accordingly of the project. And lastly, the other tested function included was the User Profile Page. The result of each test performed on each of the functions will be summarized.

The Test Objectives for each of the functions were summarized as follows:

1. **Record Page:** Verify the accuracy and functionality of daily calorie intake calculations, food item addition and removal, and navigation to the Calories History page.
2. **Progress Page:** Validate the display and update of target weight, weight goal date, progress bar calculations, and weight record management.
3. **Reminder Page:** Verify the functionality of setting, activating, and deactivating reminder notifications.
4. **Timelapse Page:** Test photo saving and display, photo selection, and timelapse video creation.
5. **Streak Page:** Validate the display and management of streak scores, including streak redemption logic.
6. **User Profile Page:** Verify accurate diet calculations based on user inputs, information display, and data storage.

6.2.1 Record Page

Integrated Testing 1: Record Page

Test Objective: To test the Daily Calories Intake limit, Remaining Calories Intake, Total Calories Consumed and added food items were displayed correctly, as well as the Add food button and the View Calories History button able to function accordingly.

Input	Expected Output	Results
Check the value of the Daily Calories Intake Limit in the Progress Bar.	The value of the Daily Calories Intake Limit in the Progress Bar is similar and accurate to the value of the Daily Calories Intake Limit in the User Profile Page. (Refer to Chapter 5.4.9 for details of the Daily Calories Limit of the User Profile Page)	PASS
Click the “+” blue icon to add food items.	The “Add food item” dialogue is displayed with all the Food, Calories and Quantity textboxes empty, as well as the “Save” and “Cancel” button.	PASS
Click on the “Save” button after inputting into the Food, Calories and Quantity textboxes in the Add Food item dialogue box.	The inputted value in the Food, Calories and Quantity textboxes in the dialogue box closed after the “Save” button is clicked. And the Food item will be added and displayed along with the food name and its calorie values in the food list in the Record Page.	PASS
	The Remaining Calories Intake will be updated to deduct the added food item calories in the food list when a new food item is added.	PASS
	The Total Calories Consumed will be updated, to sum up the added food item calories in the food list when a new food item is added.	PASS
	The Progress Bar will be filled up corresponds to the sum of the amount of added food item calories in the food list and displays the value of Total Calories Consumed over the value of Daily Calories Intake Limit.	PASS

Swipe the Food Item either to the left or right in the food list.	The Food Item will be deleted and removed from the food list on the Record Page.	PASS
	The Remaining Calories Intake will be updated to add the removed food item calories to the food list when a food item is removed.	PASS
	The Total Calories Consumed will be updated to recalculate and sum all food item calories that exist in the food list when the food item is removed.	PASS
	The Progress Bar will be updated and filled up corresponds to the sum of the amount of food item calories that exist in the food list and displays the value of Total Calories Consumed over the value of Daily Calories Intake Limit.	PASS
Click on the “View Calories History”	Navigates user to a Calories History page displaying all the past calories consumed arranged in a list by dates.	PASS
Click on any of the dates items on the Calories History page	Navigates user to a Food Details page displaying all the foods and their calories consumed for the selected day.	PASS

Table 6. 1 Integration Testing for Record Page Functions

Results: All tests passed, indicating that the system is displaying the correct values and providing accurate functionality for adding and removing food items, updating calorie counts, and navigating to the Calories History page.

6.2.2 Progress Page

Integrated Testing 1: Progress Page

Test Objective: To test the value of the Target Weight, Weight Goal Date, Progress Bar weight to lose and added Weight items are displayed correctly on the Progress Page. And to check if the weight record value plotted on the graph is respective to the weight record item in the weight list.

