PURCHASE LIST AND RECIPE MOBILE APPLICATION

BY

Melvin Chai Wen Da

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)

JUNE 2025

COPYRIGHT STATEMENT

This Final Year Project report is submitted in partial fulfillment of the requirements for the degree of Bachelor of Information Systems (Honours) Information Systems Engineering at Universiti Tunku Abdul Rahman (UTAR). This Final Year Project report represents the work of the author, except where due acknowledgment has been made in the text. No part of this Final Year Project report may be reproduced, stored, or transmitted in any form or by any means, whether electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of the author or UTAR, in accordance with UTAR's Intellectual Property Policy.

ACKNOWLEDGEMENTS

I would like to express my sincere thanks and appreciation to my supervisors, Ts Dr Ku Chin Soon who has given me this bright opportunity to engage in an IC design project. It is my first step to establish a career in IC design field. A million thanks to you.

To a very special person in my life, Stephanie Yuen, for her patience, unconditional support, and love, and for standing by my side during hard times. Finally, I must say thanks to my parents and my family for their love, support, and continuous encouragement throughout the course.

ABSTRACT

Recipe system is a system that allow user to simplify in cooking process and meal planning. It will provide a various type of recipe for different tastes and dietary needs, including vegetarian, vegan and others. Each recipe includes step-by-step instructions in text form and photo so the user can easily follow. This system also has the purchase list function. It will calculate the estimated amount of ingredient needed for one week. This function will be based on the number of servings to calculate. It will recommend recipes that are based on the remaining ingredient so users can reduce the amount of food wasted. When the ingredient of the remaining ingredient list matches with the ingredient needed, the system will automatically mark the ingredient already had in the ingredient needed list. Furthermore, this system also had one function which is to display the nutrition of one week meal plan. This function helps user easily to plan a variety of meals while ensuring a balanced diet. Each recipe provided detailed nutritional information like the amount of protein, carbohydrates and other nutritional information. Users can be based on their body health to set up a meal plan. This system will be developed as a mobile application, and the user can be easier to use because mobile applications will provide a complete graphic interface. Users also can use the application anywhere and anytime.

Area of Study: Recipe System, mobile application
Keywords: Recipe library, purchase list, nutrition pie chart, meal plan and simplify cooking process

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

TDEE	Total Daily Energy Expenditure
BMI	Body Mass Index
CPU	Central Processing Unit
RAM	Random Access Memory

Chapter 1
Introduction

In this chapter, it will present the background and motivation of the research, the contributions to the field, and an outline of the thesis. The chapter begins by introducing the core challenges faced by Purchase List and Recipe Mobile Application. It then outlines the research objectives and describes the scope and direction of the work undertaken.

1.1 Problem Statement and Motivation

This new recipe mobile application to help users plan their meals, discover and learn new recipes and simplify their grocery shopping. The app will be based on the user's habit of providing recipes that they may choose. Users also can select recipes and plan for their meal plan. It also creates a purchase ingredient list that will store the ingredients that recipe needed, helping users to keep track of what ingredient needed for their meal plan. By making these tasks more convenient, the app aims to reduce food waste, save time and encourage healthier eating choices.

In this project, the recipe mobile application will improve the function based on the existing recipe mobile application. After reviewing existing recipe mobile applications, recipe mobile applications allow users to upload and store the user's own recipe and plan for their meal. Besides that, the recipe mobile application allows users to record the ingredients that need to be purchased in a list, provide a recipe library to allow user taste and learn a new recipe.

Before I started developing the system, I had reviewed different types of recipe mobile systems like Yummly [1], Tasty [2], kitchen stories [3] and other recipe mobile applications. The system had different types of recipe systems, and they had different limitations. It Is difficult for users to use one system to conduct all the functions.

1.1.1 Challenges in Providing Nutritional Guidance

Nowadays, many users are looking for meals that align with their specific nutritional goals like maintaining a balanced diet, managing calorie intake, or following lifestyle-based eating patterns. However, most of the recipe mobile applications provide nutrition information to the user when they review the recipes. Users also find it hard to achieve their goal due to balanced

nutrition needs. Wu al [11], many people do not have insufficient knowledge about their balanced nutrition needed. For example, users did not have or understand the formula that is used to calculate the balanced calories needed everyday. Therefore, users need a function to help them get the balanced nutrition needed and calculate the meal plan total nutrition.

1.1.2 Lack of customize the recipe and getting the latest nutrition of recipe function

In many existing recipe mobile applications, users are only allowed to view the ingredients and the nutrition information in the recipe. However, users are not allowed to adjust the amount of ingredients or substitute items based on personal preferences. This limitation makes it hard for users to modify the recipe to better match their personal flavour, dietary needs, and specific nutritional goals. Furthermore, the nutritional information that is provided is usually fixed and does not update when the user changes the ingredients or the amount of ingredients. As a result, users face challenges in accurately tracking their nutrient intake from the recipe and achieve their personal nutrition goals. Users need a dynamically updated recipe nutrition function to easily achieve their nutrition goals and better match to their personal flavour.

1.1.3 Lack of recommend recipe based on remaining ingredients functions

Another common challenge in recipe mobile applications is the lack of features that recommend recipes based on the ingredients users already purchased. Existing apps only allow browsing through a general list of recipes, without using the ingredients available by the user. As a result, this will make it a struggle for users because it is hard to find the recipe that allows users to use the available ingredients in the kitchen. Also, users will face the food wasting problem due to purchasing too many ingredients and not finishing the ingredients. A function that suggests recipes based on remaining ingredients would not only save time and money but also encourage users to make the most of what they have, creating a more practical and sustainable cooking experience.

1.2 Objective

The goal of this project is to develop a recipe mobile application that integrates enhancement functions to solve the challenges outlined above. The objective of this project is as follows:

Objective 1: Develop a personalized nutrition guideline function

The first objective of this project is to create a function that helps users to calculate the balanced nutrition needed every day and track whether their meal plan that they already plan has met those requirements. Based on the analysis, the system will provide suggestions to users for getting a meal plan that matches their nutrition goal like changing the recipe or conducting some activities to burn calories. This function aims to support users to achieve their health goals while making meal planning more practical.

Objective 2: Develop a customize the recipe and get the latest nutrition of recipe function

The second objective of this project is to create a function that allows users to update the ingredient amount or substitute the ingredient. After the user updates the ingredient, the system will be based on the ingredient to recalculate the nutrition. Therefore, users can have a diet that better matches their personal flavor and easily achieve their nutrition goals like a balanced diet.

Objective 3: Develop a recommended recipe based on remaining ingredients functions

The last objective of this project is to develop recommended recipes based on remaining ingredients functions. This function will use the ingredients available that are noted by the user to search the recipes so that the user can save time on searching the recipes that allow them to cook without purchasing any ingredients. Also, this function will be based on the nutrition to search the recipes like user lack of protein so the system will find higher protein recipes to use. This allows users to reduce the food wasting problem and get a balanced diet.

1.3 Project Scope and Direction

The recipe mobile application is for all the users that want to learn cooking or storing their recipe in digital form. The name of this recipe mobile application is “Fun Cooking”. This recipe mobile application will provide several functions.

First, the recipe mobile application will include a **personalized nutrition guideline function**. When a user registers an account, the system will prompt them to enter details such as body weight, height, age, sex, and activity level. Using this information, the system calculates the user’s Basal Metabolic Rate (BMR), which represents the minimum calories the body needs to function each day. The calculation differs between male and female users. For males, the formula is:

$$BMR = 10 \times \text{weight (kg)} + 6.25 \times \text{height (cm)} - 5 \times \text{age (years)} + 5$$

For females, the formula is:

BMR = 10 \times \text{weight (kg)} + 6.25 \times \text{height (cm)} - 5 \times \text{age (years)} - 161 \] [18] After obtaining the BMR, the system calculates the Total Daily Energy Expenditure (TDEE), which represents the actual recommended daily calorie intake. The formula for this is: \[TDEE = BMR \times \text{Activity Factor}

Different activity levels have different factors (e.g., a moderately active lifestyle has an activity factor of 1.55) [18]. Once the TDEE is determined, the system compares it with the total calories from the user’s daily meal plan. If the total food calories exceed the TDEE, the system will provide advice such as reducing high-calorie recipes, substituting lighter options, or engaging in additional physical activity.

In other perspectives, the recipe apps will provide the **adjust ingredient amount function and update nutrition information recipe function**. In the detailed recipe page, the system will provide the add or minus for each ingredient so that the user can customize the ingredient amount and the taste of the recipe. After updating the ingredient amount, the system will retrieve the latest ingredient amount data and calculate the ingredient nutrition like calories, fat, protein and other nutrition data through the USDA dataset API. In the dataset, the nutrition of the ingredients will be calculated by 100g for each ingredient. System will use the formula of (Nutrient Value of ingredient = Nutrient per 100g * (Amount of Ingredients Used / 100)) to calculate the nutrition of the specific amount for each ingredient. After getting the result, the nutrition data will be displayed in table form.

Besides that, the mobile application allows users to **upload and store their own recipe** to the system. Users can key in their recipe information in the upload recipe page such as recipe title, description, image, and other recipe information. Meanwhile, users can also set the recipe as public or private mode. In the public mode, other users are allowed to view the recipe. In the private mode, only the user who uploads the recipe can view the recipe. For the insert ingredient's part, the ingredients allow inserting in auto complete functions so that the user can quickly insert the ingredients name to reduce the time and workload for inserting a recipe. After user click save button, system will calculate the recipe nutrition through conduct ((Ingredient calories per 100g * amount of ingredient) / 100) for each ingredient and total up the calories. The nutrition will be stored in a database, allowing users to view the nutrition in future.

Furthermore, the system also provides a **grocery list function**. Users are allowed to select the ingredients that they need to be purchased in the meal plan. After the user selects the ingredient needed to purchase, the system will upload the selected ingredient to the database. Then, users can check the ingredients needed in the grocery list page. In that page, users are allowed to choose a day of storing the ingredient and estimate the amount of each ingredient needed to purchase. Once a user purchases the ingredient through checking the ingredient checkbox, the ingredient will add into the pantry list also known as ingredient available. The **recommended recipe based on ingredient function** available will conduct in this pantry list. System will be based on user target nutrition and ingredient available to recommend recipes to user.

The database of this recipe mobile application is using the phpMyAdmin so that will use the XAMPP software to access it. The reason for using phpMyAdmin is to allow developers to conduct the create, read, update, and delete function in a simple way for managing the database.

1.4 Contributions

This recipe mobile application simplifies meal planning and purchase ingredient process. It helps users track ingredients and recommends recipes based on remaining ingredients. This feature helps users reduce food wasted by allowing them to cook a variety of recipes using the same ingredient.

This app also encourages healthier eating by calculating the nutritional value of recipes and displaying it in a pie chart. This feature makes it easier for users to see how balanced their meals plan for the week. It also helps users create healthier meal plans without the need to use other apps for calculating nutrition.

Furthermore, the app had integrated many functions into one application. It combines recipe management, ingredient tracking, and nutritional insights. This creates a seamless experience and saves time for users.

In the end, this recipe mobile application can help users to reduce the food waste opportunity and provide a healthier lifestyle. By using the nutrition visual function, users can be based on the nutrition pie chart to adjust their meal plan. At the same time, the added function or feature can highly improve the convenience of the recipe application like users no need to find the recipe that had the same ingredient with their remaining ingredient.

1.5 Report Organization

The details of this research are presented in the following chapters. **Chapter 1** introduces the research background, the motivation for the study, the problem statements, and the objectives of the research, as well as the overall scope and contributions of the study. **Chapter 2** review existing recipe mobile applications, highlighting their current features and identifying the limitations and missing functions that affect user experience, such as lack of personalization, limited customization, and insufficient nutritional guidance. This chapter establishes the gaps that the proposed system aims to address. **Chapter 3** is discussing the overall system design of this project. It introduces the architectural

Chapter 2

Literature Review

2.1 Existing Recipe Mobile Application

In current market, many recipes mobile applications available that aim to make cooking and meal planning easier. Cookbook [6], OrganizeEat[5], Pestle[8] and Recipe Keeper[9] are only available as mobile application. Yummly [1], tasty [2], kitchen stories [3], kuali [4], and Whisk[7] offer both web and mobile application version, this giving users the flexibility to access recipes on multiple devices.

After reviewed the applications, we can understand their features and how they are designed the recipe mobile application. Most recipe apps include basic functionalities like browsing recipes, saving the recipe as favourites, creating ingredient purchase list and simple meal planning tools. Thesis's function can provide a smooth experience for user because this function can meet the general needs of user.

However, many of these app has their own strength and weakness. For example, Yummly allows user online ordering groceries online, but it not allow user to select the number of servings for the meal [12]. By analyzing these gaps, we can identify which area needs to be improved or add new functions to improve the system. This review also helps us gather ideas and set user requirements to design a better system that can solve the limitations and offer better improvement solutions.

2.2 Yummly

Yummly is a recipe system that provides mobile applications and web-based applications. Yummly gathers a wide variety of recipes from the internet and combines them with their own company unique recipes and video tutorials. It's designed to provide cooking enthusiasts with easy-to-follow instruction and personalized meal ideas.

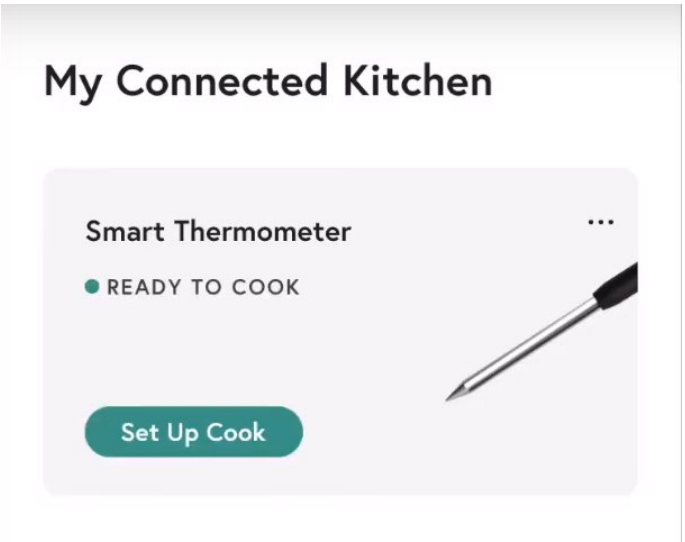

Figure 2.2.1: Yummly Smart Thermometer[1]

The strength of Yummly is provided with **Yummly Smart Thermometer function**, which connects the thermometer with the app [13]. Users can use the thermometer to identify the temperature of the meat, users can cook it to perfection without the guesswork. This function is very helpful especially for users who are beginners in cooking because they have no need to guess the temperature of meat and they will enjoy cooking.

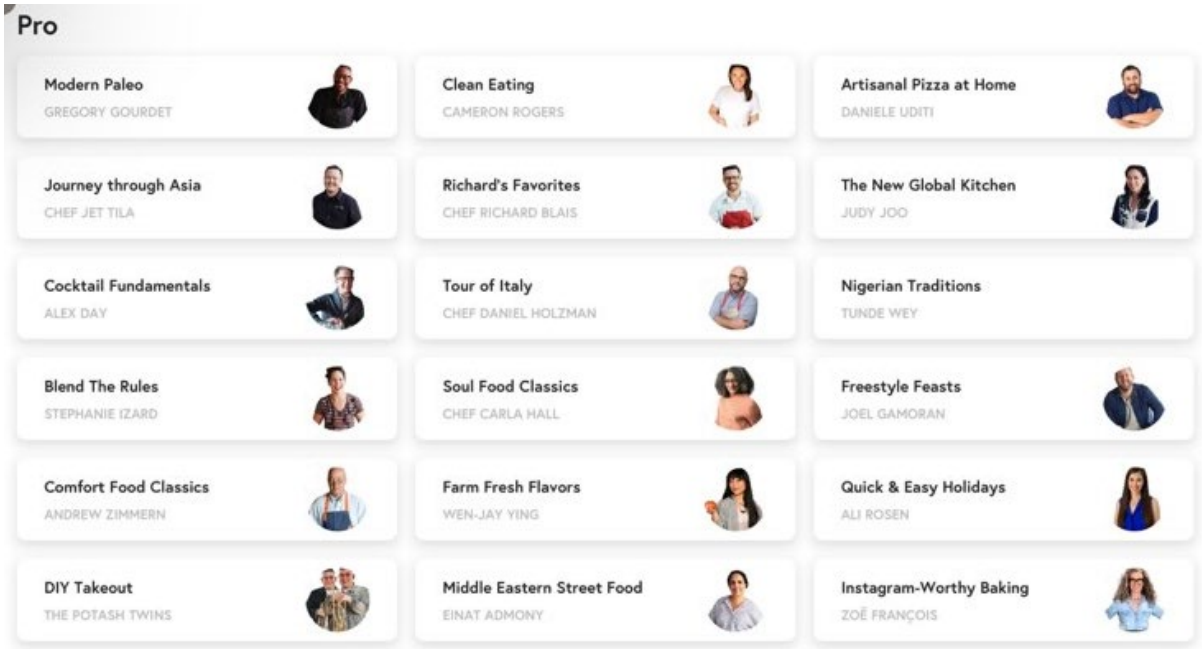

Figure 2.2.2: Category of Different Meal Type[1]

Furthermore, **Yummly has a large database that had over 2 million recipes**. Users can save time and effort for browsing the recipe on other websites and import it into the recipe system. Then, the Yummly also categorize the meal into different category like clean eating, tour of Italy and so on. Users can be based on their habit to select the category. This is useful for users

who had no idea on selecting the meal suitable for their specific meal plan, they can choose the category and set the meal as favorite meal.

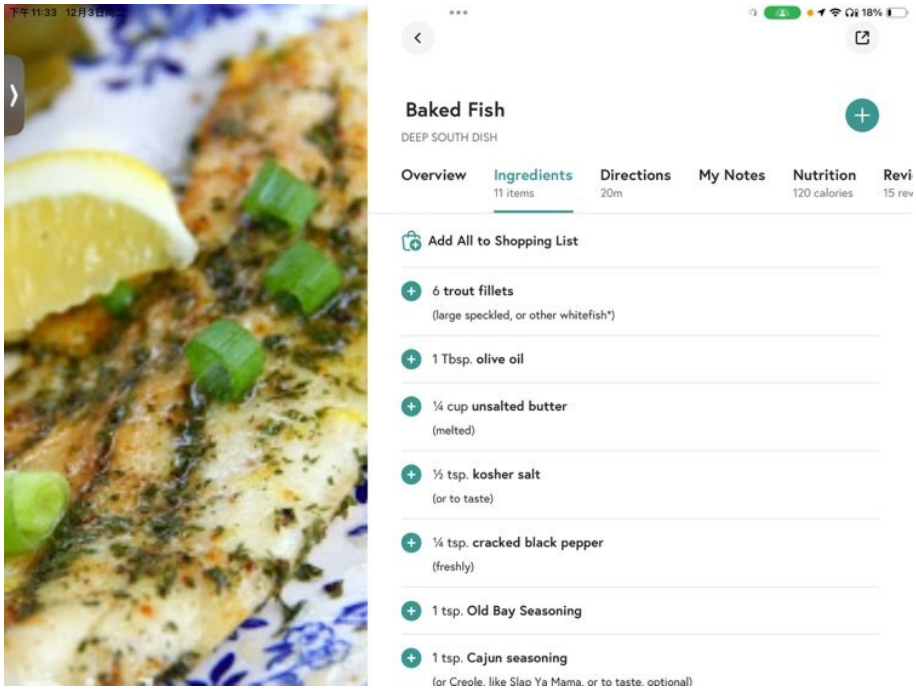

Figure2.2.3: Yummly Not Allow User to Choose Number of Serving[1]

Lastly, the weakness of Yummly is **not allowed to choose the number of serving for meal**. Yummly had fixed the number of serving for each meal so that user become not convenient to choose the meal. For example, user found the meal that want to have but the number of servings is over the number of current servings. Users need to adjust the ingredient by themselves and may cause the meal to become not perfect. User become struggled on meal planning because they need to spam their time for finding the meals that had suitable for their current serving.

2.3 Tasty

Tasty is a recipe system that provide web-based application and mobile application. Tasty provide a library of easy-to-follow recipes, and it got provide some function to allow user to plan their meal with easier such as purchase list function, making a week meal plan and so on.

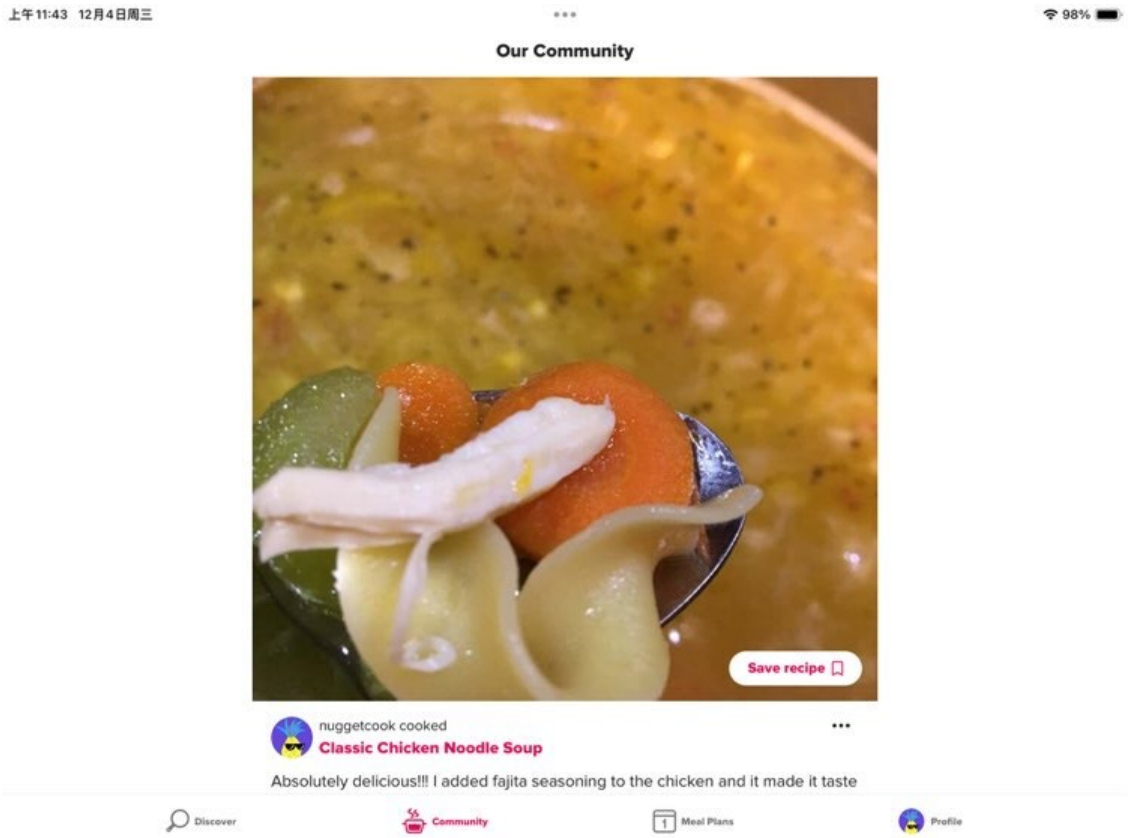

Figure2.3.1: community function of tasty[2]

The strength of tasty is **community function**. The community function allows user to share their achievement through posting the photo of their meals directly on the app. Other user can leave comment on the photo, they can discuss how to improve the food taste become more suitable for their personal taste. Then, user also can exchange their knowledge to solve the problem that will facing when cooking the meals. For example, user can exchange the method of peel shrimp shells so user can improve the efficiency of cooking. This function allow user to get more method to solve their specific problems, and user can reduce their struggled to the cooking.

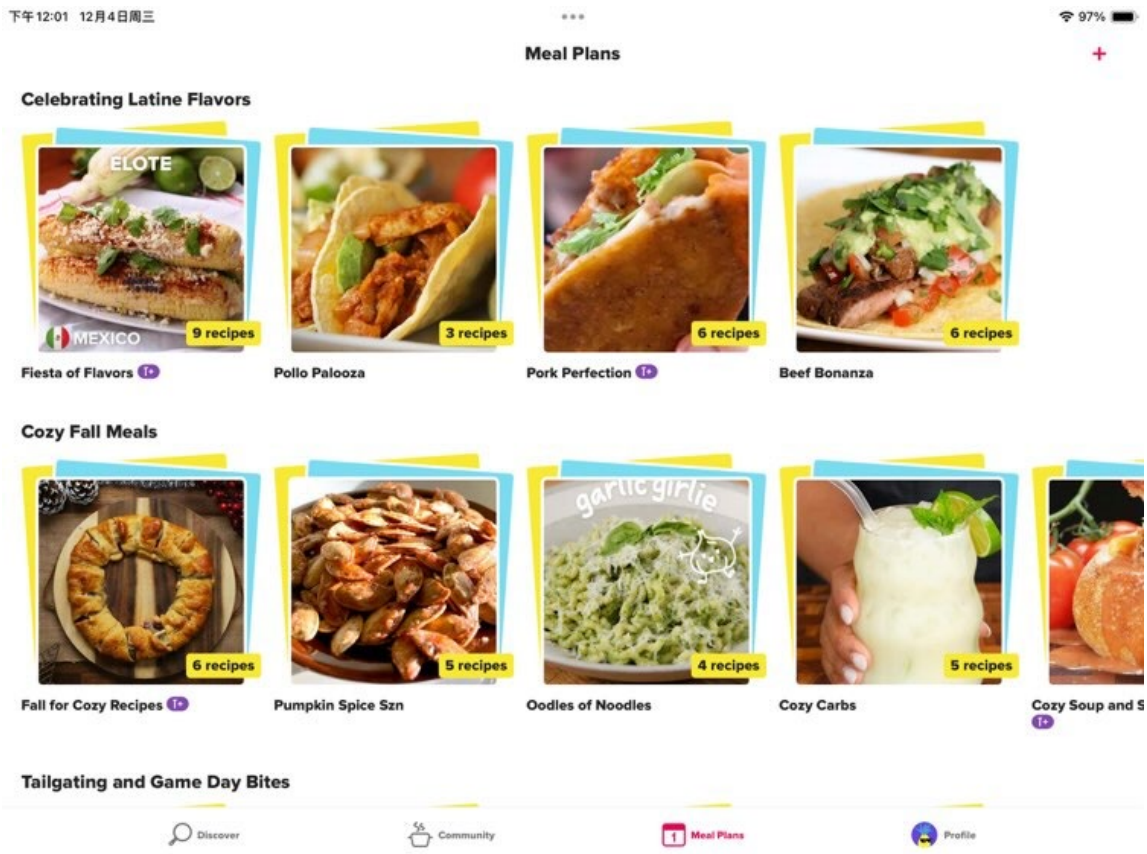

Figure2.3.2: Menu of 7-days Meal Plan[2]

Furthermore, Tasty had provide **7 days meal plan function**. Users do not need to plan the meal for a week because they can choose the meal plan that provided by Tasty. In the meal plan, Tasty had sorted properly the meal for each day. Then, the user can click add the grocery that needed by recipe into the grocery purchase list. This function can highly improve the efficiency of meal planning, users no need struggle in the meal planning process.

Lastly, the weakness of Tasty is the system will **not stock the remaining ingredient**. Once the user purchased the ingredient, the system just marked the ingredient already purchased. Users cannot track the remaining ingredients in next time purchase ingredient. Then, the system will not be based on the remaining ingredient to suggest the recipe that needs the same ingredient to user. Users need to spam many times to check the remaining ingredients every time before purchasing ingredient. If the user repurchases the ingredient that already had, this may cause the food wasting problem.

2.4 Kitchen stories

Kitchen stories provide web-based applications and mobile applications to users. Kitchen stories had provided step-by-step tutorials to users and beginner allow to easy for cooking their meals.

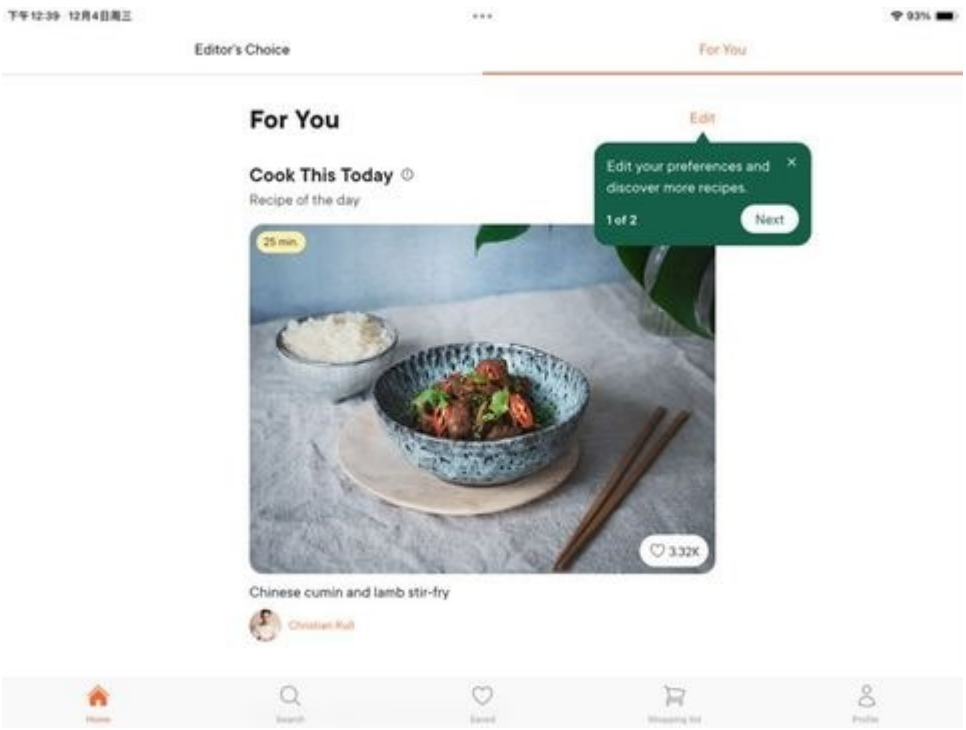

Figure2.4.1: Recipe Recommended based on User Preference [3]

The strength of Kitchen Stories is **based on the user's preferences to recommend the recipe that is suitable for user**. Users can set their diet as vegetarian, vegan or pescetarian. User also can update their cuisines type like Thai food, Italian food and so on. Kitchen Stories will be based on this to find the recipe which fulfil their requirement and recommend to the user. This allows user to explore more meal that suitable for them without putting any effort to browser the food.

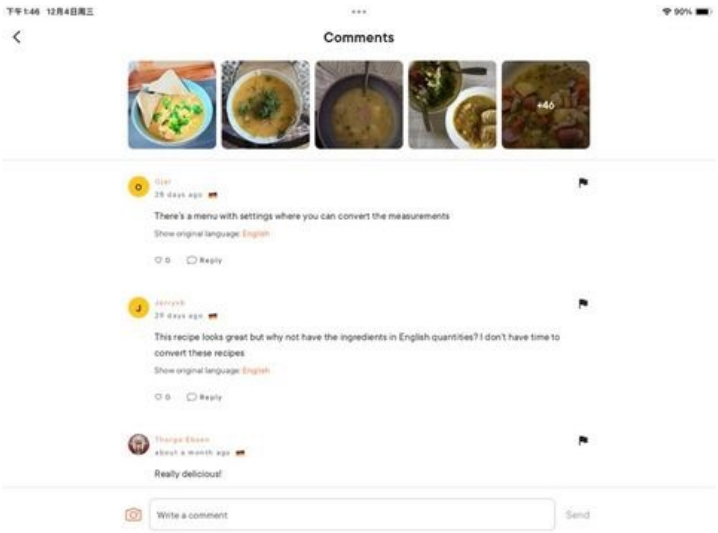

Figure2.4.2: The comment of meals in Kitchen Stories [3]

Furthermore, Kitchen Stories **will allow users to leave comments in the recipe**. Kitchen Stories will provide a space to display the comment, and users may read the comment to get more information about the meals. For example, the user can know the details of each step that is provided by other users. This allows users to plan their meals because they can know the complexity of cooking and skills of cooking the meals.

Finally, the weakness of Kitchen Stories **will not provide the meal plan**. Without this function, the system will become less convenient for users. Users will use other recipe systems to plan their meal. Users also cannot know the total nutrition of the whole week's recipe, especially users who have specific meal plans they need to follow will struggle when they use the system. They need to use other applications to calculate the nutrition by themselves and the data may not be accurate due to user keys in wrong data or forgetting the data.

2.5 Kuali

Kuali is a recipe mobile application that provide thousands of recipes from Malaysia and other world. Kuali will promote our Malaysia recipe to let other country of people to cook and taste it [14]. Users also can access this app through websites.

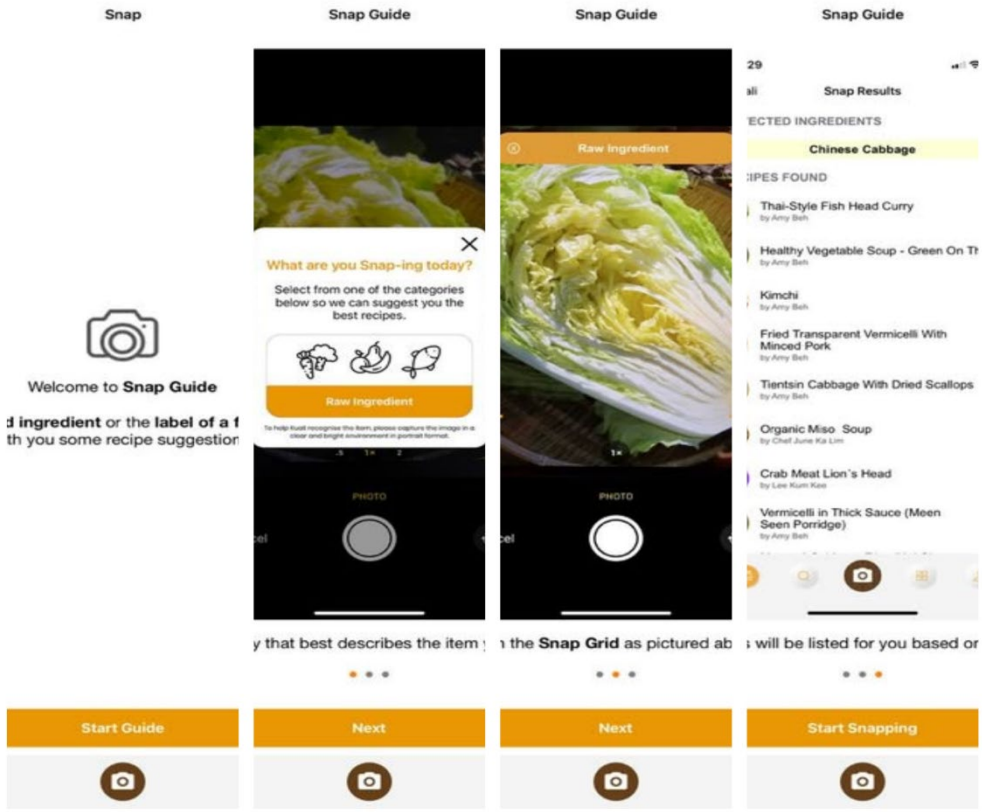

Figure2.5.1: The Way of Import Recipe [4]

The strength of Kuali is **to allow users to store the physical recipe in the system**. Users can take photos of the recipe details like instructions, ingredients needed and other information. Users need to follow the steps of figure 8 to import the recipe into the Kuali mobile application. This function can solve the problem of losing recipes physically and sharing the recipe to another user.

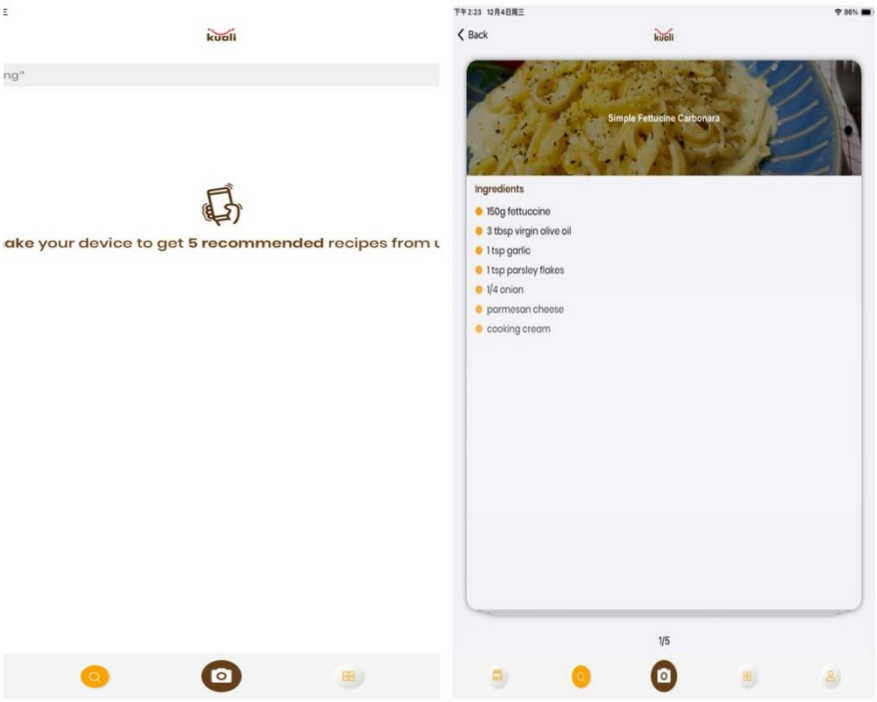

Figure2.5.2: Shake-to-Get-Recipe Function [4]

Kuali also provide **shake to get random recipes function**. Users need to shake 5 times for their mobile phone and Kuali will provide 5 different types of recipes to user. When user had no idea to cook, they can use this function to decide the recipe. This function can introduce user to recipe user might not have considered and increase the fun of cooking.

At the end, the weakness of Kuali **will not provide the purchase list function**. User may become struggled on meal planning because they need to note down the ingredient in physically or using other application. Once user note down all the ingredient, they need to calculate the total amount of each ingredient by themselves. This may cause the problem of overbuying or underbuying, user may not convenient to plan for their whole week meals.

2.6 Organize Eat

Organize Eat is recipe mobile application and doe does not provide the website. Organize Eat does not provide any recipe library to user, user need to import the recipe through upload photo of recipe, download from web, or typing the recipe.

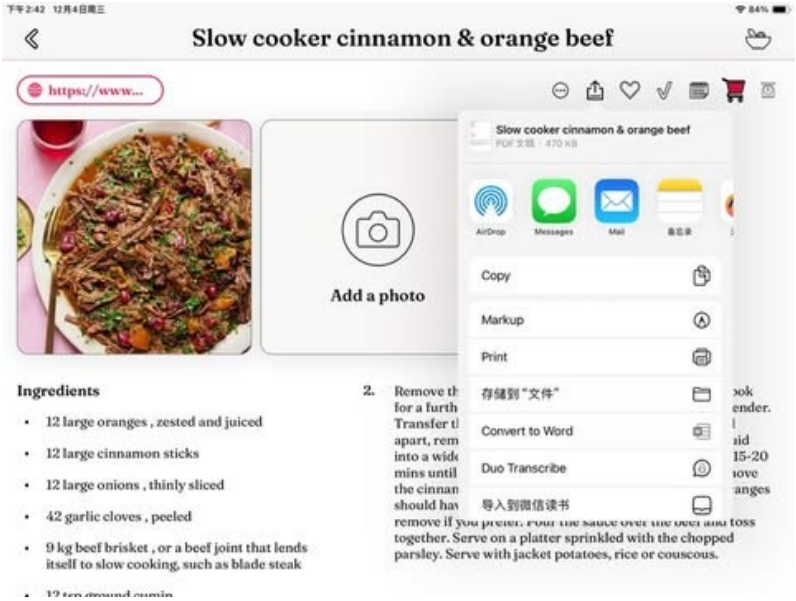

Figure2.6.1: Way of Sending Recipe to Other User [4]

The strength of Organize Eat is to **allow users to quickly share the recipe to other users**. Organize Eat will convert the recipe into PDF format, and the user can send the PDF file to another user. Once the user downloads the recipe, the user can use the recipe in offline mode, and the user can review the recipe anywhere and anytime. Users also may use Organize Eat to directly print the recipe in physical paper form.

The limitation of Organize Eat is it **will not provide the library of recipes**. Users need to import the recipe in different ways by themselves. This is not user friendly for users who are beginners in meal planning, they need to spend time learning how to browse the recipe website and importing the recipes into the system. This reduces the convenience of using the system and increases the time for meal planning. Organize Eat will not base on the user preference to recommend the meal for the user, the user cannot try to cook other recipes because they did not know the taste of other meals.

2.7 Cookbook

Cookbook is a pure recipe mobile application, users only access this app on mobile. Cookbook did not provide a library of recipes to users. Users needed to import the recipe through a website, take a photo from a reality recipe, or scan the document in the physical world.

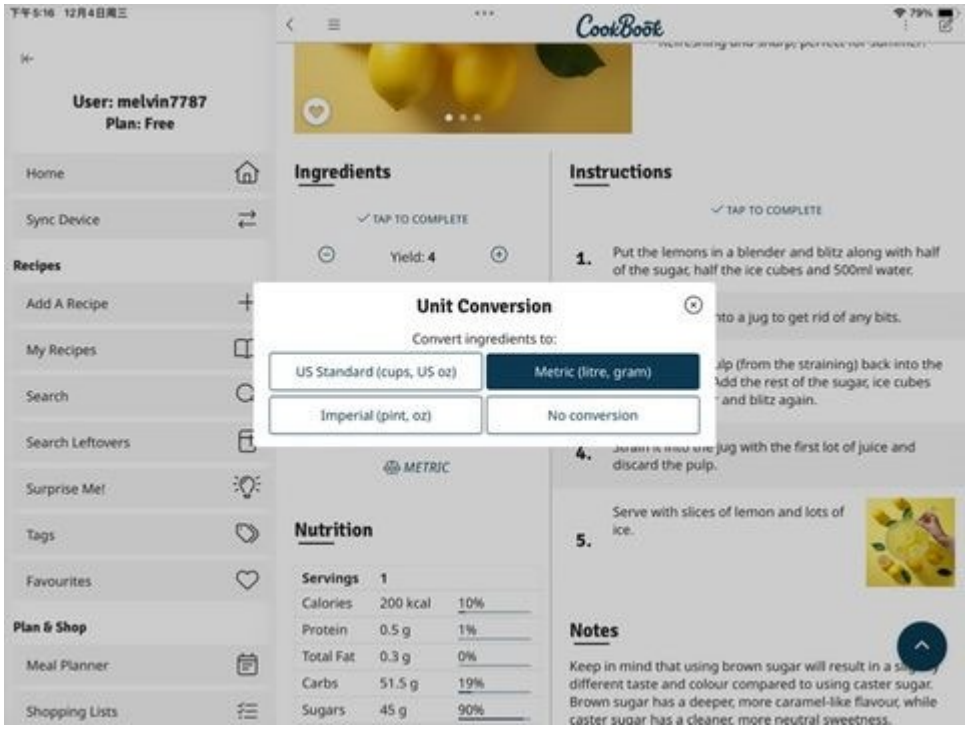

Figure2.7.1: Measurement Menu [6]

The strength of a cookbook **is providing different measurements of ingredients** to the user. Users can choose the measurement that user familiars like US Standard, Metric, Imperial, or No conversion. This can improve the overall cooking experience by reducing confusion and ensuring accuracy. Users will become easier to follow the recipe because users are able to know the measurement for each ingredient. Furthermore, Cookbook provides a **cook mode** function to the user. Once a user uses this function, the instructions of the recipe will become full screen of the mobile phone and allow the user to tap for the next step. At the same time, there are voice prompts and narration to guide the user with reading the instructions of the recipe [15].

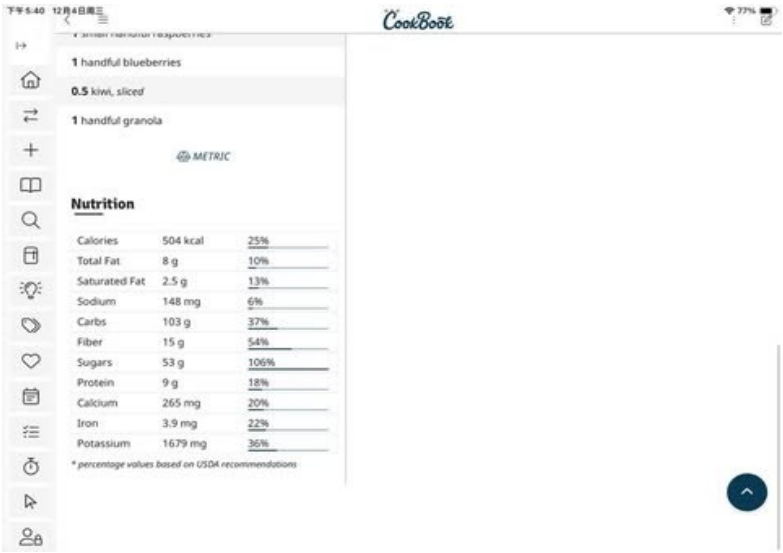

Figure2.7.2: Nutrition List in Cookbook [6]

The weakness of a cookbook will not total up all the nutrition in a meal plan and show it in a pie chart. Cookbook had provided the nutrition list in each recipe but does not show the total nutrition in one week meal plan. Users need to calculate the nutrition by themselves; this is a struggling part for the user who has the specific diet they need to follow. They need to spend time calculating the nutrition in other applications. Once they remember or key in wrong nutrition information, the data will become non accurate.

2.8 Whisk

Whisk is a mobile application that makes meal planning, recipe discovery, and grocery shopping easier. Whisk had integrated Artificial Intelligence to improve the recipe system and become more user friendly. This is because AI can help users to solve many problems and meal planning becomes easier.

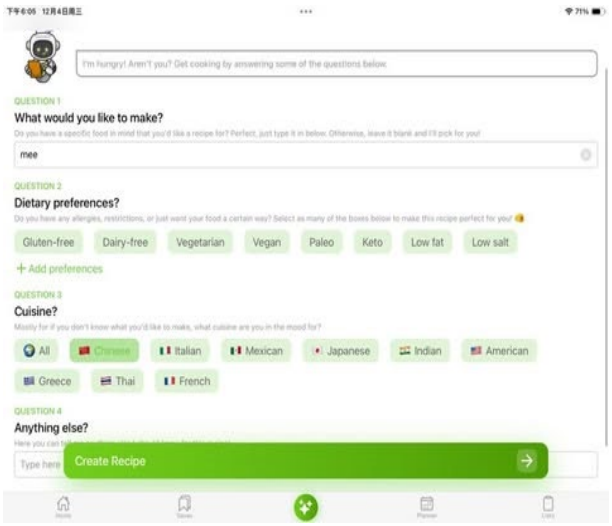

Figure2.8.1: Key In Information for Generating Recipe [7]

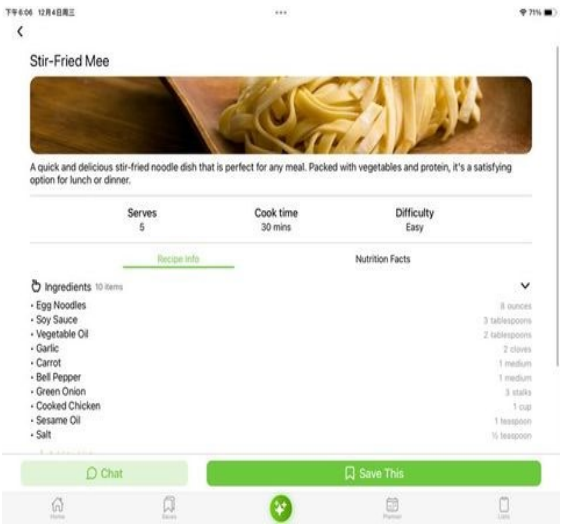

Figure2.8.2: The result of generating recipe [7]

The strength of Whisk is to provide **an artificial intelligent for generating recipe.** Users can key in their recipe that wants information into the system like What the user likes to make, dietary preferences, Cuisine, and so on. After the system receives all the information, the system will based on the information to search the recipe and recommend it to the user. This can save time for the user who has a specific diet. For example, a vegetarian can select the dietary preferences for a vegetarian and the system will generate the vegetarian recipe for the user.

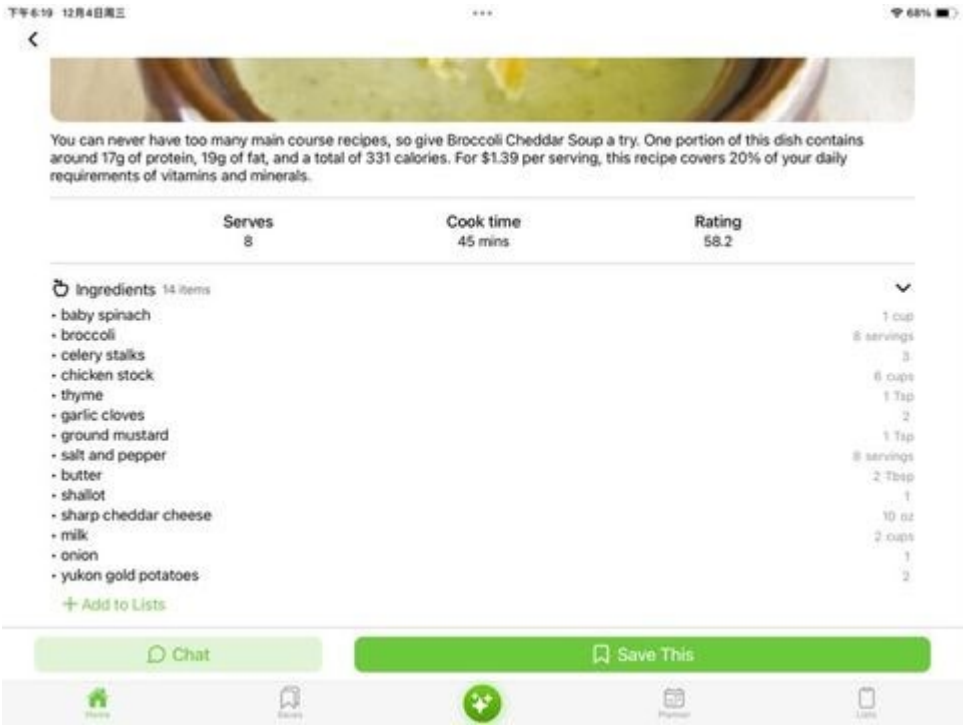

Figure2.8.3: Provide the fixed number of serving [7]

The limitation of Whisk, system will **not allow user to adjust the number of serving for the recipe**. The recipe had the fixed serving. If a user wants to change the number of servings, they need to ask the AI (artificial intelligence) to change the amount of ingredients and the cooking time for each step. If the user always cooks with the same recipe and the number of servings does not change, they need to ask the air in every time. This will increase the time and complexity for planning meals and learning the step of asking for help.

2.9 Recipe Keeper

Recipe keeper is a recipe mobile application, users cannot access this app through website. Recipe keepers allow user to store their recipe in this application but not providing any library of recipe to the user.