Input	Expected Output	Results
Check the value of the Target Weight.	The value of the Target Weight is similar and accurate to the value of the Target Weight set on the User Profile Page. (Refer to Chapter 5.4.9 for details of the Target Weight on the User Profile Page)	PASS
Check the date of the Weight Goal Date.	The date of the Weight Goal Date is similar and accurate to the sum of days to reach the target weight goal set in the User Profile Page and the current date. (Refer to Chapter 5.4.9 for details of the days to reach the target weight goal on the User Profile Page)	PASS
Check the value of the weights to lose in the Progress Bar.	The value of weight to lose in the Progress Bar is similar and accurate to the difference between the target weight goal and the current weight set in the User Profile Page. (Refer to Chapter 5.4.9 for details of the days to reach the target weight goal on the User Profile Page)	PASS
Click the “ + ” blue icon to add a new weight record.	The “Add a new weight” dialogue is displayed with all the Weight textboxes empty, as well as the “Add Weight” button.	PASS
Click on the “Add weight” button after inputting into the Weight textbox in the “Add a new weight” dialogue box.	The weight record will be added and displayed along with the weights and dates in the weight list on the Progress Page.	PASS
	The Weight Goal Date will be updated to recalculate the number of days to reach the diet weight goal based on the latest weight recorded added.	PASS

	The Progress Bar will be updated with the amount of weight loss based on the added latest weight record minus the target weight.	PASS
	The Progress Bar will be filled up corresponding to the amount of weight loss and displays the value of weight lost over the number of weights required to lose.	PASS
	The Chart graph will be updated to add a new point of the latest added weight record and its date.	PASS
	The Chart graph will be updated to add the target weight goal point weight record and its date based on the latest weight record.	PASS
Swipe the Weight Record item either to the left or right in the food list.	The Weight record item will be deleted and removed from the weight list on the Progress Page.	PASS
	The Weight Goal Date will be updated to recalculate the number of days to reach the diet weight goal based on the latest weight recorded available.	PASS
	The Progress Bar will be updated with the amount of weight lost based on the available latest weight record minus the target weight.	PASS
	The Progress Bar will be updated to correspond to the amount of weight lost and displays the value of weight lost over the number of weights required to lose.	PASS
	The Chart graph will be updated to the point of the available existing weight record and its date.	PASS
	The Chart graph will be updated to add the target weight goal point weight record and its date based on the latest available weight record.	PASS

Click on any of the eight points in the Graph.	A small box will be displayed on top if the clicked point to display the weight and its date plotted.	PASS
--	---	------

Table 6. 2 Integration Testing for Progress Page Functions

Results: All tests passed, showing that the system is accurately displaying target weight, weight goal date, and progress metrics, as well as correctly updating these values based on added or removed weight records.

6.2.3 Reminder Page

Integrated Testing 1: Reminder Page

Test Objective: To test the reminder time were able to set time and turn on or off the notification.

Input	Expected Output	Results
Click the “Pick Time” button	Display a Time Picker for the user to select a reminder time	PASS
	Display the selected reminder time on the Reminder page	PASS
Toggle the “OFF” button of the “Notification On.”	Deactivate the reminder notification set on the selected reminder time; the notification will not pop up even if the current time has reached the selected reminder time set by the user.	PASS
Toggle the “ON” button of the “Notification On.”	Activates the notification settings on the selected reminder time, a reminder notification will pop up when the current time has reached the selected reminder time set by the user	PASS

Table 6. 3 Integration Testing for Reminder Page Functions

Results: All tests passed, demonstrating that the system effectively sets and activates/deactivates reminder notifications as desired.

6.2.4 Timelapse Page

Integrated Testing 1: Timelapse Page

Test Objective: To test whether the photos taken by the user were able to be saved and displayed correctly on the screen, select all photos function able, selected photos are able to be downloaded and create a timelapse video.

Input	Expected Output	Results
Click on the “Camera” icon button.	Navigates user to built-in camera function to take photos	PASS
Take a picture with the built-in camera.	The photo taken is saved and displayed in a grid view in the gallery of the Timelapse page.	PASS
Click on any of the pictures in the gallery.	Navigate the user to a new page with the clicked pictures enlarged to fullscreen the pictures.	PASS
Long-click on any of the pictures in the gallery.	The selection mode will be activated. Selected photos will be shown a ticked icon to indicate picture has been selected.	PASS
Clicking on the “Select All” square icon button	The selection mode will be activated, and all pictures in the gallery will be selected. The selected picture can be selected or unselected by clicking once for either option.	PASS
Clicking on the “ X “ red icon button while selection mode active	Deactivate the selection mode, and unselect all pictures in the gallery.	PASS
Clicking on the “Download” icon button while selection mode active	Brings users to browse on mobile storage locations to save the selected photos. Then ask for user phone permission for file storage before the selected pictures are downloaded and stored in the mobile storage.	PASS