Figure2.9.1: The way of importing recipe provided by Recipe Keeper [9]

The strength of the recipe keeper is providing many ways to import the recipe into the system. Recipe keeper allows users to import recipes through downloading from websites, take photos of physical recipes, or key in the information of recipes by typing. This can solve the problem of users who cannot find the recipe from the internet or have their own special recipe. User also can share their recipe to the other user through pdf file.

Figure2.9.2: The way of adding purchase list [9]

Furthermore, this system provides the purchase list function to the user. Users can one click to add all the ingredients needed by the recipe into the purchase list. Once a user purchases the ingredient, they can mark the ingredient as purchased so the user no need to conduct this action by using another ingredient. This function can highly solve the problem of miss purchasing any ingredient needed. This is because sometimes people may key in wrong data and cause the problem of ingredients being underbought or overbought.

Finally, the limitation of Recipe Keeper is it will not provide the pantry function. Pantry function allows the user to track the ingredient that has already been purchased. Without this function, users may struggle to use the purchase list function because users need to check the ingredient physically every time they purchase an ingredient.

2.10 Cookpad

Cookpad is a recipe mobile application that allow user to exchange their personal recipe with other user through uploading their recipe to the app. User also can communicate with other user for discussing the recipe ingredient, recipe instruction, and other information.

Figure2.10.1: Photo of Choosing Country [10]

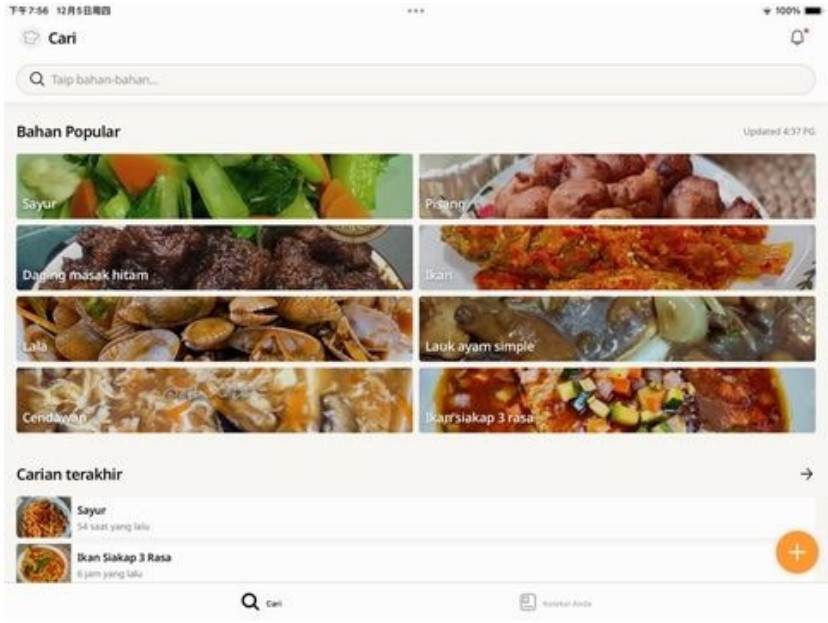

Figure2.10.2: The local recipe of Malaysia [10]

The strength of Cookpad is that the system will be based on the country of the user to recommend the local recipe to the user. For example, I selected Malaysia as my country and Cookpad showed our local recipe like Ikan siakap 3 rasa. This function can reduce the time and effort of the user because they no longer need to search for the local recipe from the browser or in the application. Sometimes, users may not find their local recipe from the internet, but Cookpad will recommend the local food for the user.

Furthermore, Cookpad also provides some competition to the user. Users may take part in the competition to share their personal recipe. This allows other users to find more recipes and learn other user's recipes. Users can see the details of the recipe like the comment that was

given by another user. This function will increase the fun of using recipe mobile applications and the system will get more and more recipes from the user.

The limitation of Cookpad is that the system will not provide the meal plan function to the user. Users need to spam time and effort to plan their meal for a week in other applications. Users also cannot know about the total amount of nutrition for the whole week in Cookpad. Users who need to follow a specific diet will struggle with this limitation. They need to calculate the total amount of nutrition by themselves.

2.11 Pestle

Pestle is a mobile application allow user to plan their meal and grocery purchase list process become easier and simple. Pestle employs green highlight for navigation, making it visually appealing and easy to use [16].

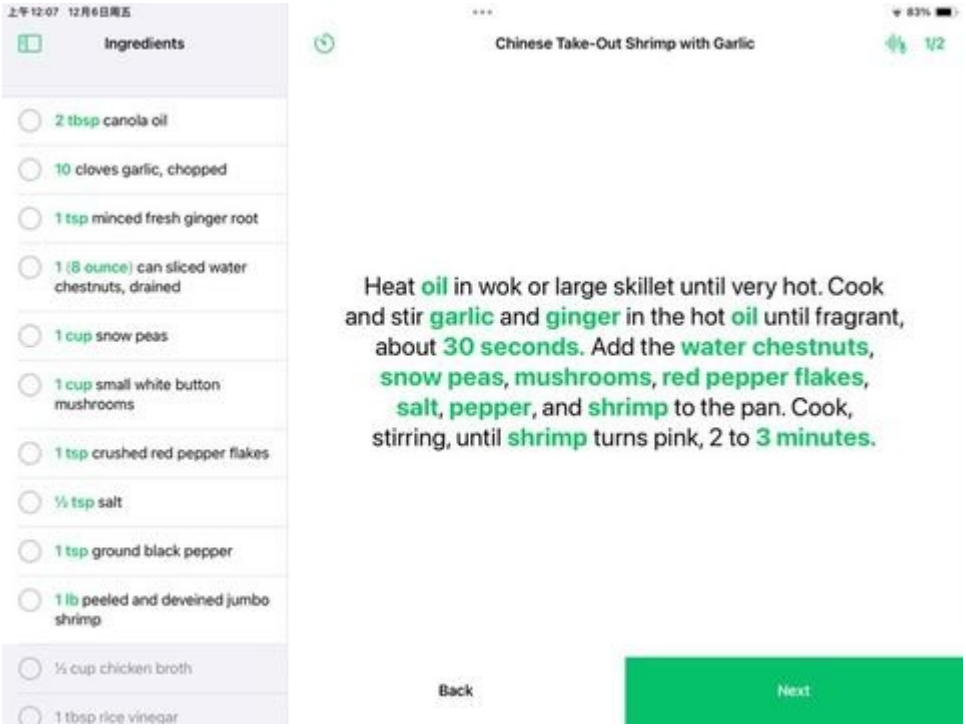

Figure2.11.1:The Cooking Mode of Pestle [11]

The strength of this app is that it provides a guided cooking mode to the user. Pestle will change the list of instructions to become step-by-step instructions. The instruction will occupy the full size of the screen, and the font size will be larger and clean. Users can use their voice to control the step for “Next” or “back”. There is a narration to read the instructions to the user. This function helps the user to free their hand to control the instruction. This can reduce the risk of

an accident when the user is cooking because the user has no need to rush to look for the instructions.

The limitation of Pestle is that it will not allow users to change the number of servings. This will reduce the choice of users because users only can choose the recipe that fits their servings. Then, Pestle also did not provide a pantry function. Users cannot track the remaining ingredient in real time and they need to check the remaining ingredient physically. This will cause users to struggle in the managed ingredient process.

2.12 Summary Review

Table 2.12.1 :Summary of Recipe Mobile Application

	Yummly	Tasty	Kitchen Stories	Kuali	OrganizeEat	CookBook	Whisk	Recipe Keeper	Cookpad	Pestle
Library Recipe	YES	YES	YES	YES	NO	NO	YES	NO	YES	NO
Grocery List Function	YES	NO	YES	NO	YES	YES	YES	YES	NO	YES
Based on remaining ingredient recommend recipe	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Customization ingredient and update nutrition infromation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
personalized guideline function	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
meal plan	YES	YES	NO	NO	YES	YES	YES	YES	NO	YES
Allow user adjust the number of serving	NO	YES	YES	NO	NO	YES	NO	NO	NO	NO

2.12.1 Limitation of Existing Application

Table 2.12.1 presented the comparison of recipe mobile applications which include Yummly, Tasty, kitchen stories, Kuali, Organize Eat, Cookbook, Whisk, Recipe Keeper, Cookpad and Pestle. There are few differences between the 10 mobile applications.

The first difference is some of the mobile applications **do not provide the library recipe in the app.** System will navigate the user to another website then allow the user to retrieve the recipe from the other website. This will cause difficulty because some of the websites will provide different language and users did not understand the recipe so that they cannot refer to the recipe. For example, a user who did not know the German language, but the recipe was written in German language so that the user cannot understand and refer to the recipe. Normally, this recipe has a fixed number of serving and ingredient amount so that the user will also find it hard to use the recipe. For example, a user who stays alone but the number serving the recipe is four people so that user cannot follow the recipe to cook. Kuali and Whisk had provided these two functions to the user at the same time.

The second difference is the grocery **list function**. Tasty, Kuali, and Cookpad did not provide this function. To record the ingredient name and amount, users need to spam time to record the grocery item in other applications or physically. While recording the ingredient, the user might record the ingredient with the wrong amount and cause the overbought problem. Users who used the recipe mobile application that had provided this function, they click one button then the system will add the item into the grocery list.

The third difference is the meal **plan function**. Kitchen Stories, Kuali, and Cookpad did not provide meal plan functions to the user. It Is difficult for users to conduct balanced meal tracking because the system cannot calculate the nutrition of the whole week. If a user wants to calculate the nutrition, they need to calculate one recipe by one recipe, and it will take a lot of time for the user to calculate.

In the end, the function of recommending ingredients based on remaining ingredients, customization of ingredients and updating nutrition information, and personalized nutrition guidelines was not provided by any recipe mobile application. These three functions will become the problem statement of this project.

Chapter 3

System Methodology

3.1 Project Development

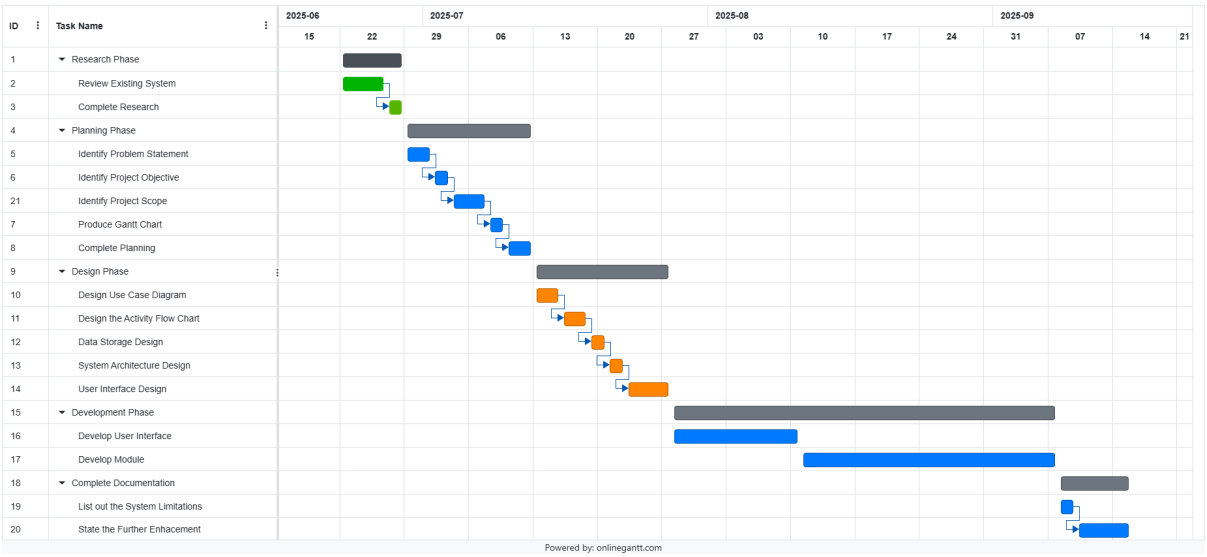

Figure 3.1.1: Gantt chart of the FYP 2

Figure 3.1.1 shows the whole process of developing recipe mobile applications. The first phase of development is the **research phase**. In this phase, I conduct the reviewing of existing recipe mobile applications like Tasty, Yummly, and other recipe mobile applications that have already launched in the market to understand their strengths and weaknesses. After I review the existing application, I can identify the limitations of the current application. Such as lack of personal nutritional guidance, lack of customization ingredient in recipe, and did not provide recommended recipe based on ingredient available.

After getting the limitation of the existing application, the second phase of development is the **Planning Phase**. I can identify the problem statement and set the objectives for this development. Such as develop a personal nutritional guidance, dynamically nutrition information of recipe once user edit the ingredients and provide recommended recipe based on available ingredients. In the meantime, I define the project scope like store recipe, grocery list and family meal plan. I also created a Gantt Chart to estimate project duration.

The third phase of development is the **Design Phase**. In this phase, several design activities are carried out to ensure that the application is user-friendly. The first activity is design use case diagrams that illustrate the interaction between user and system. Such as register an account, login account, storing a recipe and other functionality. This helps in identifying the function requirement of the application. The second activity is a design activity diagram which illustrates the step-by-step process of important features like personal nutrition guidance. The third activity is design data storage. This can ensure the data can be stored and managed efficiently. Additionally, the fourth activity is design architecture diagrams. This diagram function is outlined to define how the mobile application communicates with the backend server and the MySQL database through APIs, ensuring smooth data flow and integration. The last activity is design user interface. These steps using Figma application to sketch and prototype to visualize the layout of the screen so it can follow the design in the development phase.

The last phase of this development is the **Development phase**. I am using Android Studio to develop the frontend of recipe mobile applications, like developing the user interface and the logic of the frontend. Then, I developed the backend code and database through using Visual Studio Code and PhpMyAdmin. After finishing the development phase, I conduct the documentation. I had done the system limitation and the further improvement part of this project. It allowed this application to have clear guidance to improve and complete it in future.

3.2 System Functionalities

The use case diagram of Mobile application. This system includes some functions, such as login and register the account. During registration, the system will let the user key in their information like ingredient allergy, user personal information and other information. The system will be based on the ingredient allergy to recommend the recipe that is suitable for the user. Other than that, the system will use the user's personal information like age, height and weight to calculate the balanced calories, fat, fiber, protein, and carbohydrate for each day. Besides that, the system also had to provide the grocery list function to the user. Users can record the ingredients needed by the recipe by the user. After adding all the ingredients needed, the system will calculate the amount of ingredients to purchase for the whole week. Once the user marks the ingredients in the purchase list that has been purchased, the system will add the ingredients into the pantry list. In the pantry list, users are allowed to use the recommended recipe based on the available ingredients. Furthermore, there is another function which is meal planning. In this function, users can add the recipe that they want into the plan. After creating the plan, the system will calculate the total amount of each nutrition of all recipes like protein, fat, carbohydrates and so on. At the same time, the system calculated whether each day's plan had over the average of calories or not. If yes, the system will pop out a message to let users know the day of calories was over the average of calories and advise users to update their meal plan. The system allows users to add the exercise to burn calories through selecting the duration and type of exercise, the system will calculate the burn calories amount. Users also allow to invite other members to join their meal plan by inviting the user through user id or manually key in the member information. Then, users are allowed to create a family meal plan. In the family meal plan, users can know the member calories will be in the meal plan. Users are allowed to upload their own recipe to the application. After users upload their recipe, they may choose to share it to the community or public. The system will be based on the ingredients amount to calculate the nutrition of the recipe. If the user likes the recipe, the user can store the recipe into the favourite recipe so that they can easily find their recipes in the future. At the end, the user can use the camera to take a picture of the recipe then the system will show the calories of the recipe.

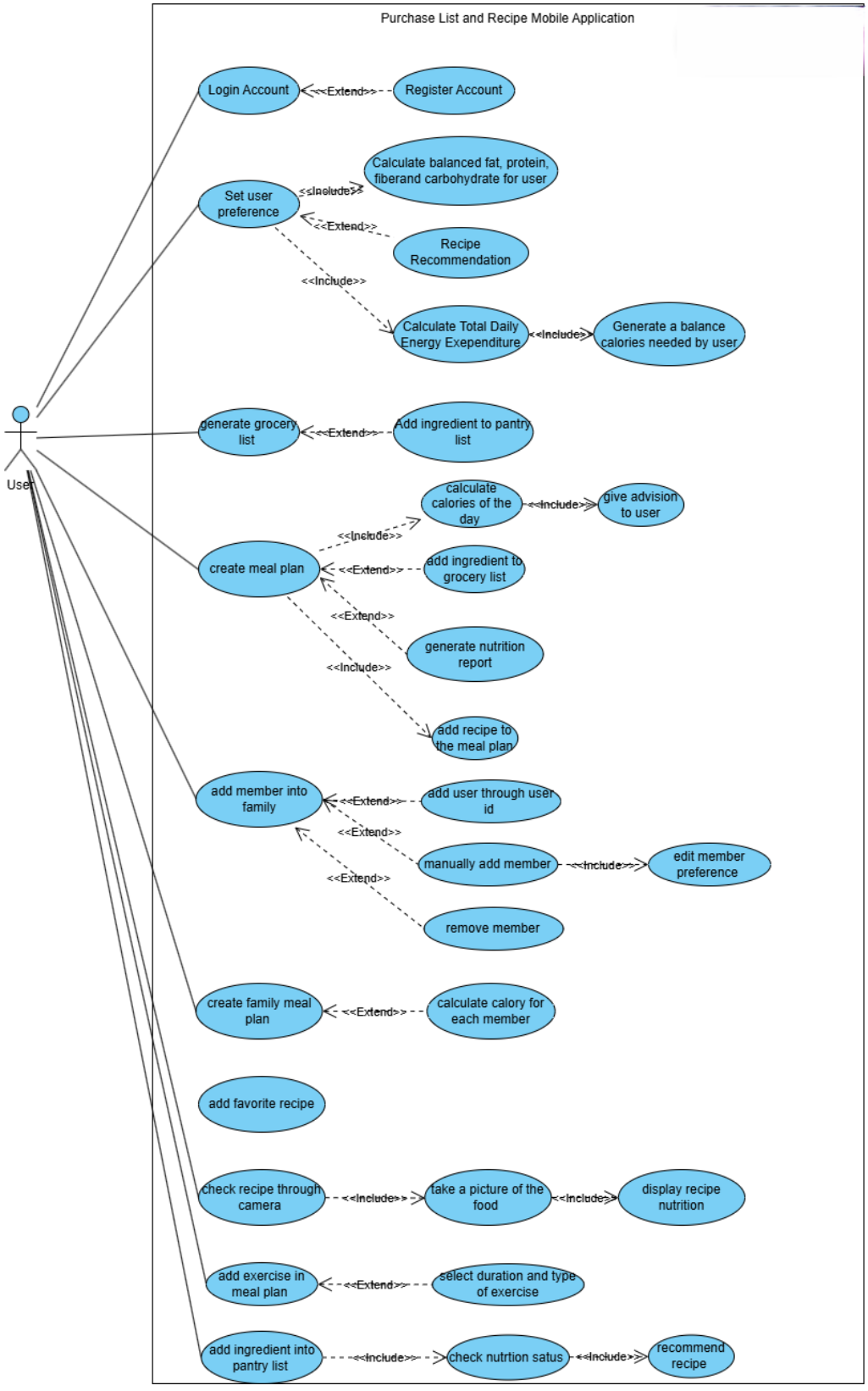

Figure3.2.1 Overall system functionalities of Recipe Mobile Application

Figure 3.2.2 is the **process of calculate balanced nutrition needed by user**. During the user register account, the system will let the user answer a survey question. After finishing the survey, the system will retrieve the data of the user like age, height, weight and the level of activity. The system will use the age, height and weight to calculate the Basal Metabolic Rate (BMR) of the user based on the formula. The male and female users had different formulas. After calculating the BMR, system also will calculate the Total Daily Energy Expenditure (TDEE) through formula (BMR * Activity Factor). After the system gets the TDEE, the system will calculate the other balanced nutrition for the user. Such as calculate balanced fat (Balanced fat = (0.3 * TDEE) / 9), balanced fibre (Balanced fiber = 14 * (TDEE / 100)), balanced protein (Balanced Protein = (0.2 * TDEE) /4) and calculate balanced carbohydrate (Balanced carbohydrate = (0.5 * TDEE) /4). After calculating all balanced nutrition, the system will store the data in the database.

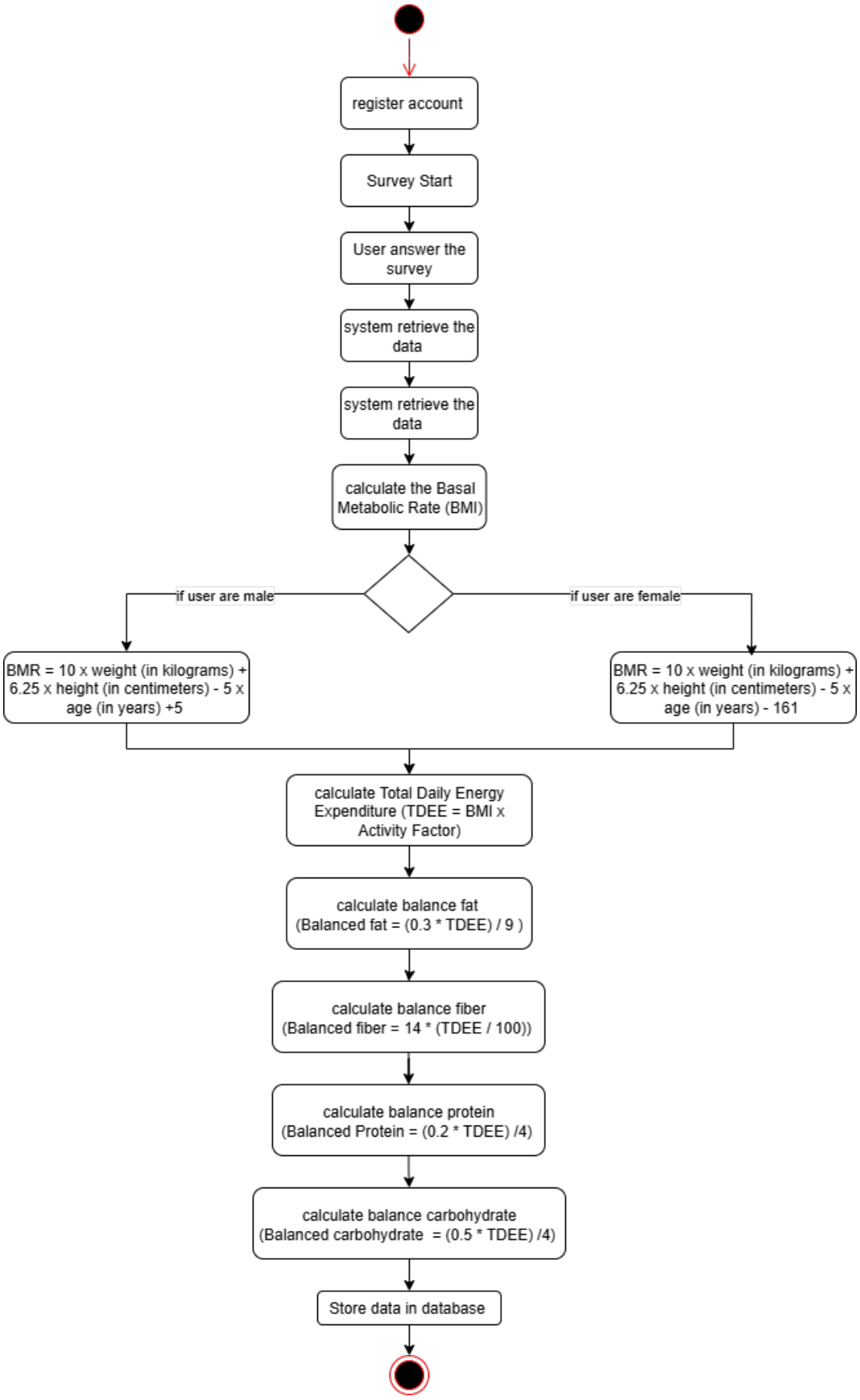

Figure 3.2.2 The Process of calculate balanced nutrition needed by user

The figure 3.2.3 is **the process of Customization Recipe during adds recipe**. First, the user will navigate to the meal plan page and display the current day meal plan. If users want to edit another day's meal plan, they can select the day. Once a user wants to add a recipe, they can click the “add something to eat” button and the system will navigate the user to the add recipe page. In the page, the system will display the recipe in different categories like all recipes, favourite recipes, low fat, and own recipes. Users can select and add recipes to the meal plan through clicking the add button. The system will pop out a message to the user which calls Select Meal Category. In this message box, users can choose which category this recipe will insert like breakfast, lunch or dinner. Then, the system will pop out another message box called adjust ingredients. Users can adjust the number of servings and the specific ingredient amount. If user adjust the servings size, system will automatically calculate the ingredients amount through (original value * (selected servings / original servings)). If the user wants to edit a specific ingredient amount, the user can edit the text of the ingredient amount. Once the user edits the ingredient amount, the system will recalculate the recipe nutrition. After that, the system, will display the nutrition of the recipe in the message box. Users need to click the confirm button to store the recipes in the meal plan database.

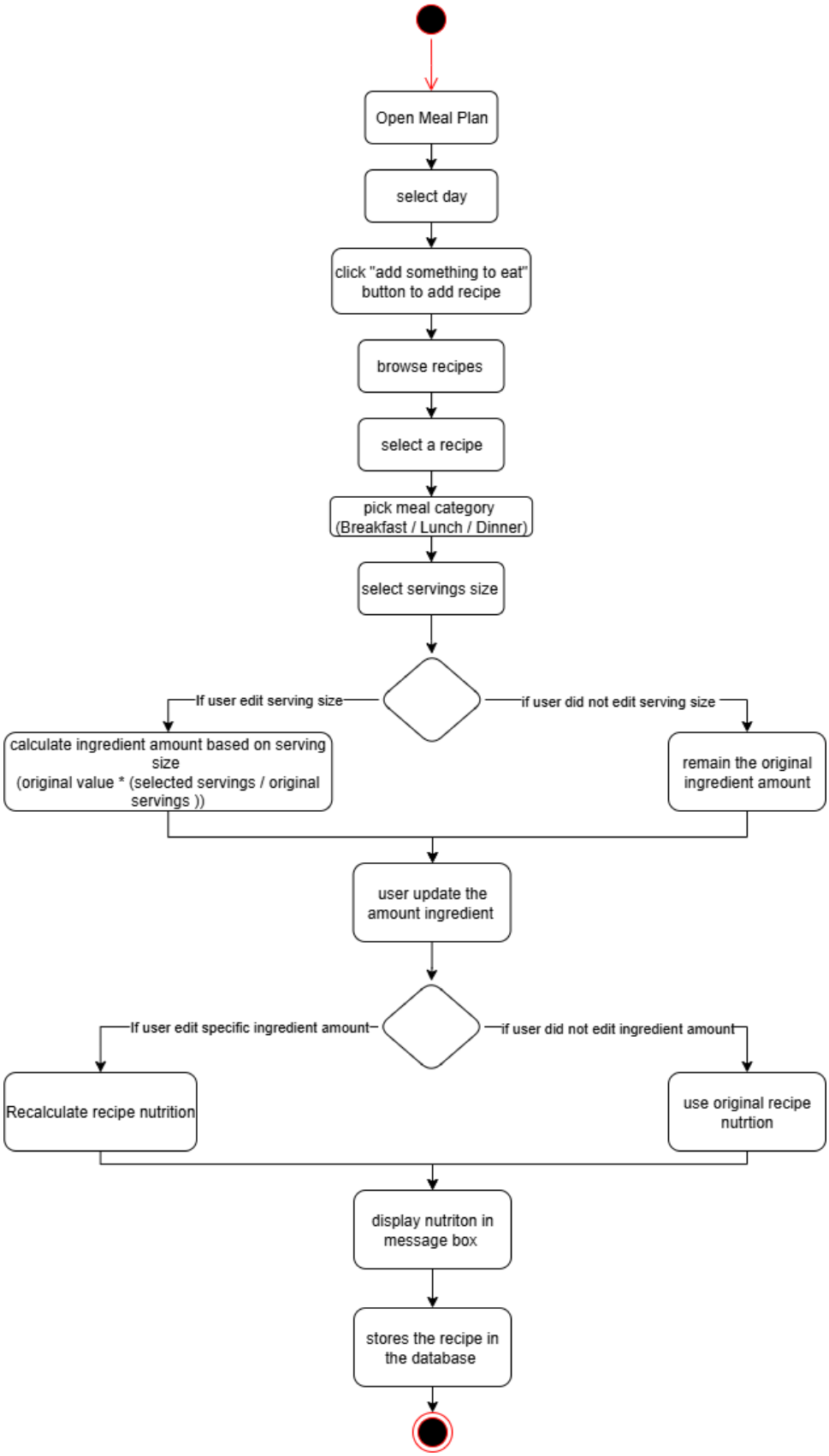

Figure 3.2.3 The process of Customization Recipe during add recipe

Figure 3.2.4 is the process of Personal Nutrition Guidance. This function will automatically conduct in the meal plan function. Firstly, users need to open the meal plan and select the day. Once the user selects the day that they want to review or edit, the system will retrieve the day plan and the total calories from the database. At the same time, the system also will retrieve the target calories also known as Total Daily Energy Expenditure (TDEE) from the database. After retrieving all the required data, the system will check if the total calories of the day have matched to the target calories or not. If yes, the system will show the "on track" indicator. Else, the system will check if the total calories are more than the target calories. If yes, the system will show an "Over Target" indicator and pop out a message box to suggest lower calories recipes to the user. If not, the system will show an "under target" indicator and suggest adding more recipes. At the end, the system will display total calories and the calories in every category like breakfast, lunch and dinner.

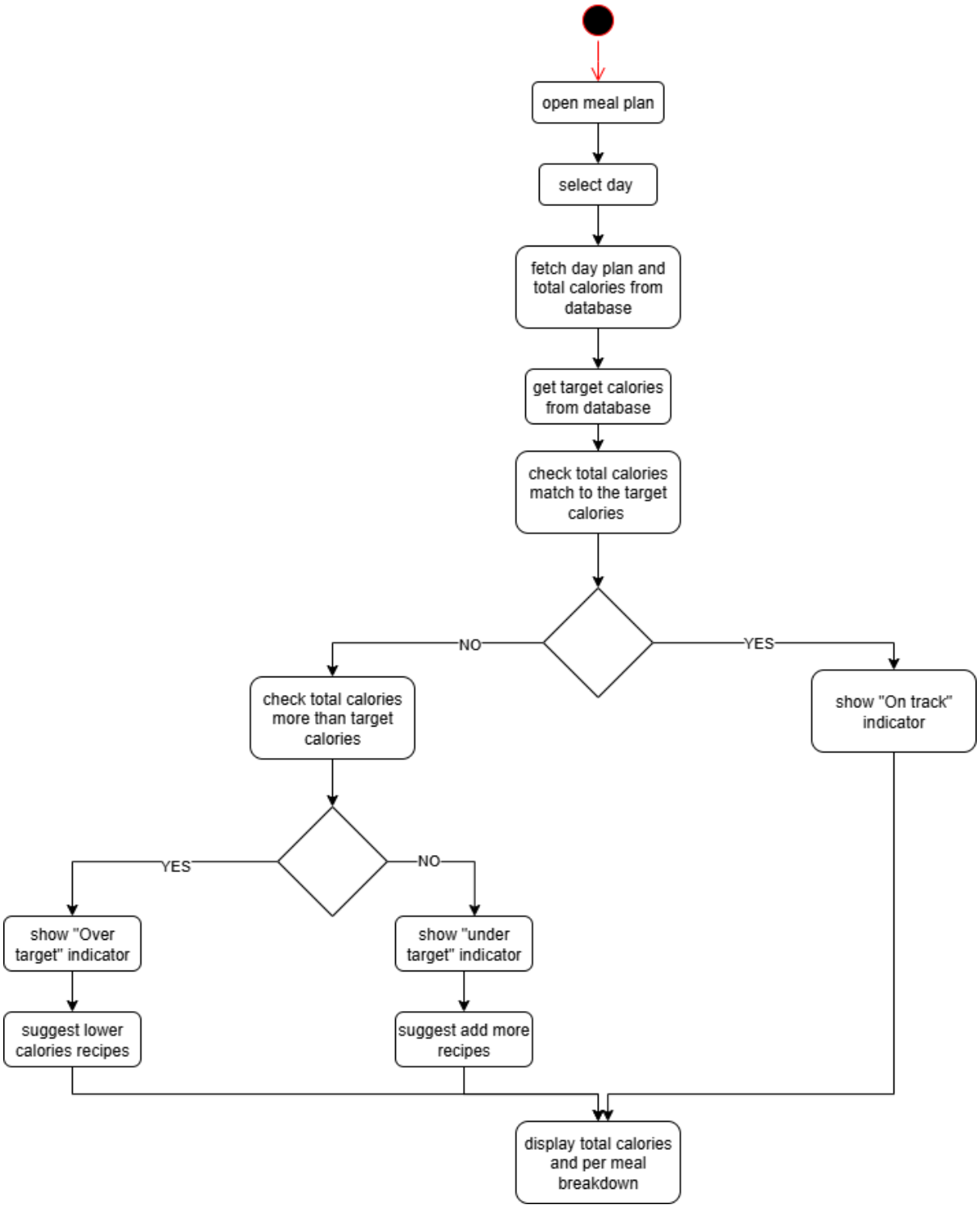

Figure 3.2.4 The process of Personal Nutrition Guidance

Figure 3.2.5 is the process of Recommend Recipe based on Available Ingredients. This function will conduct the pantry list page. When a user enters the pantry list, the system will display the ingredients in the pantry list. Users can click the “Find Recipe” button, the system will display the ingredients in a message box so the user can select the ingredients that they want to cook through by checking the check box. The system will check if the user has selected the ingredients or not. If no choose any ingredients and click “find” button, system will show “No Ingredient selected” message and let user to choose to want to selected ingredient or not. If not, this function will end. On the other hand, the system checks if the user has already selected the ingredient to cook, and the system will retrieve the total nutrition of today and the user's nutrition targets. After the system gets the data, it will use this nutrition and ingredient filter to search recipes. If no recipe fulfils the filter, the system will show a “No recipe Found” message and ask if the user wants to use other ingredients or not. If yes, the system will pop out again the ingredients selection message box. If there are recipes that fulfil the filter, the system will calculate the scores and pantry matches. It will display the nutrition dialog like less protein, more fibre and other nutrition information messages to the user. Also, it will display the recipe with nutrition information in the message box. If a user wants to check the recipe's details, they can click the recipe, and the system will navigate the user to the recipe details page.

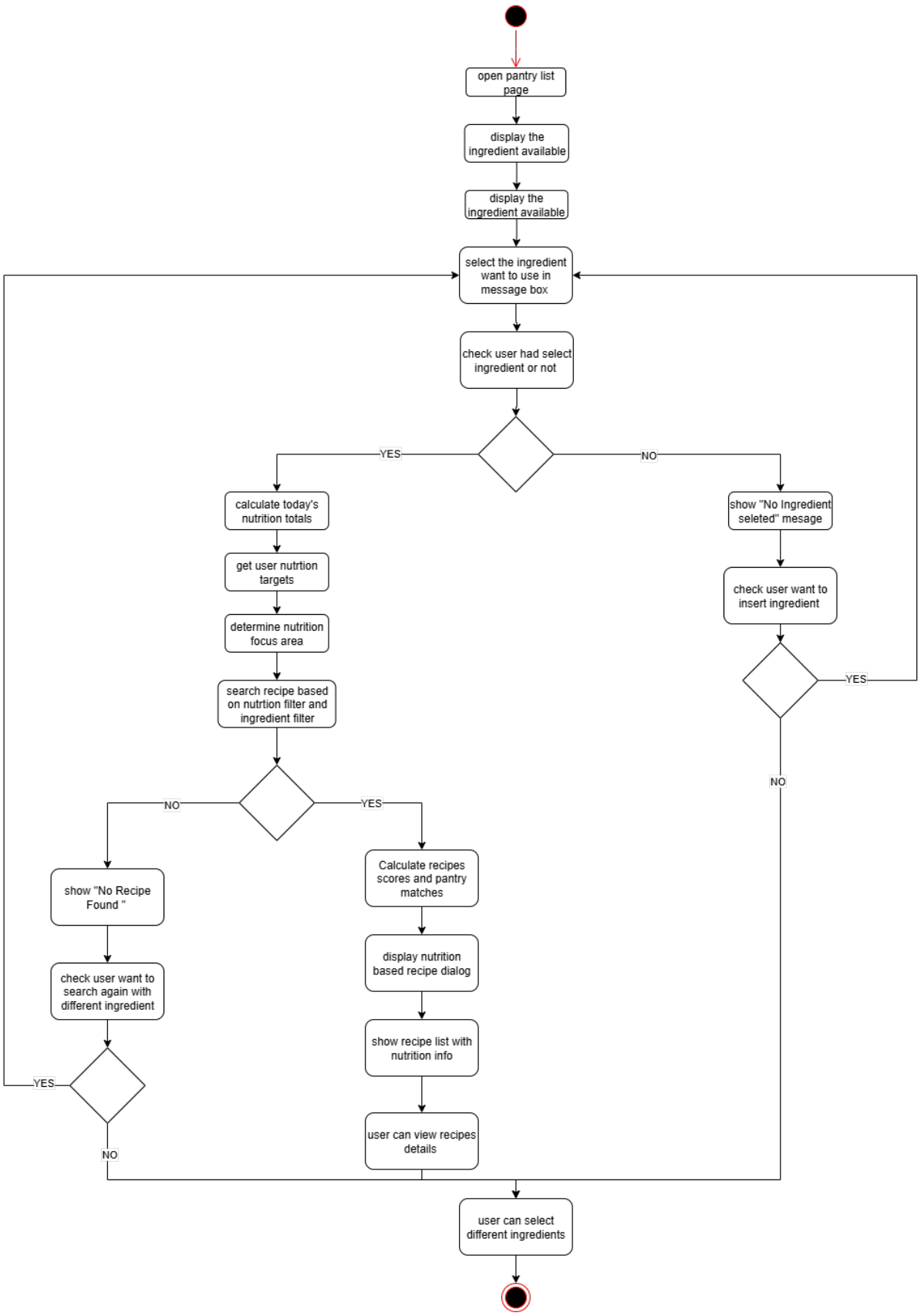

Figure 3.2.5 The process of Recommend Recipe based on Available Ingredients

Figure 3.2.6 is the process of adding family members. Users need to open the member page to add family members. In the member page, the system will display the added family members in this page. Users can add an “add members” button to add family members. The system will pop out the message box to ask the user to key in the user id to add family members or manually key in the information. If the user **chooses, use the user id method** and key in the user id of the target user. Then, the system will validate the user id on the server. If a user has been found, the system will display the username in the message box. Users need to confirm and add the user into the family through clicking the “confirm” button. The system will send add member requests to the server. If successful, the system will copy the user preferences into the family tables like the user TDEE, name, age and other user information. Also, the system will toast the “Member added” message. If the user id is not found, the system will show a “User not found” message and ask if the user wants to try another user id or not. If yes, the system will pop out the message box that allows the user to key in the user id again. Else, this function will end.

If the user **chooses a manually method,** the system will navigate the user to the member details form. In this form, users are required to fulfil the member details like name, age, height and other details information. Once the user clicks the “save” button, the system will validate whether all the forms have been filled or not. If not, the user will navigate to the form that has not yet been fulfilled. Then, the system will submit the form to the server. In this step, the system will help users to calculate the balanced nutrition needed by the family members. Once finished stored in the database, the system will show a “Member Added” message to the user. If you fail to submit a form to the server, the system will show the error message and the system will auto report to the admin. At the end, users can check the latest member list in the member page.

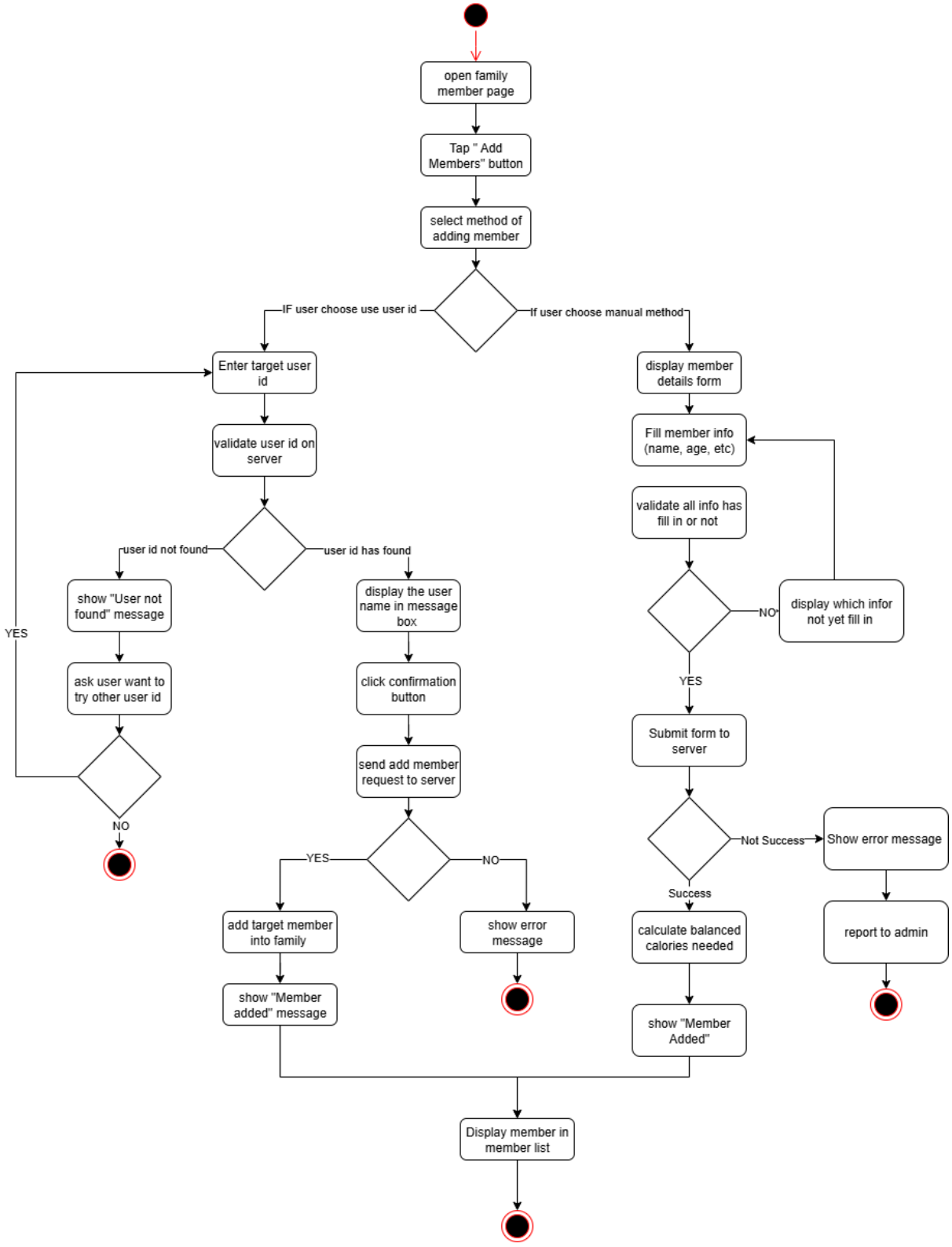

Figure 3.2.6 the process of adding family members

Figure 3.2.7 The process of a family meal plan. This function will be conducted on the family meal plan page. When a user enters this page, the user can select the date that they want to edit or view. The system will display the family recipe to the user. Users can click the "Add Recipe to Family" button to add recipes. Users will navigate to the add family page. In this page system will display the recipe in different categories like all recipes, own recipe, favourite recipe, and low-fat recipe. Once a user chooses the recipe to add through clicking the "add" button. The system will pop out a "select family member and meal category" message box. In this message box, users can choose this recipe and add it into categories like breakfast, lunch and dinner. Also, users can choose which member will have this recipe too and the member will display in the checkbox with name only. Then, the system will pop out another message box called adjust ingredients. Users can adjust the number of servings and the specific ingredient amount. If user adjust the servings size, system will automatically calculate the ingredients amount through (original value * (selected servings / original servings)). If the user wants to edit a specific ingredient amount, the user can edit the text of the ingredient amount. Once the user edits the ingredient amount, the system will recalculate the recipe nutrition. After that, the system will display the nutrition of the recipe in the message box. Users need to click the confirm button to store the recipes in the meal plan database. In this process, the system will calculate the portion size of each member, and the nutrition will be obtained by each member. After calculating the nutrition, the system will store this recipe into a database. If successful, the system will show an "Added to family meal plan" message to the user. The user will navigate to the family meal plan page. The system displays the latest total calories of today and calories needed for today. For the target calories needed can edit which member will be involved today through updating the spinner of the family member. Once the user updates the target calories, the system also will update the calories needed.

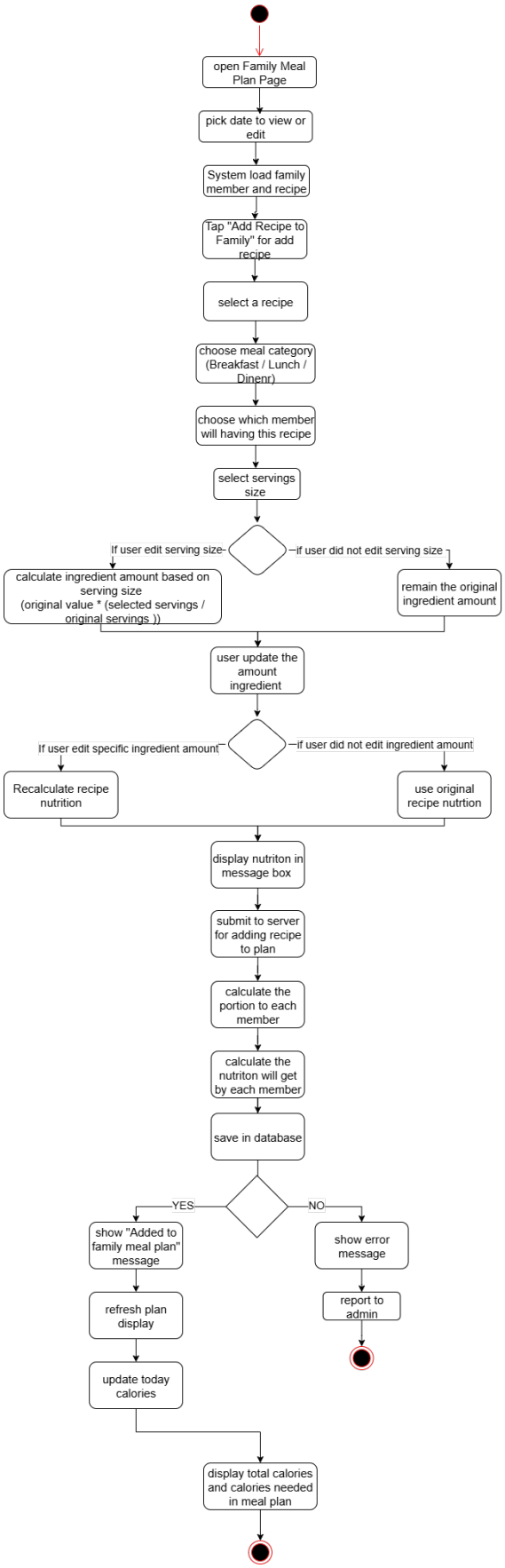

Figure 3.2.7 the process of family meal plan.

Chapter 4

Design of System Prototype

4.1 System Architecture Design

The figure 4.1.1 is the architecture diagram of recipe mobile application. This application uses a 3-tier architecture pattern to develop. In this pattern, it will have three different layers which are presentation layer, application layer and database layer. The function of the presentation layer is allowing the user to interact with the application through providing a user interface. This user interface design is using UML language to develop in Android Studio. The UML language allows developers to create, update or create the elements in user interface like button, text view, edit text and so on. For example, users can design the button shape from rectangle to rounded rectangle through updating the corner radius. When finished with the screen that is listed in figure4.1.1, users can smoothly and clearly interact with the application.

The second layer is the application layer. The function of the application layer is handling the activity and communication between the presentation layer and database layer, also known as logic layer. The presentation layer will handle the account management functions like user login account, forget password, and register account. After user login to the application, they can add the family member through family member management that is provided by the application layer. Users are allowed to add the member through using user id or manually key in the member information. At the same time, it also handles the recipe management functions like store recipes, calculating recipe nutrition, and setting recipes visible. Furthermore, users are allowed to view the recipe details like ingredients needed, instructions of cooking, and nutrition of the recipe through using the recipe detail's function. If users like the recipes, users can add the recipe into the favourite recipe list through using add favourite recipe function. Besides that, users can plan a meal plan for themselves or family meal plan. The function that provided to manage the meal plan included add recipe into meal plan, calculate the total calories of the day, retrieve the target calories of user, retrieve the burn calories, calculate nutrition of

each category, give advice based on nutrition and calculate the calories needed by user. If the calories are over, the user also can conduct some exercise to burn the calories. The presentation layer provides the logic for handling exercises like add exercise and remove exercise.

The last layer is the database layer. The responsibility of the database layer is data storage and retrieval. The system will conduct the CRUD operation to manage the database which is created, read, updated and deleted. For example, the user account information will separate into the user table and user preference table. The user table will store the basic information of the user like username, password and so on. The user preference table will store the user data like age, height, TDEE, and other data. At the same time, the member information will store the same data of the user, but it is specific for member use only because they cannot use it to login. Moreover, the recipe information will separate into different tables like recipes table, recipe ingredient table, recipe nutrition table, and recipe instructions tables. This allows users to easily find the specific data of recipes and update it in future. Besides that, the meal plan record and family meal plan record also have their own meal plan ingredients table, meal plan nutrition table, meal plan recipe table, and meal plan tables. These records have been separated into a normal meal plan that is used by a user alone meal plan and a family meal plan which is used for the user and family. At the end, the exercise data has an exercise table and a user exercise table. The exercise table will store the exercise data like the calories burned in one hour. The user exercise table will store the exercise conducted by the user.