Clicking on the “Video” icon button while selection mode active	Brings users to browse mobile storage locations to save the timelapse video based on the selected pictures. Then ask for user phone permission for file storage before the selected pictures were used to create timelapse video and were stored in the mobile storage.	PASS
---	---	------

Table 6. 4 Integration Testing for Timelapse Page Functions

Results: All tests passed, indicating that the Timelapse Page properly saves and displays photos and allows users to create timelapse videos from selected images.

6.2.5 Streak Page

Integrated Testing 1: Streak Page

Test Objective: To test the value of the Current Streak, the Highest Streak Scores were saved and displayed correctly. And to test the streak redemption logic.

Input	Expected Output	Results
Click on the “Fire” icon button when the user’s daily calories are within the limit.	The “Redeem Streak” will appear, and upon clicking the “Redeem” button, the Streak has been redeemed, and the Streak count will increment by 1.	PASS
Click on the “Fire” icon button when the user has already redeemed the streak for the day.	The “Redeem Streak” will appear, and upon clicking the “Redeem” button, the Streak will fail to be redeemed, and the “Failed” dialogue will appear informing the user have redeemed the streak for the day, the existing Streak count will remain unchanged.	PASS
The user’s daily calories limit was exceeded for the day	The “Failed” dialogue will appear automatically to inform that the user’s daily calorie limit has been exceeded and 5 Streak points have been deducted automatically as penalties.	PASS
The user missed a day redeeming their Streak.	The “Failed” dialogue will appear automatically to inform that the user missed redeeming their streak, and 5 Streak points have been deducted automatically as penalties.	PASS
The Current Streak count is higher than the Highest Streak Score	The Highest Streak Score will be automatically be updated to the current streak value.	PASS

Table 6. 5 Integration Testing for Streak Page Functions

Results: All tests passed, showing that the Streak Page accurately displays streak values and applies the appropriate streak redemption logic.

6.2.6 User Profile Page

Integrated Testing 1: User Profile Page

Test Objective: To test the user details that were inputted by the user in the textbox of the User Profile Page were performing the diet calculation accurately, displaying the calculated information correctly, as well as storing and loading the saved user details correctly in the User Profile Page.

Input	Expected Output	Results
Input all user details in text boxes. The text boxes are Name, Gender, Age, Current Weight, Target Weight Goal, Physical Activity Level, and Starting Diet Date.	The textbox displayed all users' inputs and the user details textboxes correctly.	PASS
	The summary dialogue box displayed all users' inputs and the user details textboxes correctly.	PASS
<p>The input value for diet calculation in user details textboxes.</p> <p>Textbox value:</p> <ul style="list-style-type: none"> • Gender = Male • Age = 22 • Height = 160 • Current Weight = 55 • Weight Goal = 50 • PAL = 1.375 	<p>Calculate and display the output for the daily calorie intake limit and the number of days to reach the targeted weight goal correctly using the correct calculation in the summary dialogue box.</p> <p>Expected Output Calculation: (Refer to Chapter 5.4.9 for Diet Calculation)</p> $BMR = 88.36 + (13.375 \times 55) + (4.8 \times 160) - (5.7 \times 22) = 1467.96$ $TDEE = 1467.96 \times 1.375 = 2018.45$ $Daily\ Calories\ Intake\ Limit = 2018.445 - 500 = 1518.45\ kcal$ $No.\ Days\ to\ Reach\ Goal = (55-50)/0.5 * 7 = 70\ days$	PASS
Select the "Save" blue icon button to save all the inputted details.	The saved user details load and displays into the textboxes correctly after closing and reopening the page.	PASS

Table 6. 6 Integration Testing for User Profile Page Functions

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CHAPTER 6

Results: All tests passed, demonstrating that the User Profile Page correctly calculates and displays diet information and properly stores and loads user details.

6.3 Project Challenges

This section depicts some of the major challenges faced during the development of the Diet Manager project and how each challenge was weight and taken into consideration to overcome each of the challenge.

1. UI Design challenges:

The most important aspect of any app's success is designing an interface that is both aesthetically pleasing and easy to use. The UI for the Diet Manager app must present the relevant details and data in an orderly and simple way.

Here are some of the difficulties with the Diet Manager app's user interface design faced:

- **Displaying a lot of data:** The app must show users' diet progress, as well as other details such as a lot of users, added weight record lists, graph charts with weight points plotted, consumed calorie lists, and other elements. It is important to have users be able to discover and get the information they require with ease, thanks to the UI's design.
- **Consistency in design and layout:** The usability of an app depends on its consistency in each of these areas. The app's UI components, including the colours, fonts, and layout, were set to be uniform throughout. It makes it easy for the user's eye to browse and navigate around the app.
- **Developing an intuitive navigation system:** The navigation system, such as the bottom navigation bar and navigation drawer implemented, must be user-friendly and enables users to simply switch between its many pages and functions.

2. Optimizing Performance Challenges:

To guarantee that the Diet Manager app operates quickly and effectively on all devices, performance optimization is essential. For the Diet Manager app, these issues were presented when optimizing performance:

- **Storing and managing a lot of data:** Including user information and food databases will be necessary for the app. The data storage and retrieval system for the app, such as the Firebase Firestore database, must be designed for optimization for it to function swiftly and effectively.
- **Minimizing load times:** To give users a smooth experience, the Diet Manager's pages must load quickly. By resizing and compressing pictures taken by the user before uploading and storing them to Firebase Storage in the Timelapse pages, load times can be reduced significantly.
- **Animation optimization:** Animations can enhance the Diet Manager's aesthetic appeal but, if not done correctly, can also make it less responsive. Animations were used with caution and minimized so that they perform main functions and load multiple element's animations without lengthening the app's screen loading time.

6.4 Objectives Evaluation

This section discussed the evaluation of each objective of the project and how it has been achieved.

6.4.1 Evaluation of Sub-objective 1

The sub-objective is to develop a diet management module to calculate the user's food calorie intake in every meal. (Refer to Chapter 1.2, Sub-objectives 1)

Evaluation: The diet management module has been successfully developed and tested. The system accurately calculates calorie intake for every meal and updates the user's total daily calorie consumption. This objective has been fulfilled.

6.4.2 Evaluation of Sub-objective 2

The sub-objective two is to develop a weight tracking tool to record users' weight and for users to keep track of their weight. (Refer to Chapter 1.2, Sub-objectives 2)

Evaluation: The weight-tracking tool has been successfully implemented and tested. The Progress Page provides users to record their weights and display them in a graph for users to visualize and keep track of their weight progress.

6.4.3 Evaluation of Sub-objective 3

Sub-objective three is to develop a summary report system to monitor user dieting progress to keep track of user diet goals. (Refer to Chapter 1.2, Sub-objectives 3)

Evaluation: The summary report system has been implemented and tested. The Progress Page provides a clear visualization of the user's diet goals, dates, and weight loss progress and visualizes their diet goal with a line graph. This objective has been fulfilled.

6.4.4 Evaluation of Sub-objective 4

Sub-objective four is to develop a reminder tool for users to input user's food calorie intake when the users forget to. (Refer to Chapter 1.2, Sub-objectives 4)

Evaluation: The Reminder Page has been developed and tested, successfully allowing users to set and manage reminder notifications for inputting food calorie intake. This objective has been fulfilled.

6.4.5 Evaluation of Sub-objective 5

Sub-objective five is to develop a timelapse of the user's diet progress using pictures that the user saves daily for the user to have an overview of their diet progress. (Refer to Chapter 1.2, Sub-objectives 5)

Evaluation: The Timelapse Page has been implemented and tested, enabling users to save daily pictures and create a timelapse video showcasing their diet progress. This objective has been fulfilled.