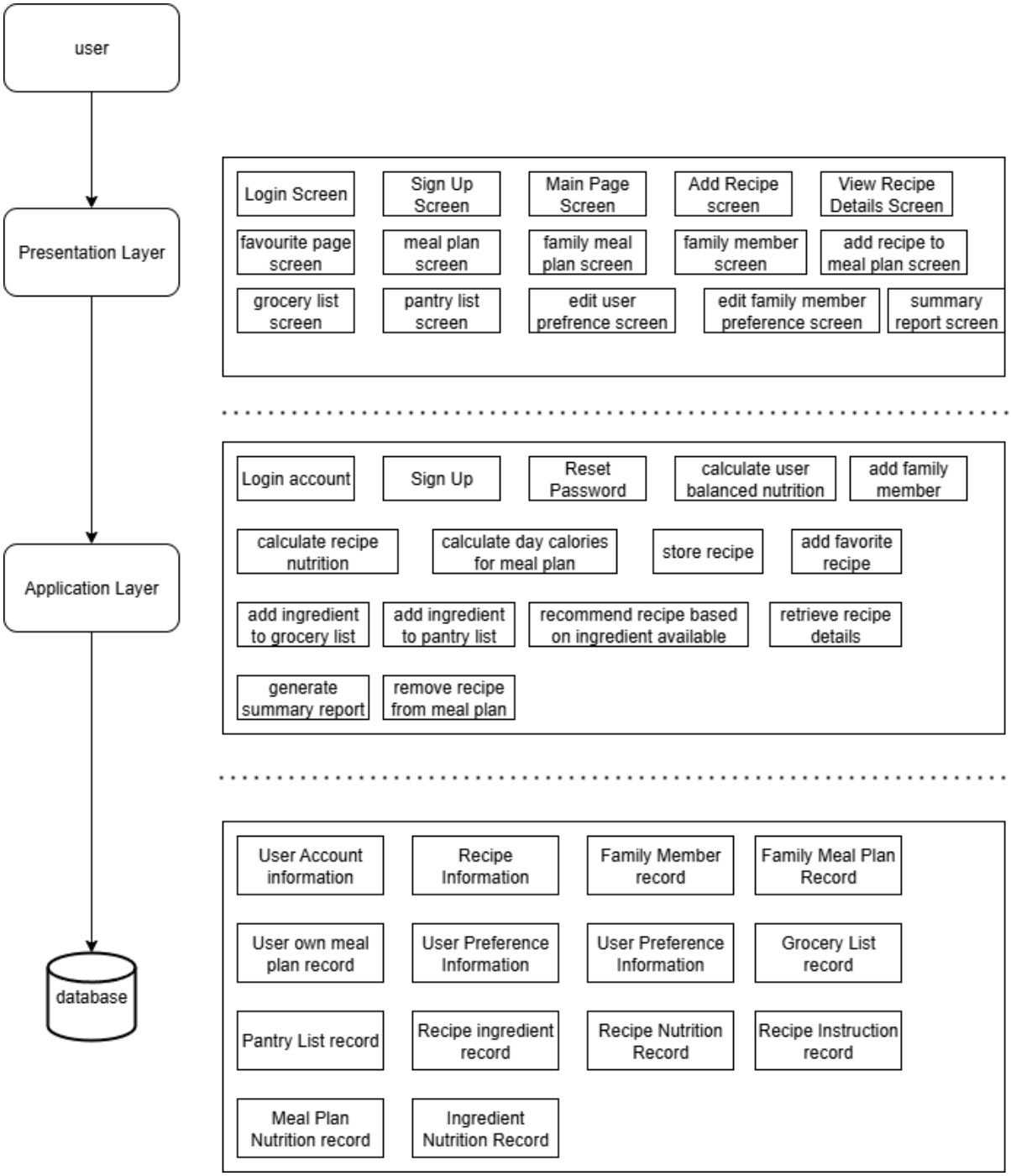

Figure 4.1.1 Architecture Design of Recipe Mobile Application

4.2 Graphical User Interface Design

Figure 4.2.1 shows the user interface of the login page. Users must fill in the username and password to login their account. If they do not have an account, they can click the Sign-Up button to register a new account. Also, users who forget passwords can also click the Forgot Password button to update their password.

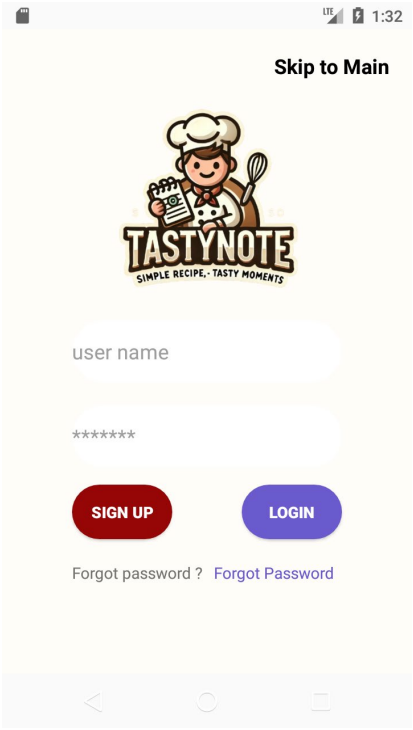

Figure 4.2.1 Login Page

Figure 4.2.2 shows the user interface of the register account. Users are required to fill in the username, password and email address that they want. After filling in the information, click the “register” button to continue.

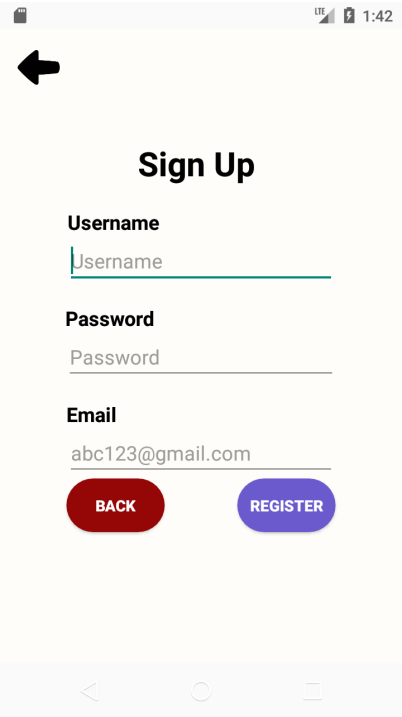

Figure 4.2.2 user interface of Register Account

Figure 4.2.3 shows the user interface of setting user preferences. Users need to fill in all the data like allergy ingredients, cuisine type, age, height(cm), weight (KG), gender and activity level. After filling in all the information, the user clicks the save preferences button to store the data in the database

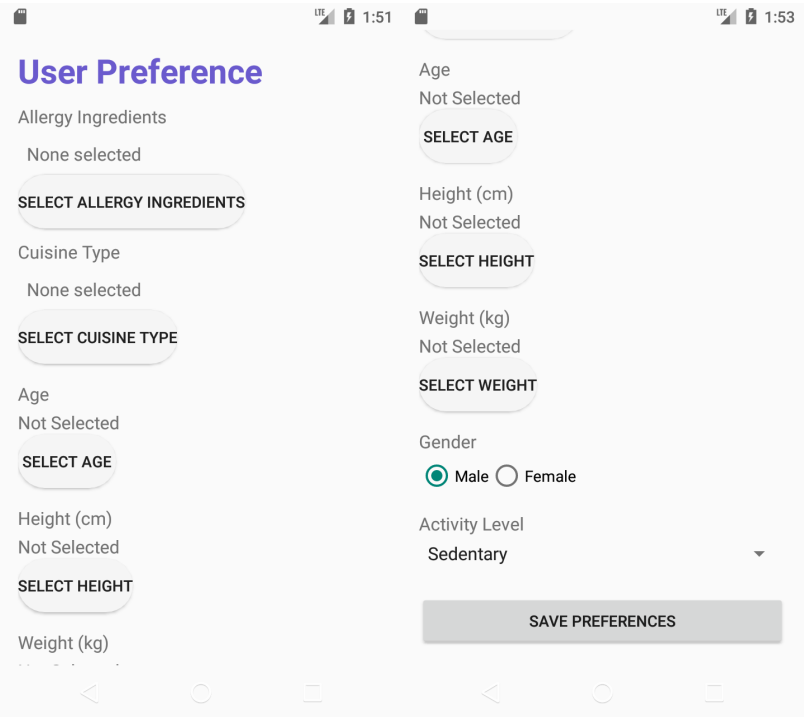

Figure 4.2.3 user interface of setting user preferences

Figure 4.2.4 shows the user interface of forgetting passwords. The user needs to key in their email, and the system will verify the account has registered or not. If yes, the user will navigate to the set a new password page and the user needs to key in the new password two times in different edit texts which are password and confirm password. After the key in the new password, the user is required to click the “reset password” button to update the password.

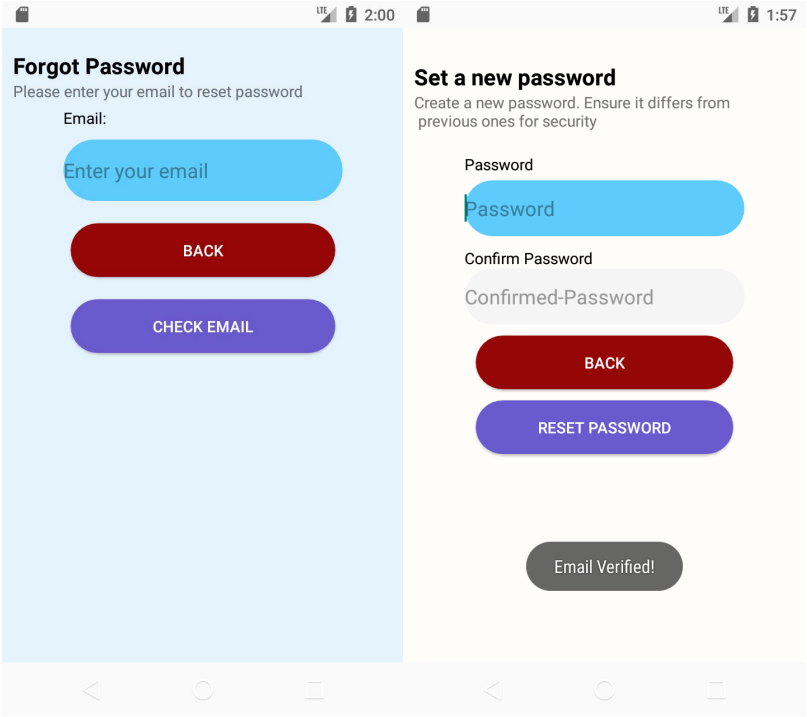

Figure 4.2.4 user interface of forget password

Figure 4.2.5 shows the user interface of the main page. In this page, users are allowed to view some recipes in different categories like Malay cuisine type, Chinese cuisine type and Asian cuisine type. The “Scan Ingredient For Nutrition” button will navigate users to the scan recipe page. At the bottom, the logo of the footer allows users to navigate to different pages including the home page, meal plan page, add recipe page, grocery list page, and user setting page. If the user clicks the recipe, the user will navigate to the detailed recipe page to view the recipe details.

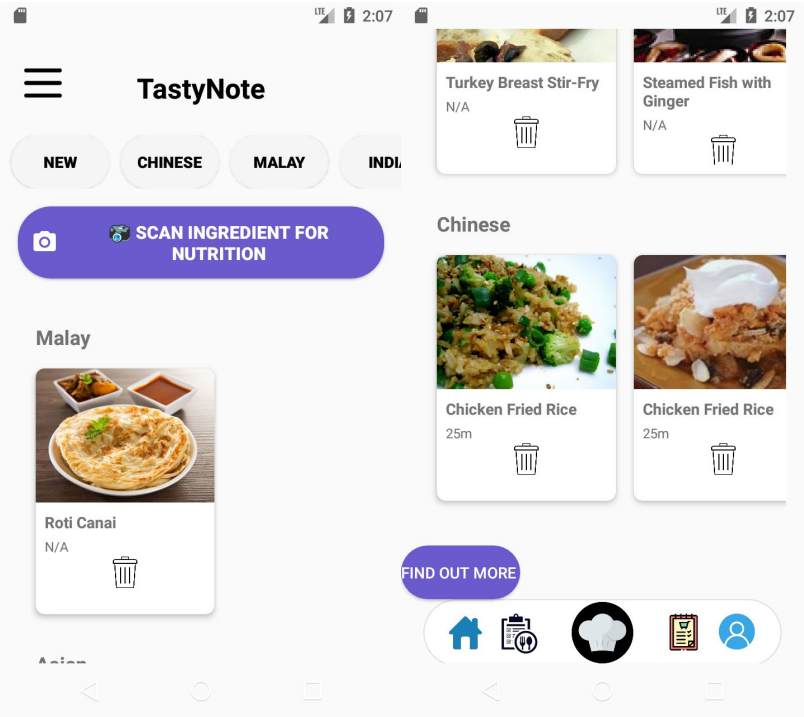

Figure 4.2.5 user interface of Main page

Figure 4.2.6 shows the user interface of the detailed recipe page. At the top will show the recipe name. Below the recipe name, will show a different logo that allows the user to click and navigate to the different page which details the recipe page, recipe ingredients page, recipe instructions page, and the nutrition of recipe page. Users are allowed to view the photo of the recipe, category of recipe, the time of preparation, and the serving size of recipes.

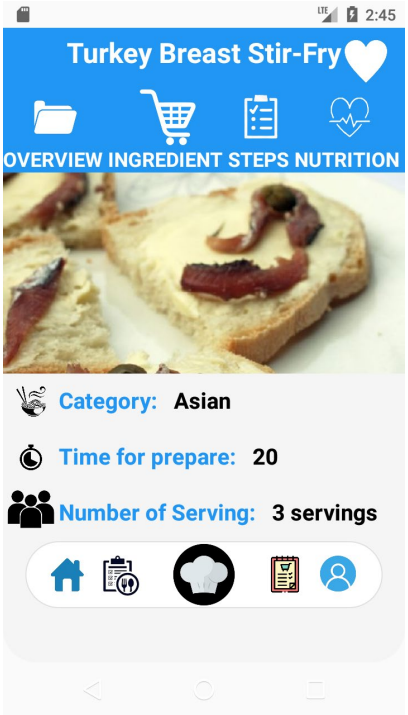

Figure 4.2.6 user interface of details recipe page

Figure 4.2.7 shows the user interface of the recipe ingredient page. In this page, users are allowed to view all the ingredients and the ingredient amount needed by the recipe. In the bottom, users can click the “update ingredient amount” button and “add ingredients” button to manage the ingredients amount. Users can click the number of servings, and the system will list the number in the spinner, allowing users to select the latest servings size.

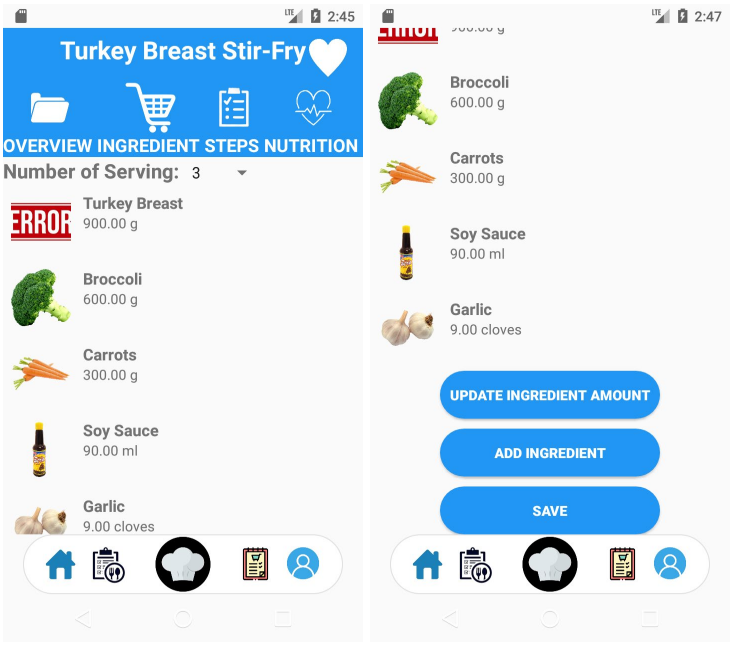

Figure 4.2.7 user interface of recipe ingredients page

Figure 4.2.8 shows the user interface of the update ingredients page. If the user clicks the “update ingredient amount” button, the system will pop out the edit ingredient message box so the user can edit the amount. If user click the add ingredient button, user allow to add new ingredients into the recipe

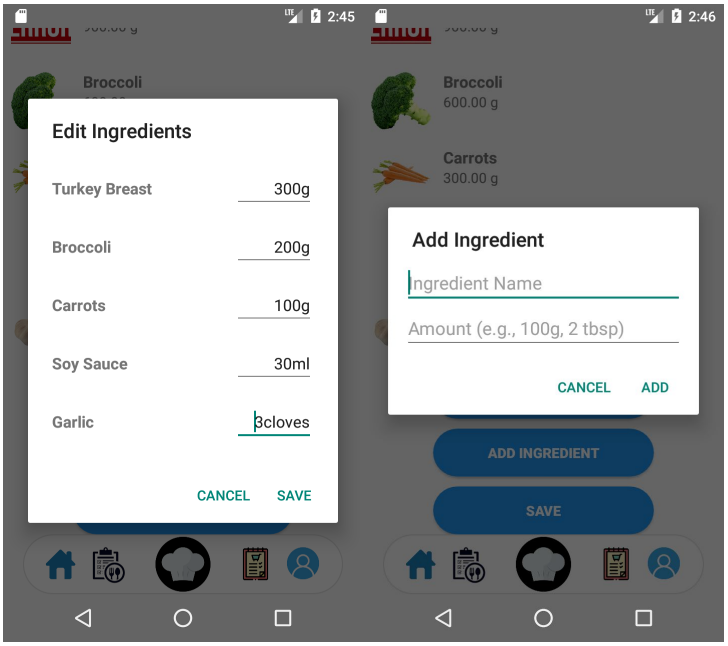

Figure4.2.8 user interface of updating ingredients

Figure 4.2.9 shows the user interface of the instruction recipe page. Users can view all the steps so they can follow the step and cook the recipe.

Figure 4.2.9 user interface of instruction recipe

Figure 4.2.10 shows the user interface of nutrition recipe page. In this page, user allow view the nutrition information of the recipe like calories, fat, fibre, protein, and carbohydrate.

Figure 4.2.10 user interface of nutrition recipe page

Figure 4.2.11 shows the user interface of the personal meal plan page. Users are allowed to view the recipe that is inserted in the day. At the top, users can choose the week through clicking the "week of 15/9/2025" and the system will display the in-spinner form. Also, users can choose the day of week. Besides that, users can also choose the "Recipe" button to view the recipe of the day and the "Exercise" button to view the exercise of the day. Below the button, users can view today's calories status. The status will show as the formula (Today Food calories – Exercise Burned = Calories Today) and check the Total Daily Energy Expenditure of the user. The recipe will be separated into three categories which are breakfast, lunch and dinner. At the top of the category, users can check the calories, protein, fat and carbohydrate of the category. Users can add recipes into the meal plan through clicking the "Add Something to eat" button and the system will navigate users to the add recipe page. At the bottom, there are two buttons which are the "Check Grocery List" button and the "Nutrition Analysis" button.

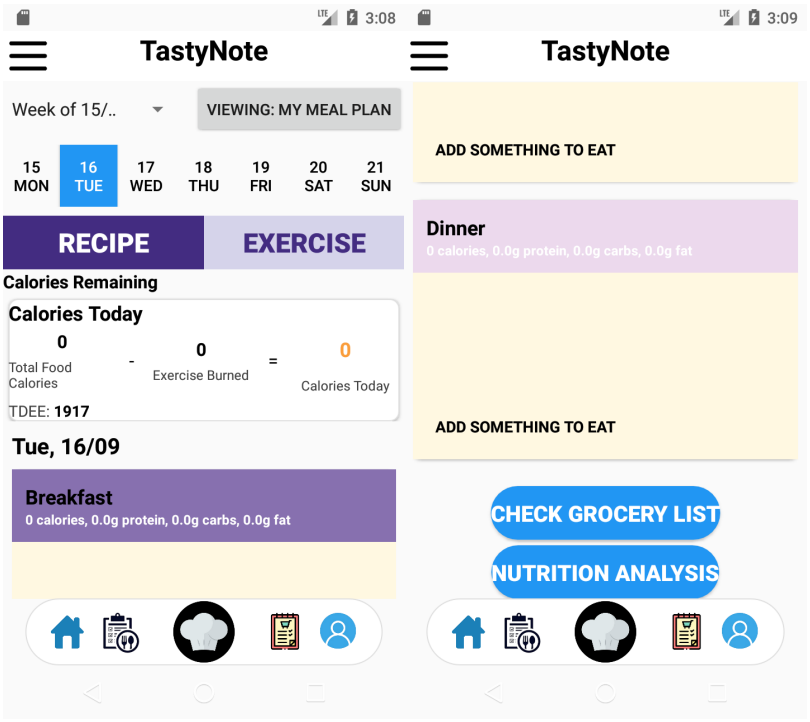

Figure 4.2.11 user interface of personal meal plan page

Figure 4.2.12 shows the user interface of add grocery list. This message box will come out once user click the "Check grocery list" button. The ingredients needed will display in checkbox form.

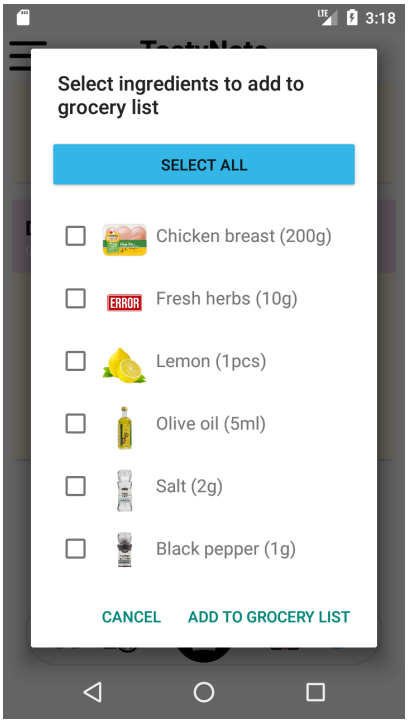

Figure 4.2.12 user interface of add grocery list message box

Figure 4.2.13 shows the user interface of the summary nutrition page. In this page, users are allowed to view the calories of the week. The red colour bar means the user had over the Total daily energy expenditure (TDEE), green colour means user had matched the TDEE, yellow colour means user undertaking the TDEE. At the top, users can change to the other member to view their calories through the spinner of the member.

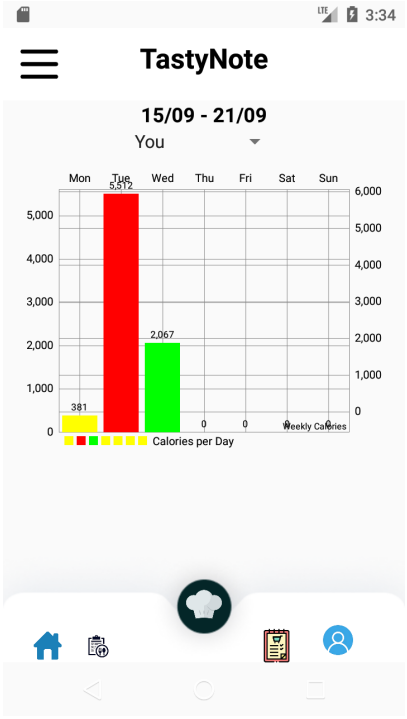

Figure 4.2.13 user interface of summary nutrition page.

Figure 4.2.14 shows the user interface of the user setting page. In this page users are allowed to view their user information through clicking the “user information” button, view their user preferences through clicking “user preference” buttons, want to update their password through clicking “update password” buttons, and update family members through clicking "update other member” buttons.

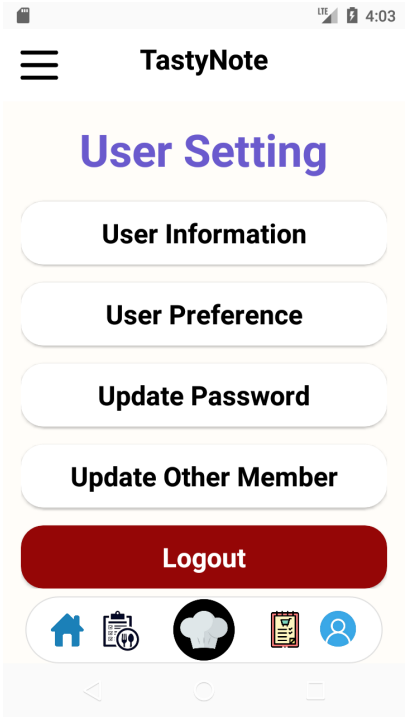

Figure 4.2.14 user interface of user setting

Figure 4.2.15 shows the user interface of user information. In this page, users will see their profile picture, username and email. Users can also update their profile picture by clicking the "change picture" button.

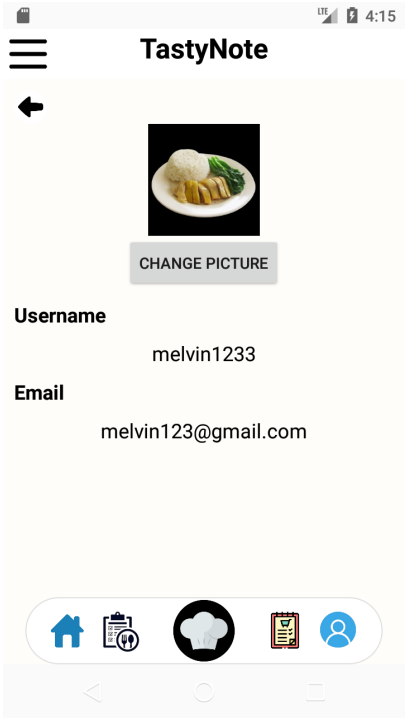

Figure 4.2.15 user interface of user information page

Figure 4.2.16 shows the user interface of the user preferences setting page. In this page users are allowed to view the previous preference setting like allergy ingredients, cuisine type, age, height (cm), weight (KG), gender, activity level and protein level.