6.4.6 Evaluation of Sub-objective 6

Sub-objective six is to develop a streak system for users to collect streak points when the user does not exceed their daily calorie intake limit. (Refer to Chapter 1.2, Sub-objectives 6)

Evaluation: The Streak Page has been successfully developed and tested. Users can now collect streak points for staying within their daily calorie limits, thus encouraging adherence to their diet goals. This objective has been fulfilled.

6.5 Concluding Remark

To summarize, this Chapter has discussed system testing and performance metrics used in an application, with a focus on integration testing. Integration testing is essential for ensuring that various components of the application work together seamlessly, providing a consistent user experience. Performance metrics used to evaluate the testing process include functionality, user experience, data accuracy, reliability, and efficiency. Integration testing focuses on major functions of the application, such as the Record Page, Progress Page, Reminder Page, Timelapse Page and Streak Page as well as another function tested is User Profile Page. Test objectives for each function include verifying accuracy and functionality, validating display and updates, ensuring correct navigation and displays, and testing various features such as reminder notifications, photo saving, and diet calculations based on user inputs. Then testing and results for each function were discussed, and the objectives of the project were evaluated with the successful completion of five objectives for a diet management application. The application features a diet management module that accurately calculates users' calorie intake per meal and updates daily consumption, a summary report system and a weight tracking tool to track users' weight on the Progress Page that monitors users' diet progress and displays estimated diet goal dates. Additionally, a reminder tool has been developed on the Reminder Page, allowing users to set and manage notifications for inputting food calorie intake, while the Timelapse Page enables users to save daily pictures and create a timelapse video showcasing their diet progress. Overall, all objectives have been fulfilled.

In conclusion, this chapter has provided a comprehensive overview of the system testing, performance metrics, and integration testing applied to the diet management application. The successful implementation and evaluation of various components have demonstrated the application's effectiveness in meeting its objectives. With a user-friendly interface and valuable features, the application offers a comprehensive solution to help users manage their diet, track their progress, and stay motivated throughout their weight loss journey.

CHAPTER 7 CONCLUSION AND RECOMMENDATION

7.1 Conclusion

To summarize, the project aims to develop a Diet Manager system into an Android mobile application. The project introduces some of the problems of the current existing diet app, which are methods of dieting not explained clearly to the user, users forgetting to input food intake into the app, and as well as users seeing the diet app as not interesting or fun. The motivation of the project is to implementation of better diet calorie counting features by providing detailed guides to educate users about dieting to solve the problems of the existing system, such as mentioned earlier. The proposed solution to the problems mentioned is to develop a diet manager system for individuals with weight concerns by implementing the system into an Android mobile application, including all dieting functions such as calculating the user's food calorie intake in every meal, a summary report system to monitor user dieting progress to keep track user diet goals, weight tracking tool to record user's weight and for the user to keep track of their weight., and a reminder tool for users to input user's food calorie intake when the users forget to. The project also contributes **two novelties** that can improve the diet manager app, which provides **a tool for the user to create a timelapse of their diet progress by collecting and compiling all the pictures taken by the user daily throughout their dieting journey and providing an interesting streak system whereby user continue to redeem daily streak points and not to break the streak whenever the user does not over consume their daily calories limit.** Both novelties aimed to increase users' continuous motivation to use the app and to have a happier user experience with the app.

7.2 Recommendation

First, the added food item can be improved because there's difficulty adding custom food items. One of the Diet Manager app's drawbacks is that it can make it difficult for users to add unique food items to their diet plans. This can be an issue for users who enjoy special or handmade dishes that are not readily available in the app's database. The app might include a function that lets users design their own food products and include them in their diet plan to get around this restriction. Users should be able to enter information about the meal, including its name, portion size, and calorie count. Additionally, the software can let users save their own food items for later use, saving them from having to be manually entered each time. Consider a situation where a user wishes to add a unique food item that isn't already in the app's database. The software must provide a function that enables users to manually enter meal names and nutritional details like calories, protein, carbohydrates, and fats. The user may then save this customized food item for later use and include it in their diet plan. For instance, the app may have a "Create Custom Food" option that directs users to a form where they can enter the specifics of their custom meal on the food search page.