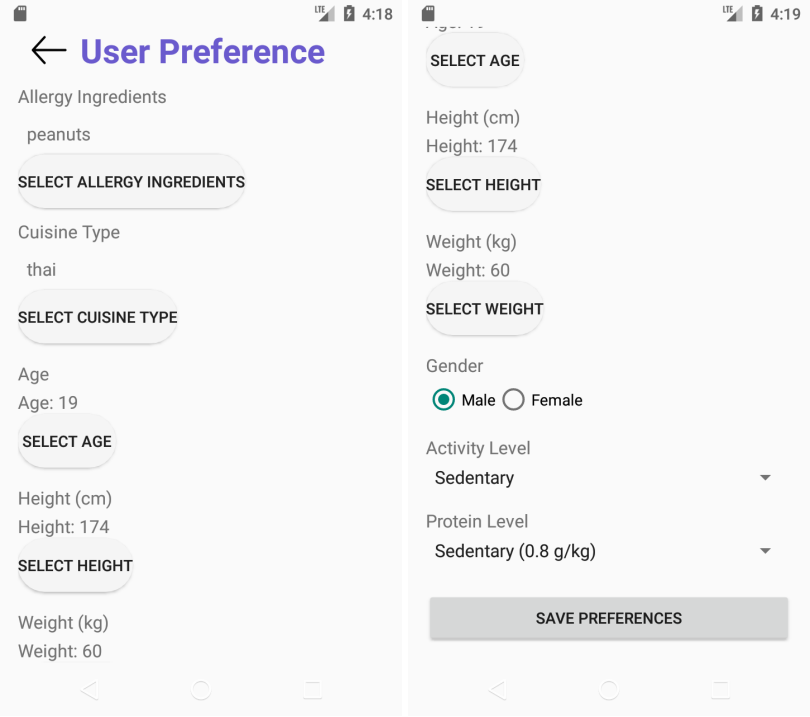

Figure 4.2.16 user interface of user preferences setting page

Figure 4.2.17 shows the user interface of the family member page. In this page, users will see the members that already add into the family. If a user wants to add a new member, they can click the "+" button. The system will pop out a message box to allow the user to choose an add member in which way like using user id or manually key in method.

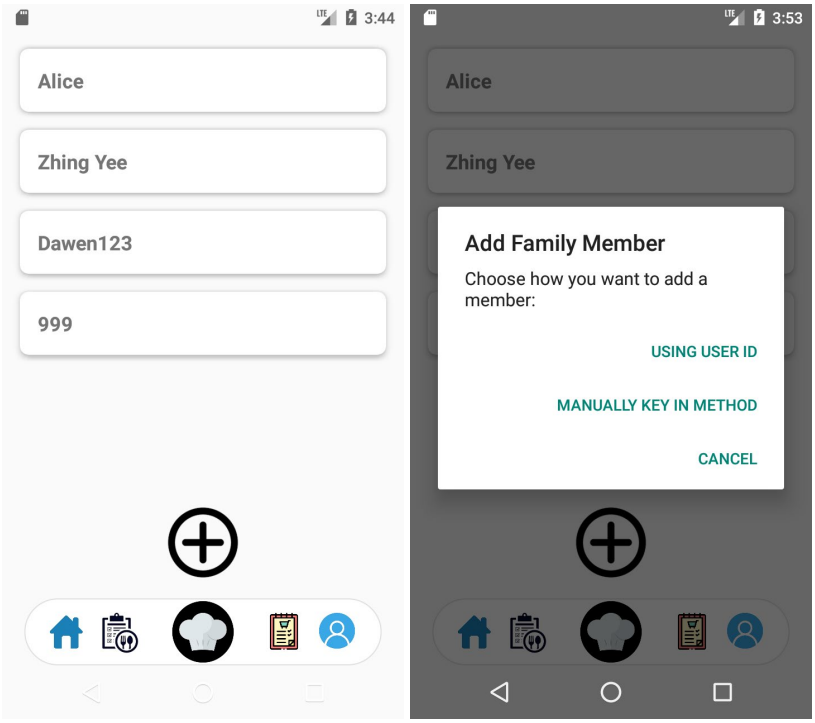

Figure 4.2.17 user interface of family member page

Figure 4.2.18 shows the user interface of adding a family member page. Users need to key in the member's name, allergy ingredients, cuisine type, age, height, weight, gender and activity level. Once the user finishes it and clicks the save preference button. The system will save the member into the database.

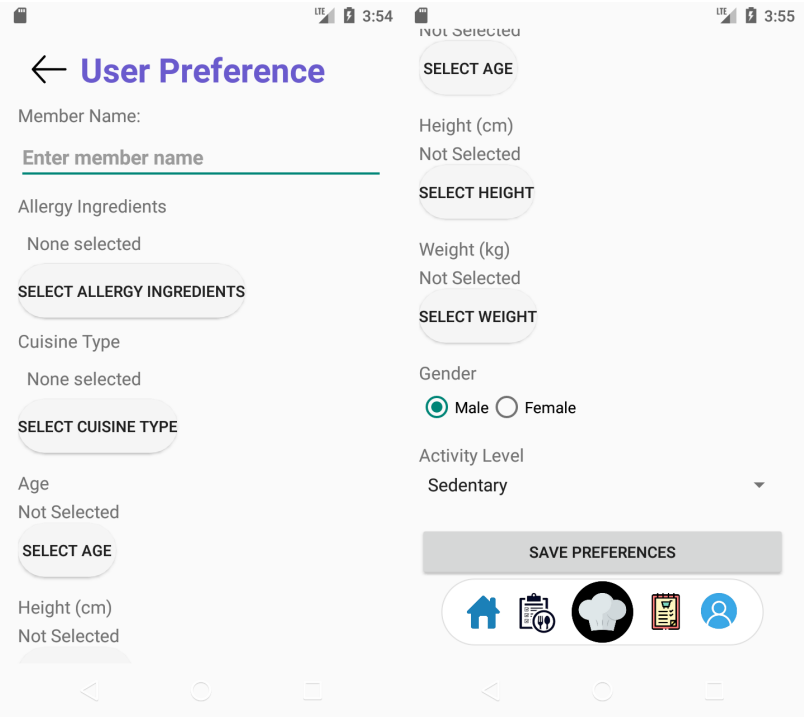

Figure 4.2.18 user interface of adding family member page

Figure 4.2.19 shows the user interface of the Family meal plan page. Users are allowed to view the recipe that is inserted in the day. At the top, users can choose the week through clicking the "week of 15/9/2025" and the system will display the in-spinner form. Also, users can choose the day of week. Users can view today's calories status. The status will show as the formula (Today Food calories – Total Calories today = Calories needed). Users can choose the member involved in the meal plan through clicking the three-dot logo and the system will list the member in checkbox form at the message box. The recipe will be separated into three categories which are breakfast, lunch and dinner. At the top of the category, users can check the calories, protein, fat and carbohydrate of the category. Users can add recipes into the meal plan through clicking the "Add Something to eat" button and the system will navigate users to the add recipe page. At the bottom, there are two buttons which are the "Check Grocery List" button and the "Nutrition Analysis" button.

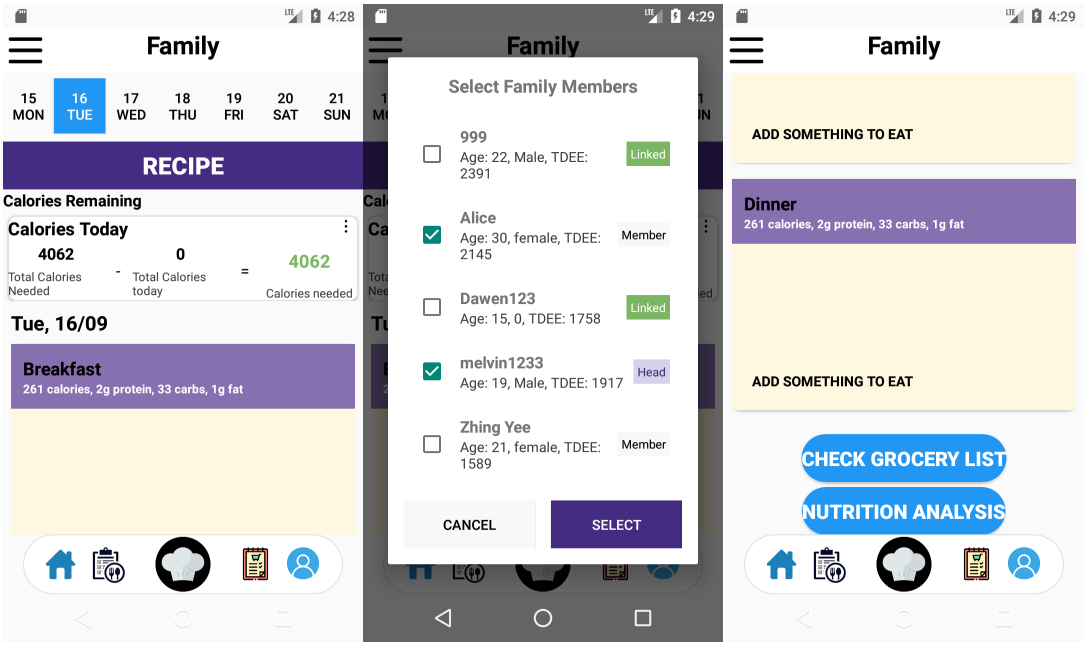

Figure 4.2.19 user interface of family meal plan page

Figure 4.2.20 shows the user interface of the add recipe page. On this page, the user will view the recipe. Users can choose which category to view like all recipes, my recipe, low fat and favourite recipe.

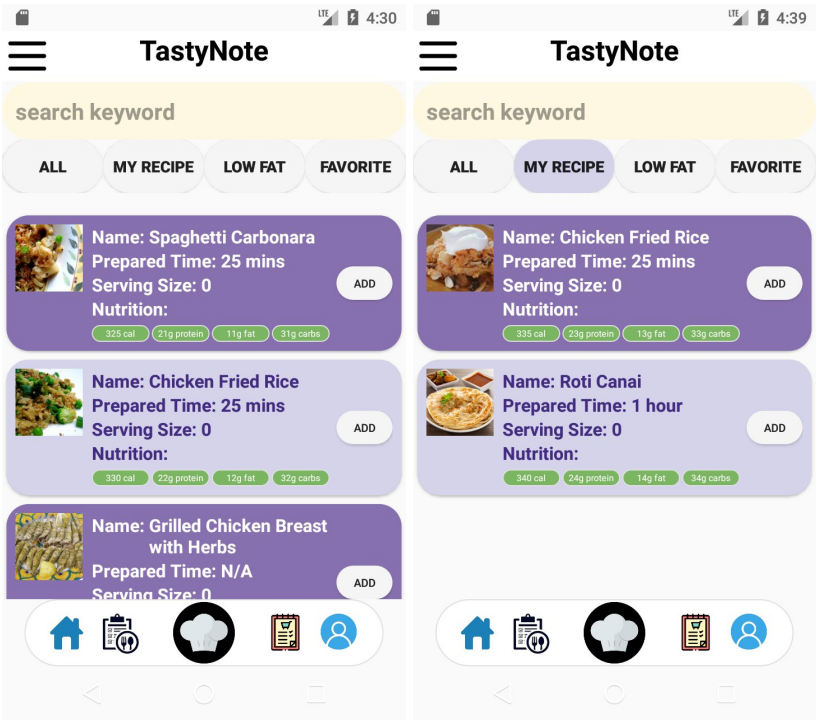

Figure 4.2.20 user interface of add recipe page.

Figure 4.2.21 shows the user interface of the process adding the recipe page. After the user clicks the “add” button for a recipe, the system will pop out the select family member and meal category message box. In this message box, users can choose which member will have this

recipe and this recipe will be under which category like Breakfast, lunch, and dinner. Then, the system will pop out another message box called adjust ingredients. Users can adjust the number of servings size and the specific ingredients amount. At the end, the system will show the nutrition of the recipe.

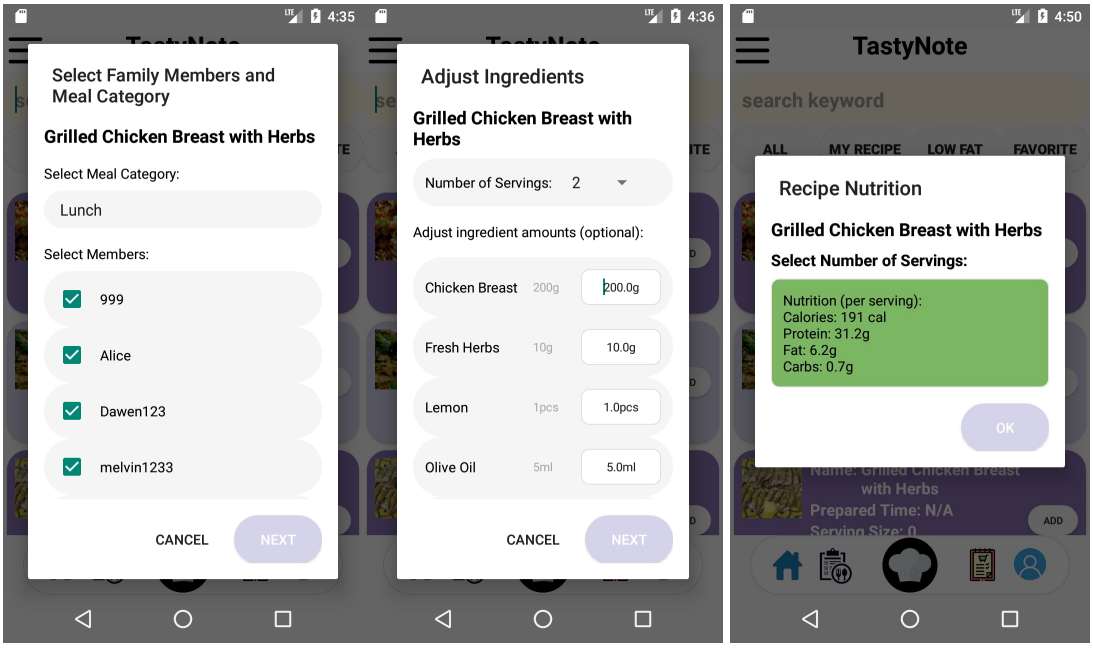

Figure 4.2.21 user interface of process adding recipe page

Figure 4.2.22 shows the user interface of favourite recipe page. In this page, user can check the recipe that add into favourite recipe.

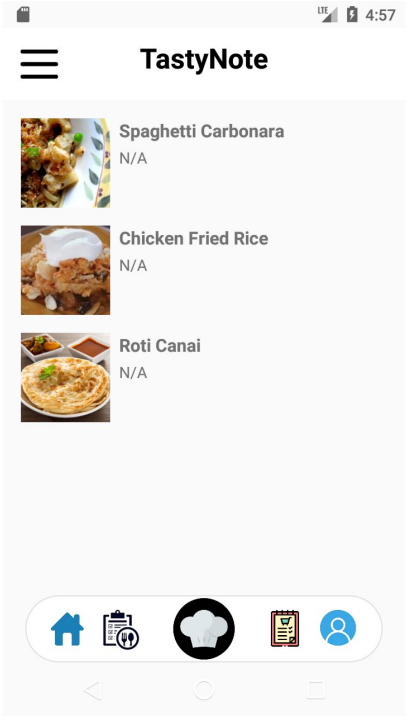

Figure 4.2.22 user interface of favourite recipe page

Figure 4.2.23 shows the user interface of user own recipe page. After user upload their own recipe to the recipe mobile application, they can review their own recipe in this page.

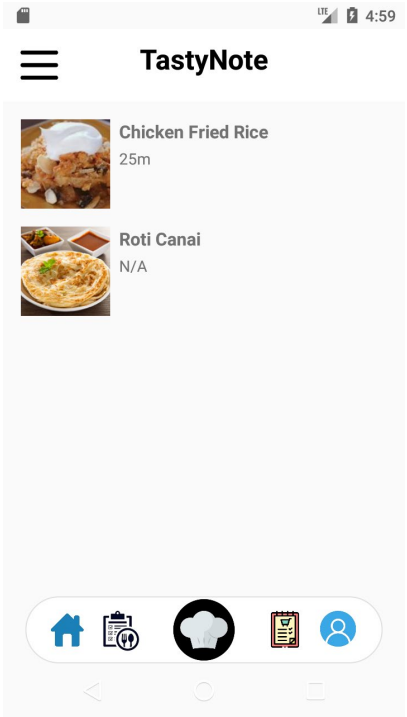

Figure 4.2.23 user interface of user own recipe page

Figure 4.2.24 shows the user interface of the add recipe page. In this page, users need to upload their recipe picture, title, descriptions of the recipe, time for cooking the recipe, the cuisine type of the recipe, dietary of the recipe, the visibility of the recipe, ingredients of the recipe and the instructions of the recipe. For the ingredients of the recipe, users can click the "Add ingredient" button to add the new columns for the ingredients. At the same time, the text view of the recipe has auto complete functionality so the user can select the ingredients name in the spinner. The Instructions part also has the add columns function through clicking the "Add Instruction" buttons. If a user wants to remove an ingredient or ingredient that they do not need anymore, they can click the "garbage can" logo to remove it.

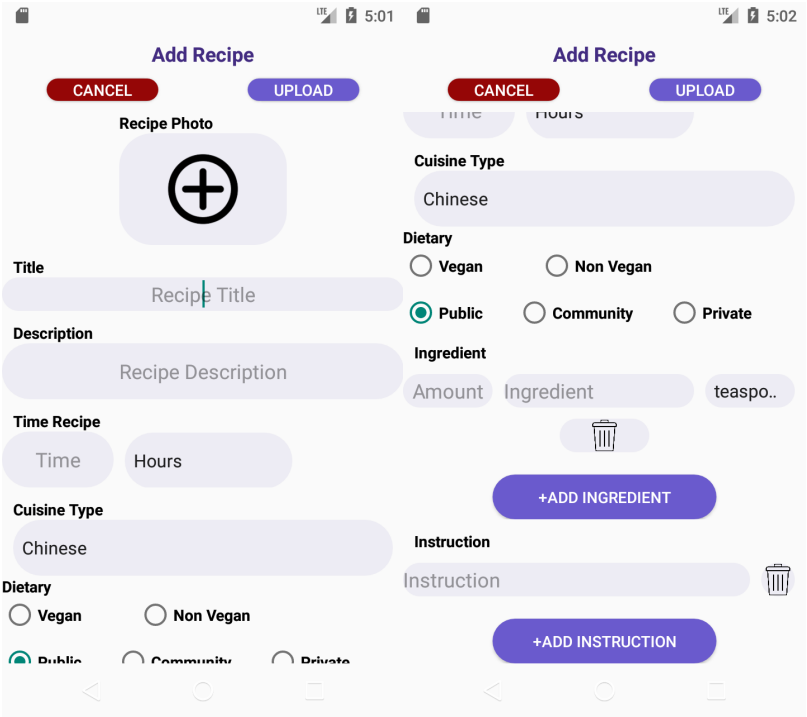

Figure 4.2.24 user interface of add recipe page

Figure 4.2.25 shows the user interface of the exercise page. Users are allowed to view the exercise that was added for the day. Users can change the day to view different days of the exercise through clicking the day of week show at the top. In the exercise card view, we can see the calories burned in every hour, the duration of the exercise, and the exercise conducted with which member. Users can click the "Add exercise" button to add new exercise in the day.

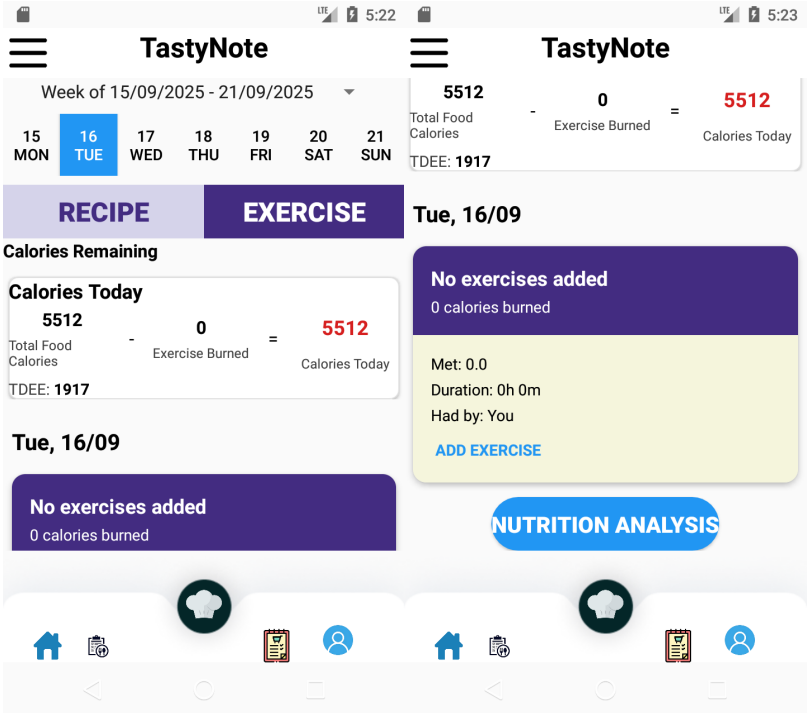

Figure 4.2.25 user interface of exercise page

Figure 4.2.26 shows the user interface of the process adding exercise. Firstly, users need to choose the exercise type, and it will display in spinner form so users can easily choose the exercise. Then, the user needs to choose the start time and ending time and the system will automatically calculate the duration. At the end, the user needs to choose which member will join the exercise through checking the member checkbox.

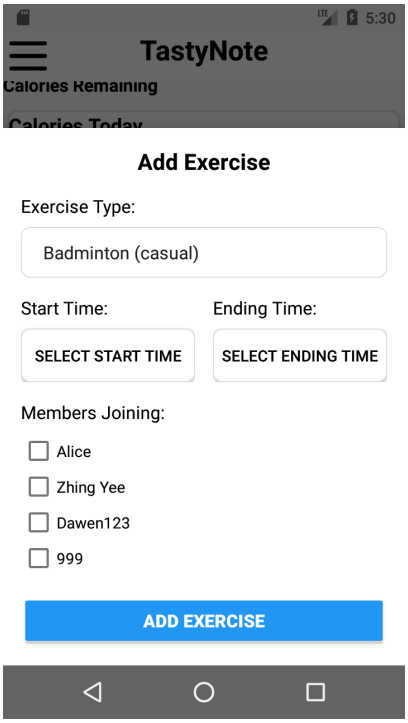

Figure 4.2.26 user interface of the process adding exercise

Figure 4.2.27 shows the user interface of the detected recipes through photos and displays the calories of the ingredients. Firstly, the camera will auto activate and allow the user to click the "take photo" button. Then, it will take the photo for the recipe, but it will not store the photo on the phone. If a user wants to use the photo that was saved on their phone, they can click the "Gallery" button. The system will navigate the user to the photo page and allow the user to select which photo needs to identify recipes. After the user takes the recipe photo or selects the photo from the gallery, the system will auto detect the recipe name and retrieve the nutrition data of the recipe from the database. The system will pop out a message box about the recipe nutrition data like recipe name, calories, carbohydrates, fat, and fiber. If the user wants to scan another recipe just click the "ok" button and the system will allow the camera to take a photo again. Figure 4.2.28 shows the nutrition message box about the tacos and the nutrition of tacos.

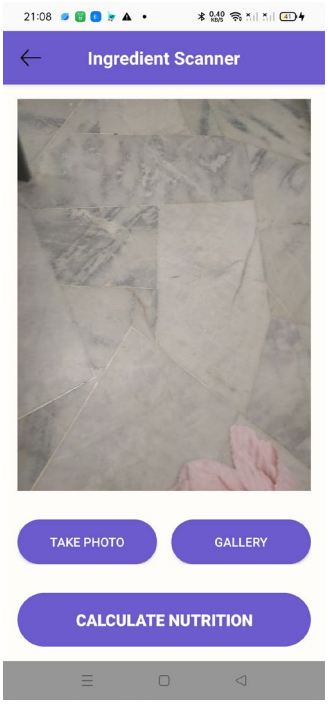

Figure 4.2.27 shows the interface of detect recipe through photo function

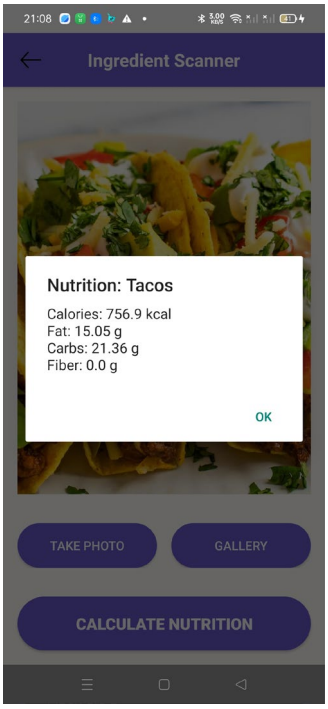

Figure 4.2.28 shows the message box about the calories of the recipes

Figure 4.2.29 shows the user interface of the grocery list. In the grocery list, we can view the details of ingredients that we need to purchase like the image of the ingredient, the amount of the ingredient and the name of the ingredient. If the user checked the check box of the ingredient, the ingredient will be moved from the grocery list to the pantry list, also known as the purchased ingredient. The "+" image view allows the user to add the ingredient manually.

After the user clicks it, the system will pop out a message box called “Add grocery item”. The second method of adding grocery items is using the “check grocery list” button in the meal plan page. In this method, the system will check if the item is allowed to be purchased in a fixed amount or not. If yes, the system will normalize the ingredients into a fixed amount like sugar and salt will be purchased in 1kg or 1000g. If not, the system will store the amount that is needed by the recipe. Figure 4.2.30 shows the process of adding ingredients to the grocery list manually. Users are required to key in the ingredient name and the amount of the ingredient. After the key in the name and amount of ingredient, users need to click the “confirm” button to store the ingredient in the grocery list.