Secondly, the Diet Manager calorie monitoring can be improved by including the user's daily physical activity that burns the user calories. Then the burnt calories can be included in the calorie counting calculation. The limited tracking of physical activity is another drawback of the Diet Manager app, which may not track this crucial component of leading a healthy lifestyle. The app can either include a feature that enables users to manually track their physical activity or interact with fitness trackers to overcome this issue. Users should be able to enter the kind of activity, how long it lasted, and how many calories they burnt using this function. The software can also offer advice and tips on how to balance one's food and exercise in order to reach fitness objectives. For customers who wish to manage their food and exercise in one location, the Diet Manager app can offer a complete solution by resolving these restrictions.

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FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year : Y3S3	Study week no. : 3
Student Name & ID : 1902956	
Supervisor : Abdulkarim Kanaan Jebna	
Project Title : Diet Manager	

1. WORK DONE

[Please write the details of the work done in the last fortnight.]

Had transferred all contents from FYP1 report to FYP2 report.
Completed some functions in application of the project.

2. WORK TO BE DONE

Continuing writing the FYP2 report.
Work on the next Diet Manager's application functions.

3. PROBLEMS ENCOUNTERED

No major problems encountered.

4. SELF EVALUATION OF THE PROGRESS

Everything is fine.



Supervisor's signature



Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year : Y3S3	Study week no. : 4
Student Name & ID : 1902956	
Supervisor : Abdulkarim Kanaan Jebna	
Project Title : Diet Manager	

1. WORK DONE

[Please write the details of the work done in the last fortnight.]

Completed some functions in application of the project.

2. WORK TO BE DONE

Continuing writing the FYP2 report.
Work on the next Diet Manager's application functions.

3. PROBLEMS ENCOUNTERED

No major problems encountered.

4. SELF EVALUATION OF THE PROGRESS

Everything is fine.



Supervisor's signature



Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year : Y3S3	Study week no. : 5
Student Name & ID : 1902956	
Supervisor : Abdulkarim Kanaan Jebna	
Project Title : Diet Manager	

1. WORK DONE

[Please write the details of the work done in the last fortnight.]

Completed half of the Diet Manager's application functionalities.

2. WORK TO BE DONE

Continuing writing the FYP2 report.

Continuing the remaining half of the Diet Manager's application functions.

3. PROBLEMS ENCOUNTERED

No major problems encountered.

4. SELF EVALUATION OF THE PROGRESS

Everything is fine.



Supervisor's signature



Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year : Y3S3	Study week no. : 7
Student Name & ID : 1902956	
Supervisor : Abdulkarim Kanaan Jebna	
Project Title : Diet Manager	

1. WORK DONE

[Please write the details of the work done in the last fortnight.]

Completed the remaining half of the Diet Manager's application functionalities.
Completed half of the FYP2 report.

2. WORK TO BE DONE

Designing and creating the UI/UX design for the Diet Manager application.

3. PROBLEMS ENCOUNTERED

No major problems encountered.

4. SELF EVALUATION OF THE PROGRESS

Everything is fine.



Supervisor's signature



Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year : Y3S3	Study week no. : 9
Student Name & ID : 1902956	
Supervisor : Abdulkarim Kanaan Jebna	
Project Title : Diet Manager	

1. WORK DONE

[Please write the details of the work done in the last fortnight.]

Completed half of the Diet Manager's application UI/UX design.

Completed the Streak functions of the Diet Manager.

Completed the UI/UX design for the whole Diet Manager application.

Tested all the functionalities of the Diet Manager to be working well with the implemented UI design.

2. WORK TO BE DONE

Making changes to the FYP report on the changed Streak functionality of Diet Manager.

Performing further testing on the Diet Manager application.

Continuing writing the FYP 2 report.

3. PROBLEMS ENCOUNTERED

No major problems encountered.