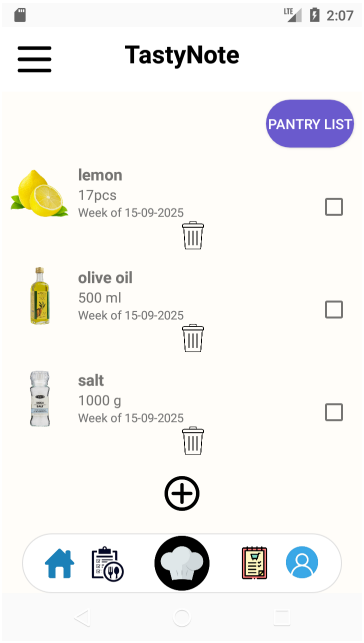

Figure 4.2.29 shows the user interface of grocery list

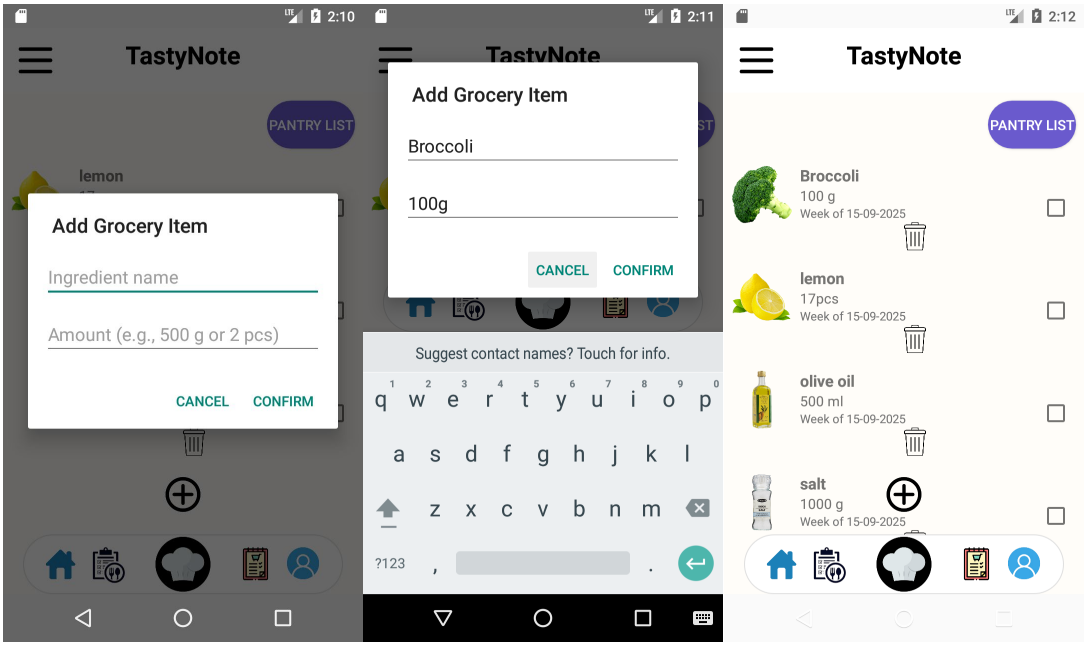

figure 4.2.30 shows the process of adding ingredients to grocery list manually

Figure 4.2.31 shows the user interface of the pantry list. In this page, the system will show all the ingredients that are available through checking the ingredients in the grocery list. The ingredients amount will be deducted once the user confirms the recipe has cooked. When the ingredient amount becomes zero, the system will automatically remove the ingredients from this list. Below there is a “recommend recipe” button. The system will pop out a message box called “smart recipe recommendation” once the user clicks the “recommended recipe” button. In the message box, users can choose the ingredient that they want to use for finding recipes that they can cook. By default, the system will select all the ingredients, and the user can click the “deselect all” button to unselect all the ingredients. After the user has selected the ingredient, the system will search and display the recipe that can be cooked for the user. Users can get the tips to select the recipe through the nutrition focus.

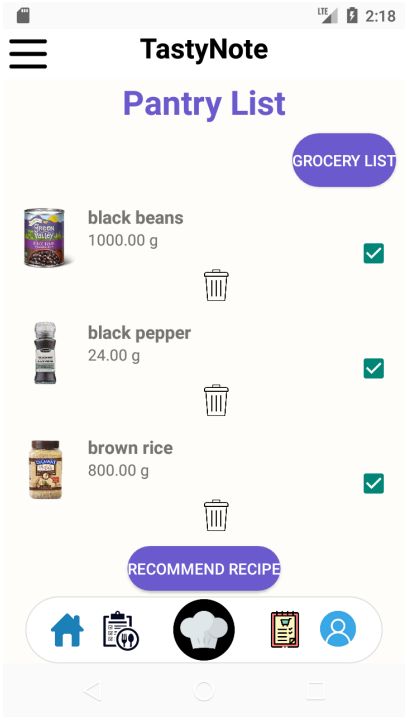

Figure 4.2.31 shows the user interface of pantry list

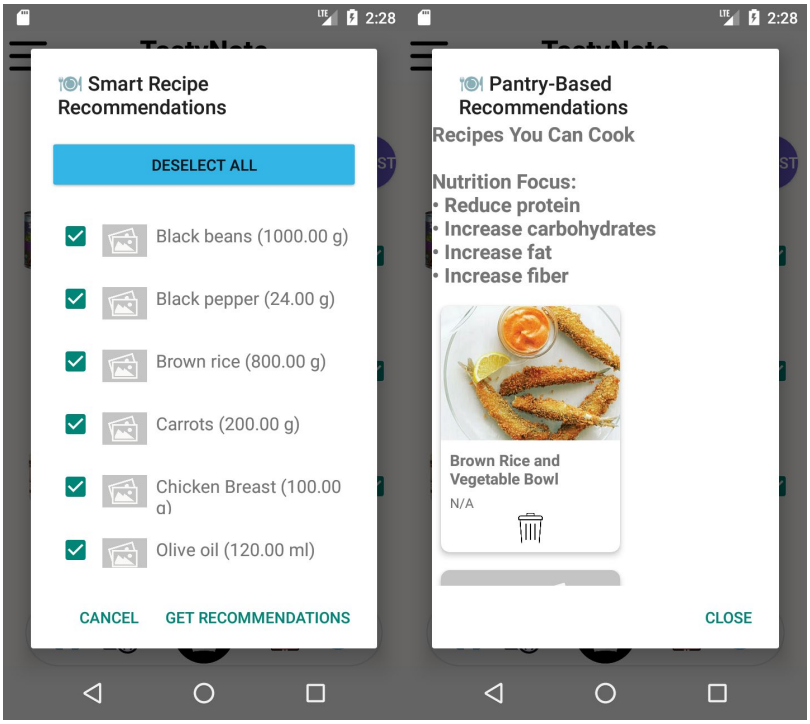

figure 4.2.32 shows the process of recommend recipe based on ingredients

4.3 Data Storage Design

The database table format that is used in recipe mobile applications is MySQL. The reason for choosing MySQL as database table format is that MySQL provides a structured way to store the data and allows the admin to manage the relationship between the tables. Also, developers can use simple queries for retrieving and uploading data to the database so it can become easier to develop the mobile application.

The figure 4.3.1 shows the database structure of recipe mobile applications. First, the tables used to store user information have split into two tables which are users tables and user_preferences tables. The user tables used to store the basic information of the user like username, password, and email address. The user preferences will store the user recipe preferences, user's biometric data like age, height and other data. Also, there is a table for storing the data same with the user preferences but specifically used for members which is called user_members tables. Furthermore, there are four tables used to store recipe data which are recipes tables, recipe ingredients tables, recipe instruction tables and recipe nutrition tables. This allows the system to easily manage the recipe data because the data has split clearly in different tables. Moreover, there are two types of meal plan for storing individual meal plan and family meal plan. Individual meal plans will include meal plan tables, meal plan ingredients tables, meal plan nutrition tables, and meal plan recipe tables. This allows the meal plan to have all the updated information like ingredients and nutrition based on the customization of the user. The family meal plan will include the family meal plan table, family meal plan access log table, family meal plan ingredient tables, family meal plan recipes and family meal plan members that used to record which member will have the recipes. Besides that, the system also has two types of grocery lists to store the ingredient needed to purchase, which are grocery list tables used to record the ingredient needed to purchase and user pantry tables to store the purchased ingredient. At the end, the system will use the exercise table to store the exercise information like average calorie burn in an hour. The user exercise table will store the member who had conducted what type of exercise, duration of conduct exercise and the calories burned by conducting this exercise.

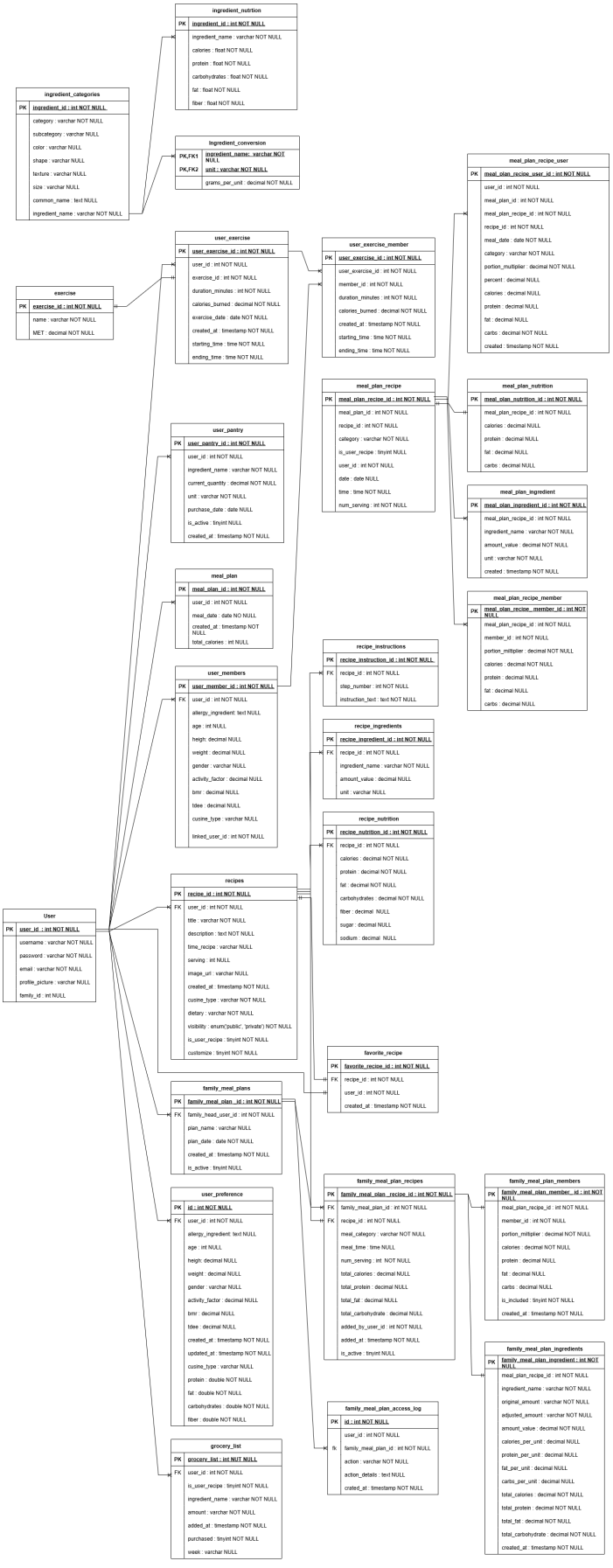

Figure 4.3.1 Database Structure of recipe mobile applications

4.4 Hardware and Software Requirements

4.4.1 Hardware Requirements

Description	Specifications
Model	Asus ROG STRIX G15
Processor	10th Gen Intel(R) Core (TM) i5-10800H
Operating System	Microsoft Windows 10 Home Single Language
Graphic	Nvidia GeForce GTX 1650ti
Memory	16GB LPDDR5
Storage	512Gb PCIe Gen 4 NVMe SSD

Table4.4.1: Hardware Requirements

4.4.2 Software Requirements

Integrated Development Environment (IDE)	Android Studio
Front-end language	Java
Back-end language	PHP
Database Management System (DBMS)	phpMyAdmin

Table4.4.2: Software Requirements

Chapter 5

System Testing

5.1 System Testing

No	Test Case	Expected Output	Actual Output	Remark
1	Able to get the balanced nutrition needed by user through completed the user setting	User will have Total Daily Energy Expenditure and BMI.	User can view their calories needed of the day in meal plan page	PASS
2	Able to add recipe to meal plan and calculate nutrition will get by user and member	User able to view the recipe in the meal plan and the nutrition of the day will be displayed	The recipe will display in the meal plan and the nutrition display in each category. Also, the day of calories had been updated	PASS
3	Able to give advice to user based on the status of meal plan	User will be getting advice for planning meal plan	User will see the message box about the tips of planning suitable meal plan	PASS
4	Able to customize ingredients through editing the amount of ingredient.	Nutrition of recipe will be updated after user edit the ingredient data	User can view the recipe nutrition in recipe nutrition page	PASS
5	Able to store ingredient into the grocery list	System will store the ingredient that wants to be purchased by user into a list	User able to select ingredient to add into the grocery list in meal plan, view	PASS

			grocery list in grocery list page	
6	Able to recommend recipe based on ingredient available	System will be based on the ingredient available to recommend recipe to user	User able to select the ingredient and system based on the selected ingredient to recommend recipe that enough ingredient to cook	PASS

Table 5.1 test results of recipe mobile application

The table 5.1 show the test results of recipe mobile application. This test plan will focus on the objectives of development and it allow developer to confirm their project had achieved with the objective.

The first test plan is testing the **calculated balanced calories needed by the user every day**. This test plan allows the system to get the correct total daily energy expenditure (TDEE) and give the advice to the user based on the TDEE in the meal plan. To test the calculations of TDEE, users need to fill up all the information required by the user preferences. The Figure 5.1.1 shows the information that needs to be filled up by the user like the allergy ingredient, cuisine type and so on. The most important data that is used to calculate the TDEE is age, height, weight, gender and activity level. After the user submits the data to the server, the server will calculate the TDEE and BMI to store in the database. The figure 5.1.2 shows the record that just now updated for the user who had user id is 2. In the figure 5.1.3, users are allowed to view the TDEE amount in the card view of calories today. Users can view the calories needed by themselves every day.

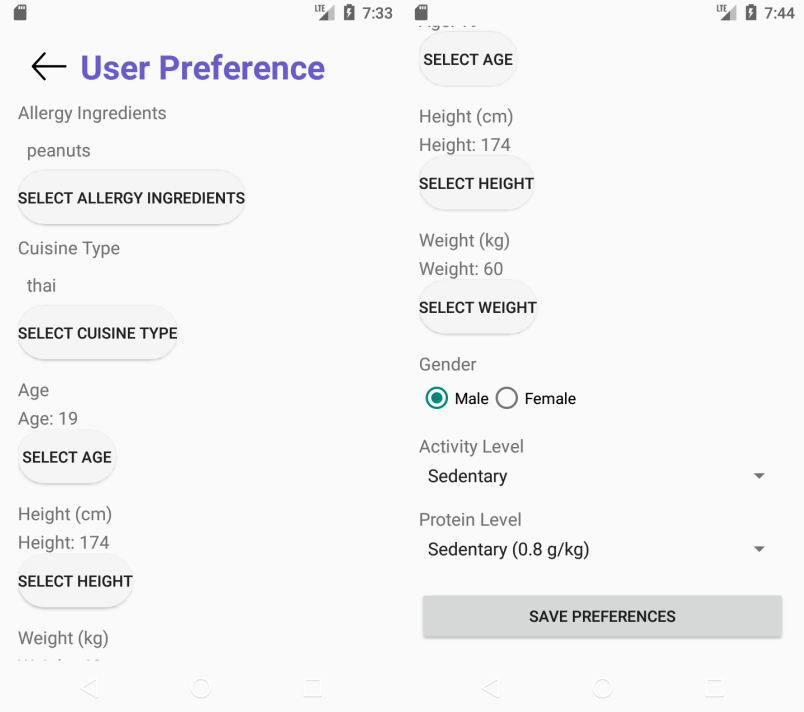

Figure 5.1.1 screenshot of user preferences page

id	user_id	allergy_ingredients	age	height in cm	weight in kg	gender	activity_factor	Basal Metabolic Rate	Total Daily Energy Expenditure	created_at	updated_at	cuisine_type	protein	fat	carbohydrates	fiber
1	2	peanuts	19	174.00	60.00	Male	1.20	1597.50	1917.00	2025-04-13 14:45:49	2025-09-12 11:15:44	thai	48.00	63.90	287.48	26.84

Figure 5.1.2 screenshot of user preferences record in database

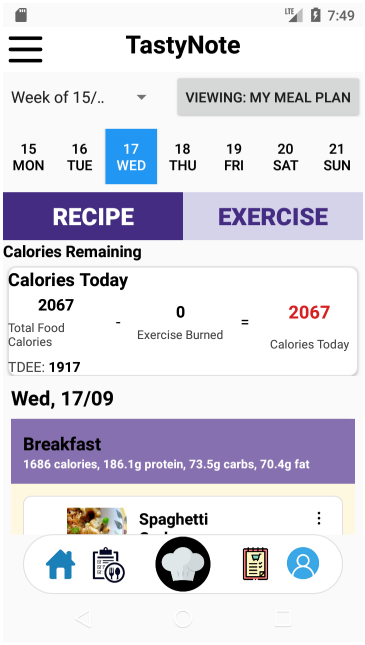

Figure 5.1.3 screenshot of meal plan page

The second test plan is **testing the system able to add recipes to the meal plan and calculate the latest calories for the user**. This function will be conducted in the meal plan page, allowing users to view the "Add Something to Eat" button. Figure 5.1.4 shows the empty meal plan page

and the calories of today are zero because the user has not yet added any recipe to the meal plan. At the same time, we also can see that every category also shows zero for each nutrition like protein, fat, fibre and carbohydrate. After the user clicks the “Add Something to Eat”, the system will navigate the user to the add recipe page. Figure 5.1.5 shows the recipe that users can add into the meal plan. At the top, there are some buttons that allow users to filter the recipe like all recipes, favourite recipes, own recipe and lot fat recipe. For example, the user chooses the favourite recipe, and the system will show all the recipes that user added into the favourite recipe list. Figure 5.1.6 shows the recipes of users added into the favourite recipe list. Besides that, users are allowed to search the recipe through typing the name of the recipe in the search keyword. Figure 5.1.7 shows the user searching “Grilled Chicken Breast with Herbs” through the search keyword and the system displays the Grilled Chicken Breast with Herbs recipe to the user. After the user finds the recipe that they want to add, users can click the “add” button of the recipe for adding the recipe to the meal plan. The system will pop out the message box to allow users to choose which category of recipes will be inserted like breakfast, lunch and dinner. Also, users can choose which member will have this recipe too through checking the member check box. Figure 5.1.8 shows the select members and meal category message box. For example, the user chooses this recipe in the morning, and Alice will have this recipe with the user. After that, the system will pop out another message box called “Adjust Ingredients”. In this message box, users can adjust the ingredients amount and the system will be based on this ingredient amount to recalculate the nutrition again. After getting the latest nutrition, another message box will pop out which is called “adjust recipe serving”. In this stage, the system will allow the user to select the number of servings, and it will display the original servings size to the user by default. After the user clicks the “save to meal plan” button, the system will save the recipe to the meal plan and toast a message about the user successfully adding a recipe with the recipe details. Users can view the meal plan, the system will update the total food calories, and the categories nutrition also will be updated. Figure 5.1.11 shows the system had successfully added the recipe into the meal plan. Figure 5.1.12 shows the database of storing the recipe and the nutrition of user and member.

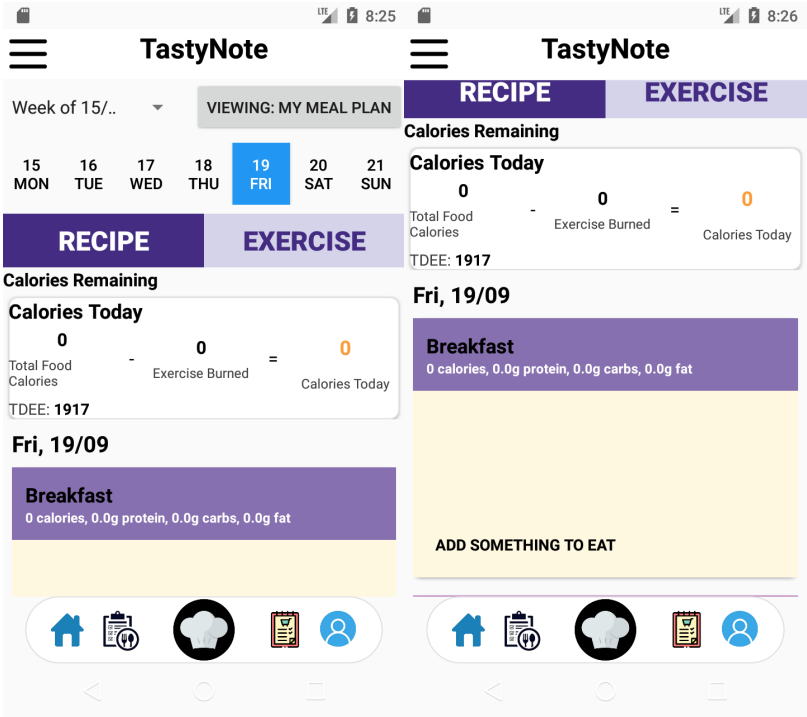

Figure 5.1.4 screenshot of empty meal plan

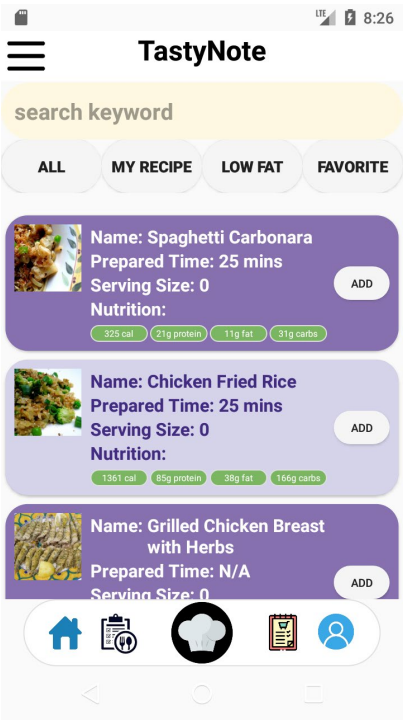

Figure 5.1.5 screenshot of recipe page

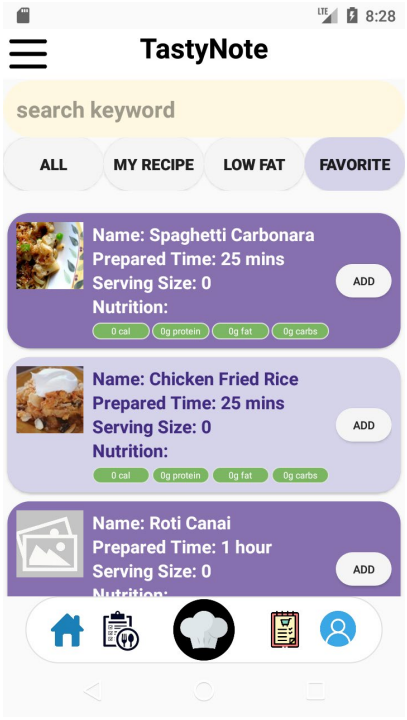

Figure 5.1.6 screenshot of favourite recipe in add recipe page

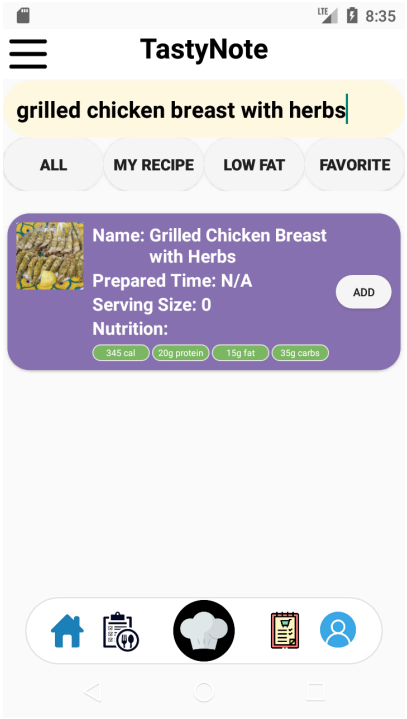

Figure 5.1.7 screenshot of search recipe through recipe name

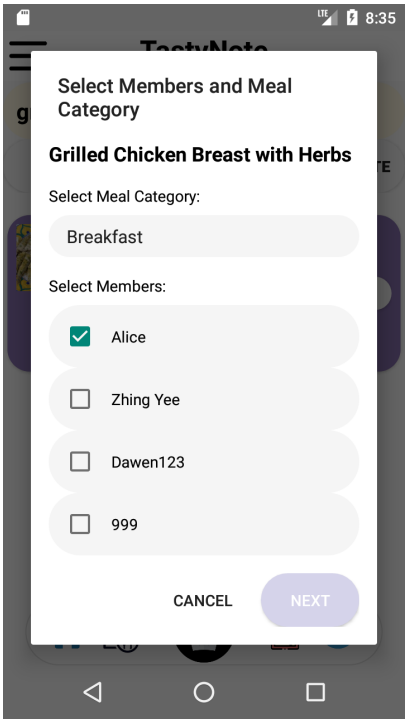

Figure 5.1.8 screenshot of select member and meal category message box

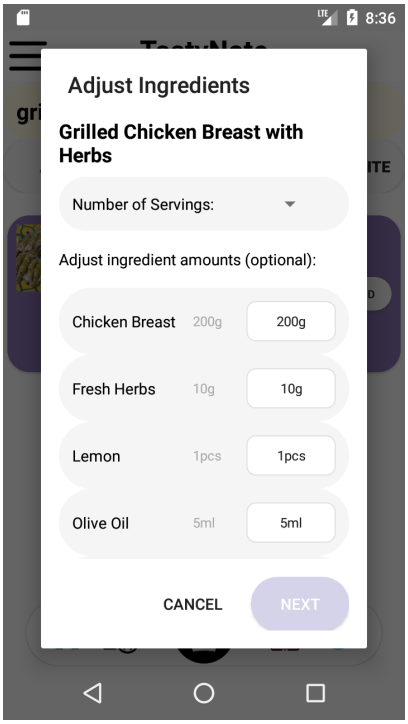

Figure 5.1.9 screenshot of adjust ingredients message box

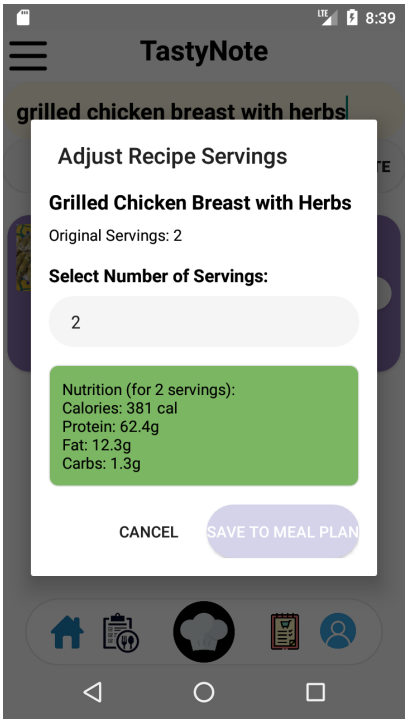

Figure 5.1.10 screenshot of adjust recipe servings message box

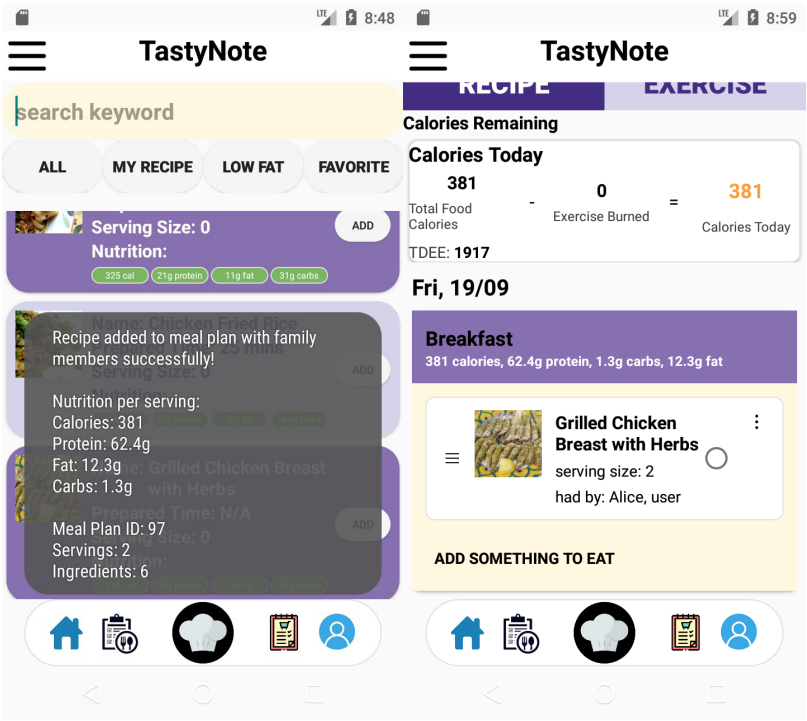

Figure 5.1.11 screenshot of successful add recipe into meal plan

id	user_id	meal_date	created_at	total_calories
97	2	2025-09-19	2025-09-19 00:59:28	381