4. SELF EVALUATION OF THE PROGRESS

Everything is fine.



Supervisor's signature



Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year	: Y3S3	Study week no.	: 10
Student Name & ID	: 1902956		
Supervisor	: Abdulkarim Kanaan Jebna		
Project Title	: Diet Manager		

1. WORK DONE

[Please write the details of the work done in the last fortnight.]

All Diet Manager application's function has been completed.
Completed testing on the application.

2. WORK TO BE DONE

Performing minor changes on the application to fix certain bugs.
Completed the remaining half of the FYP report.

3. PROBLEMS ENCOUNTERED

No major problems encountered.

4. SELF EVALUATION OF THE PROGRESS

Everything is fine.



Supervisor's signature



Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year	: Y3S3	Study week no.	: 11
Student Name & ID	: 1902956		
Supervisor	: Abdulkarim Kanaan Jebna		
Project Title	: Diet Manager		

1. WORK DONE

[Please write the details of the work done in the last fortnight.]

Completed and tested fully on all Diet Manager application's functionalities.
Completed the FYP report.

2. WORK TO BE DONE

Compile and rearrange FYP report files according to format. And prepare project's application for submission.

Perform plagiarism check in Turnitin and have FYP2 report to be signed by Supervisor.

Preparing FYP report and project files to be submitted.

3. PROBLEMS ENCOUNTERED

No major problems encountered.

4. SELF EVALUATION OF THE PROGRESS

Everything is fine.



Supervisor's signature



Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year : Y3S3	Study week no. : 12
Student Name & ID : 1902956	
Supervisor : Abdulkarim Kanaan Jebna	
Project Title : Diet Manager	

1. WORK DONE

[Please write the details of the work done in the last fortnight.]

Completed FYP report and project's application.

Completed Plagiarism Check in Turnitin and have FYP2 report signed by Supervisor.

2. WORK TO BE DONE

Prepared report files, submit FYP report to portal.

3. PROBLEMS ENCOUNTERED

No major problems encountered.

4. SELF EVALUATION OF THE PROGRESS

Everything is fine.



Supervisor's signature



Student's signature

POSTER

DIET MANAGER

INTRODUCTION

This project is about a Diet Manager system developed for Android mobile application. It is used to provide the basics functions of dieting for user, such function includes calculating calories based on user food intake, summary report of user diet progress, reminder tool to remind user input food intake, as well as two new novelties of which is timelapse of pictures of user progress and streak system for user to create streak on their dieting progress.

PROBLEM STATEMENT

1. Users may lose interest or give up using the app when results do not meet their expectations.
2. The user lacks the motivation to lose weight.

OBJECTIVES

- Develop a diet management module to calculate the user's food calorie intake in every meal.
- Develop a weight tracking tool to record users' weight and for users to keep track of their weight.
- Develop a summary report system to monitor user dieting progress to keep track of user diet goals.
- Develop a reminder tool for users to input user's food calorie intake when the users forget to.
- Develop a timelapse of the user's diet progress using pictures that the user saves daily for the user to have an overview of their diet progress.
- Develop a streak system for the user to collect streak points when the user does not exceed their daily calorie intake limit.

CONTRIBUTIONS

- Provide a tool for user to create a timelapse of their diet progress by collecting and compiling all the pictures taken by the user daily throughout their journey
- Provide an interesting streak system whereby user continue redeem daily streak points and not to break the streak whenever user does not over consume their daily calories limit

METHODOLOGY

- Phased Development

```
graph TD; Analysis --> Design; Design --> Implementation; Implementation --> Maintenance; Maintenance --> Planning; Planning --> Analysis;
```

RESULTS

- Track user's daily calories intake
- Track user's weight and estimate targeted weight goal date
- Remind user to track food intake
- Create memorable timelapse video to stay motivated
- Streak system for user create new diet-habit

CONCLUSIONS

Diet Manager system developed in Android helps user to achieve user's diet goal with all the basic dieting functions and innovative methods to increase user's motivations and create new diet-habits by timelapse system and streak system.

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