id	meal_plan_recipe_id	ingredient_name	amount_value	unit	created_at
447	190	Chicken Breast	200.00	g	2025-09-19 16:48:06
448	190	Fresh Herbs	10.00	g	2025-09-19 16:48:06
449	190	Lemon	1.00	pcs	2025-09-19 16:48:06
450	190	Olive Oil	5.00	ml	2025-09-19 16:48:06
451	190	Salt	2.00	g	2025-09-19 16:48:06
452	190	Black Pepper	1.00	g	2025-09-19 16:48:06

id	meal_plan_recipe_id	calories	protein	fat	carbs
112	190	381.00	62.40	12.30	1.30

id	meal_plan_id	recipe_id	category	is_user_recipe	user_id	date	time	num_serving	cooked
190	97	44	Breakfast	1	2	2025-09-19	08:00:00	2	0

id	meal_plan_recipe_id	member_id	portion_multiplier	calories	protein	fat	carbs
127	190	1	1.00	190.50	31.20	6.15	0.65

id	user_id	meal_plan_id	meal_plan_recipe_id	recipe_id	meal_date	category	portion_multiplier	percent	calories	protein	fat	carbs	created_at
149	2	97	190	44	2025-09-19	Breakfast	1.00	50.00	190.50	31.20	6.15	0.65	2025-09-19 16:48:06

Figure 5.1.12 screenshot of database for added recipe

The third test plan is **testing the tips that give the user a better meal plan**. After the system has the TDEE of the user, the system allows the user to give the tips to the user. This is because the system will calculate the calories over the TDEE through using formula (TDEE -Total Meal Plan Calories = Calories needed). Also, a system was set to calculate the balanced calories needed in every category like breakfast, lunch and dinner. Breakfast will occupy 25% of TDEE, lunch will occupy 40% of TDEE, and dinner will occupy 35% of TDEE. Figure 5.1.13 shows the tips that are displayed by the system for breakfast, lunch and dinner, users can consider reducing the portion size or choose a lower calories recipe. At the same time, users also can conduct some exercise to burn calories.

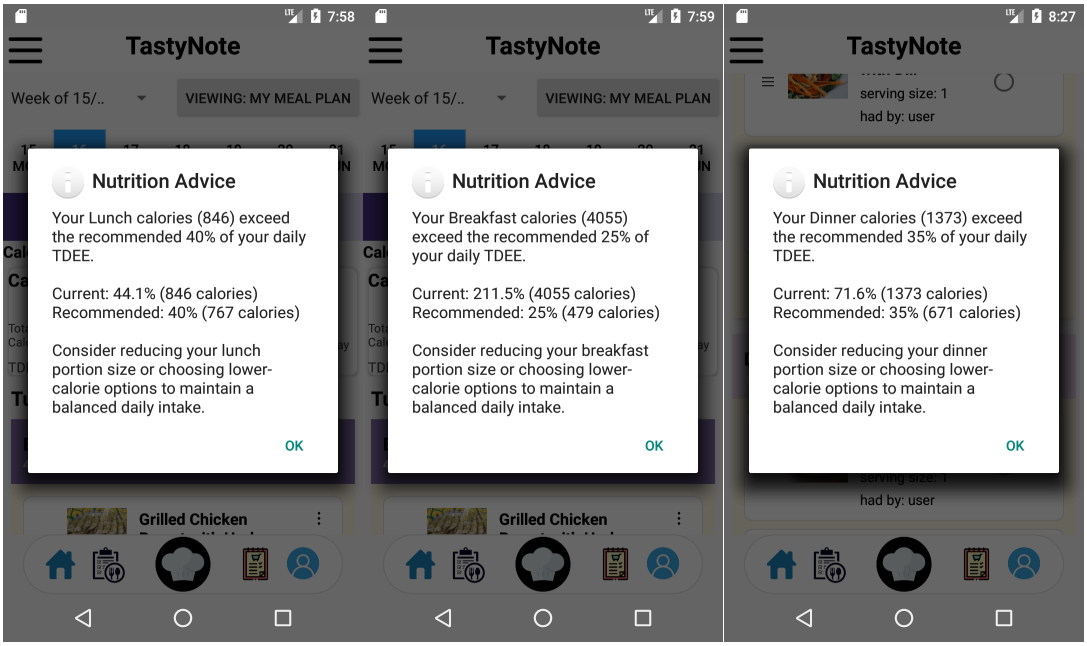

Figure 5.1.13 screenshot of tips displayed by system

The fourth test plan is **testing the customization ingredients amount and ingredients**. This function allows the user to edit the ingredients data like updating the ingredients amount and substitute the ingredients with another type of ingredient. After updating the ingredients, the system will calculate the latest nutrition for the recipe. Figure 5.1.14 shows the original ingredient amount and the nutrition of chicken fried rice. Users can click the "Update ingredient amount" button and the system will pop out the message box to the user. Figure 5.1.15 shows the message box of edit ingredient. user can view the current amount of ingredients. Users can edit the ingredient amount through typing the new ingredient amount. For example, we update the amount of cooked rice from 340g to 500g. After successfully updating the amount, the system will toast a message about ingredients successfully updated. Figure 5.1.16 shows the success of updating the ingredients amount and nutrition of the recipe. At the same time, users are also allowed to update the ingredients needed by the recipe through clicking the "add ingredient" button and the system will pop out a message box called "Add Ingredient". In this message box, the user needs to key in the ingredient they want to add, and the system will provide the autocomplete function. For example, I key in "Broc", and the system will list broccoli in the spinner. Figure 5.1.17 shows the process of adding new ingredients into the recipe which is adding 800g broccoli into the recipe. Figure 5.1.18 shows the recipe successfully adding the broccoli into the recipe and the nutrition also updated.

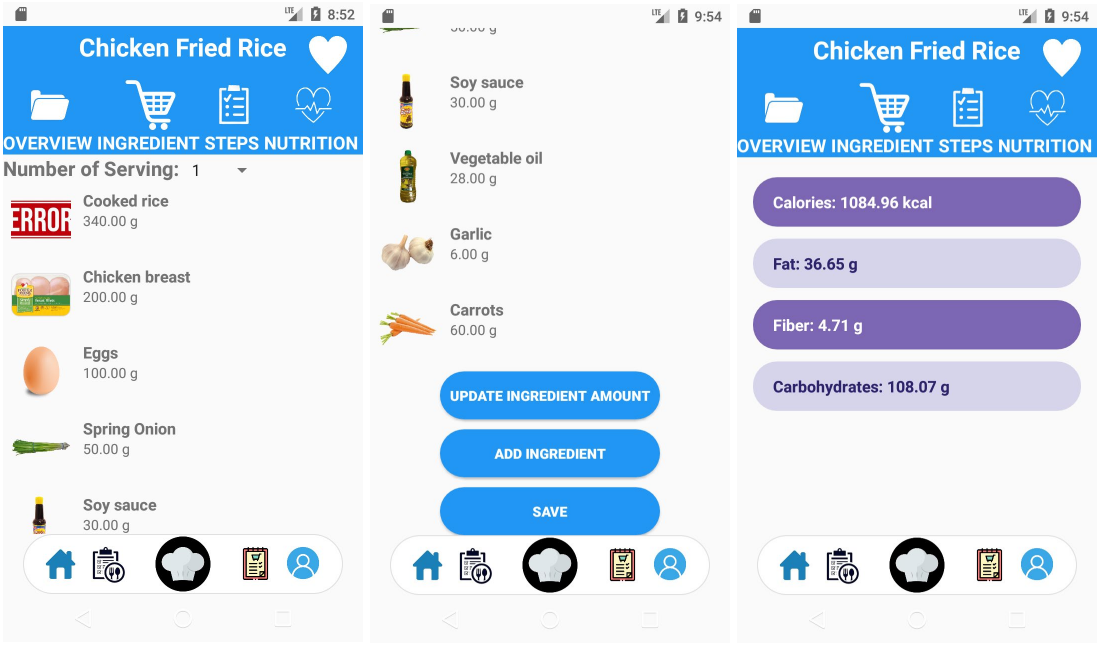

Figure 5.1.14 screenshot of original ingredients and nutrition

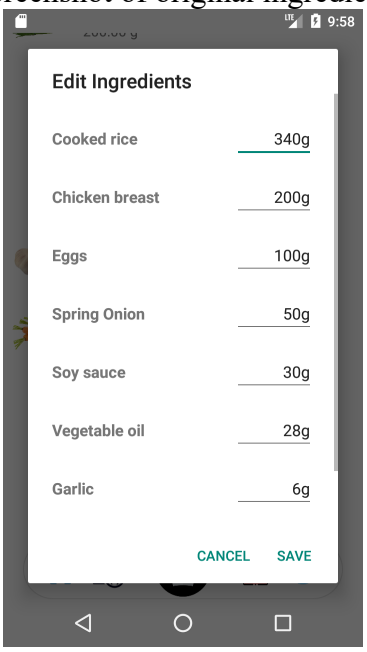

Figure 5.1.15 screenshot of updated ingredients amounts message box.

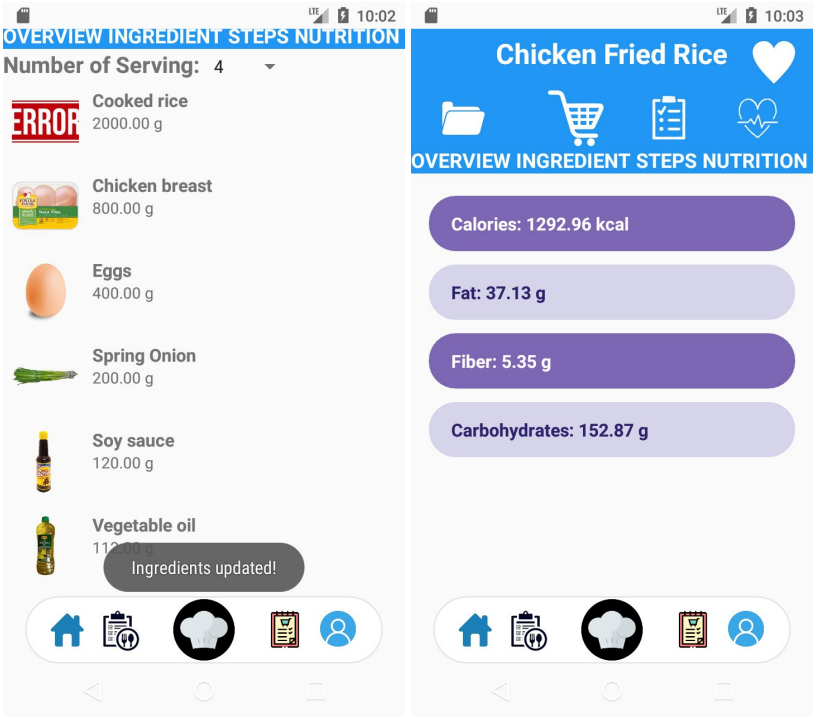

Figure 5.1.16 screenshot of successful updated ingredient amount and nutrition of recipe

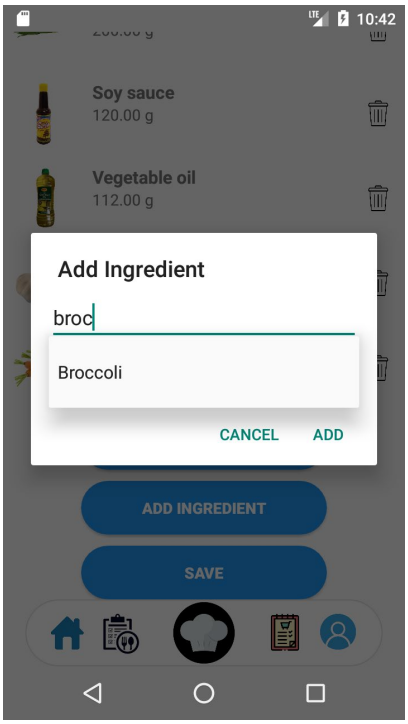

Figure 5.1.17 screenshot of add new ingredient into recipe message box

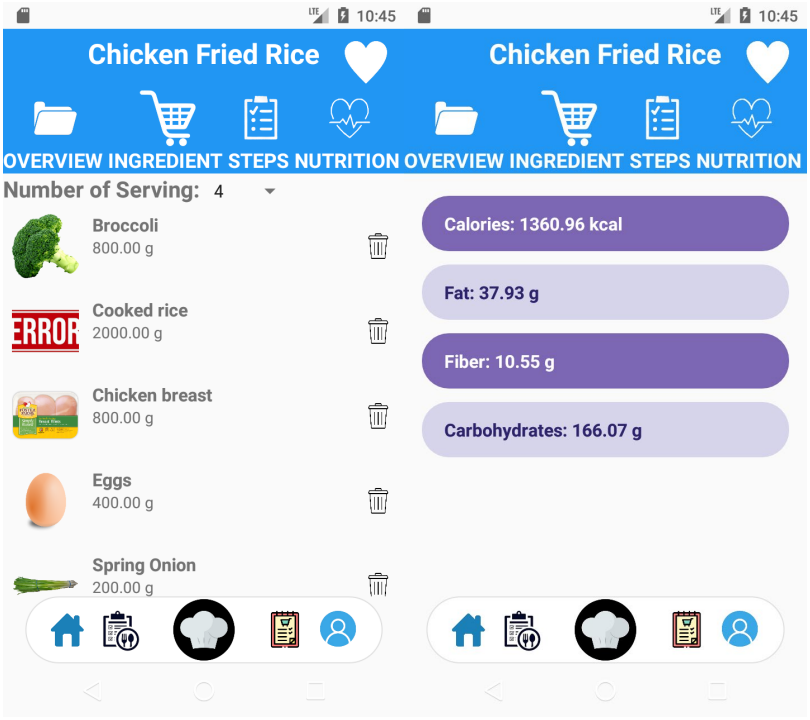

Figure 5.1.18 screenshot of successful add new ingredient into the recipe and nutrtion updated

The fifth test plan is **testing the add ingredients to grocery list**. Firstly, users need to add recipes into the meal plan. After adding the ingredients to the meal plan, users can click the "check grocery list" button for checking what ingredients need to be purchased this week. The system will show all the ingredients needed to purchase. Users are allowed to add the ingredient to the grocery list through the ingredient's checkbox. If the user wants to check all the ingredients, they can click the "select all" button and the system will automatically check all the ingredients. After that, users can click the "add to grocery list" button. For example, I added carrots, soy sauce, brown rice and black beans to the grocery list. Once the user has finished the step, the user can view the ingredients in the grocery list. Figure 5.1.19 show the process of adding ingredient to the grocery list. In the grocery list, the user will see the "dustbin" logo and this logo allows the user to remove the ingredients from the grocery list. The check box allows users to confirm purchase the ingredients and move the ingredients to the pantry list. Also, some of the ingredient has normalization become an amount already fixed. For example, soy sauce amount from 30ml become 500ml. Figure 5.1.20 shows the database record about the ingredients added by user.

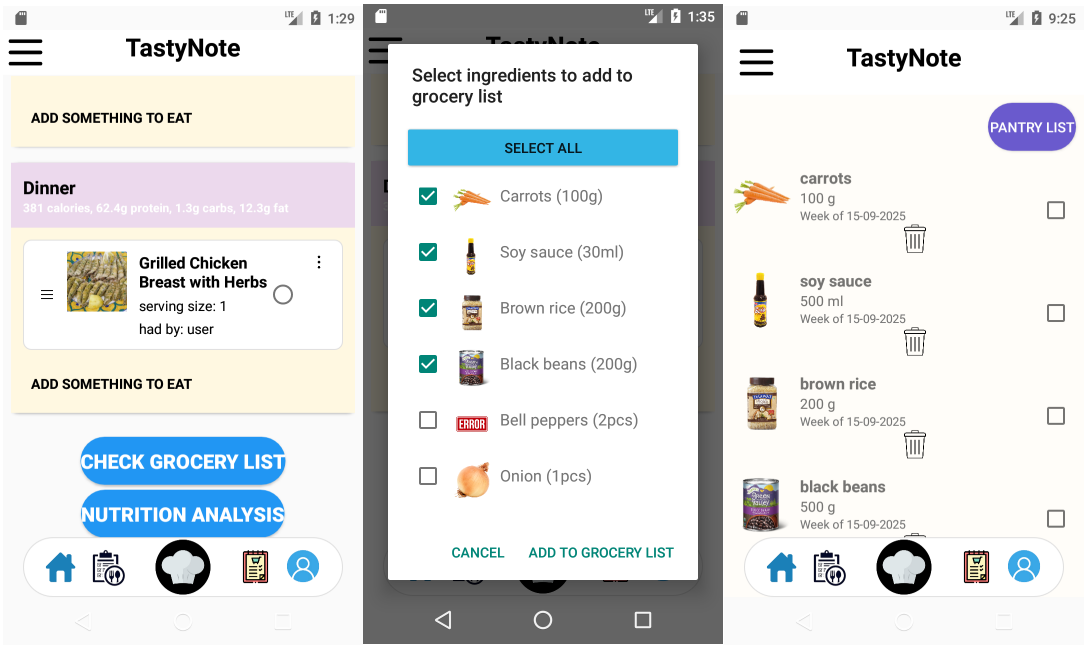

figure 5.1.19 screenshot of the process of adding ingredients to grocery list

2	1	carrots	100 g	2025-09-19 17:25:40	0	Week of 15-09-2025
2	1	soy sauce	500 ml	2025-09-19 17:25:40	0	Week of 15-09-2025
2	1	brown rice	200 g	2025-09-19 17:25:40	0	Week of 15-09-2025
2	1	black beans	500 g	2025-09-19 17:25:40	0	Week of 15-09-2025

Figure 5.1.20 screenshot of database about grocery list updated

The sixth test plan is **testing the recommended recipe based on available ingredients**. Firstly, the user needs to add ingredients to the pantry list from the grocery list. After the user added ingredients into the pantry list, the user was able to view the available ingredients in the list. Figure 5.1.12 shows the pantry list with the ingredients. Users can click the “Recommend Recipe” button to search the recipe. Figure 5.1.21 shows the system will pop out a message box called “Smart Recipe Recommendation”, users are required to choose the ingredients that they want to cook. After the user chooses the ingredients, the system will retrieve the balanced nutrition needed by the user and the total nutrition of the day. The system will compare each nutrition to determine which recipe matches the nutrition of the user needed and the ingredients. Figure 5.1.22 shows the message box that displays the parameter of nutrition and the recipe that fulfils the nutrition parameters and ingredients requested by the user. In the message box, users can choose the recipe that they recommend by system and view the details of the recipe. By default, the system will automatically check all the ingredients, allowing users to click the “deselect all” button to uncheck all ingredients. After the user selects the ingredients, they need to click the “Get Recommendation” button to get the recommended recipes. Figure 5.1.23 shows the recipe that had enough ingredients to cook. Also, we can view the nutrition advice

shown at the top like reduce protein, increase carbohydrate and other nutrition advice. Users can click the recipe that they want to view, and the system will navigate the user to the specific recipe details page. For example, I choose the “Brown Rice and Vegetable Bowl” recipe, and the system will show the details to me. Figure 5.1.23 shows the details of brown rice and vegetable bowls recipe details.

.

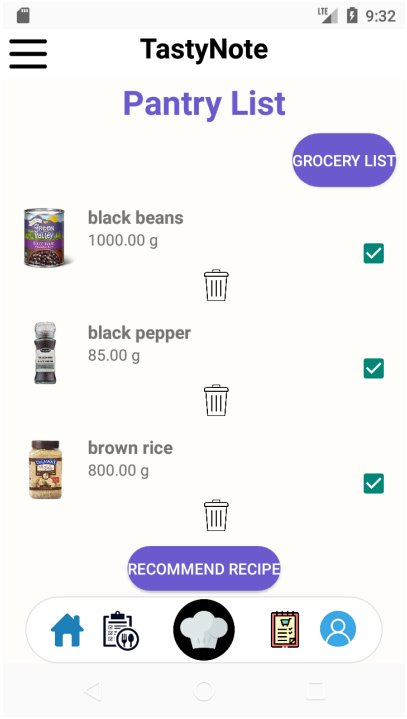

Figure 5.1.21 screenshot of pantry list

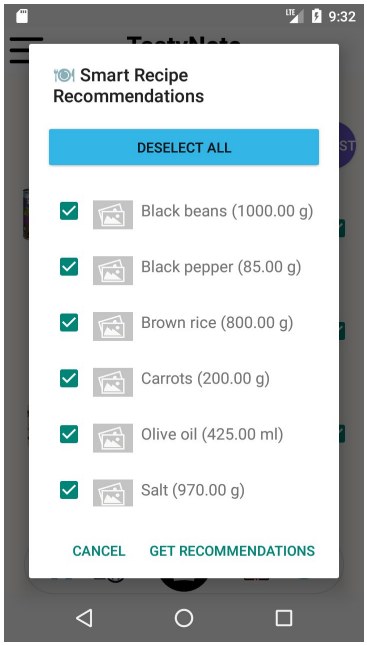

Figure 5.1.22 screenshot of pop out “smart recipe recommendation” message box

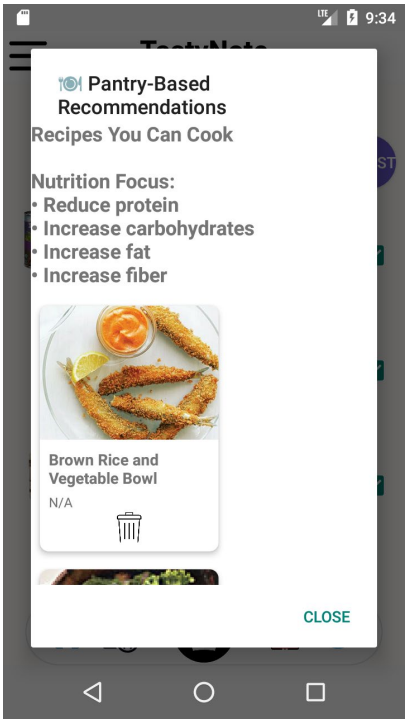

Figure 5.1.23 screenshot of recipe recommendation message box

Figure 5.1.24 screenshot of details recommended recipe page

Chapter 6

System Evaluation and Discussion

6.1 Objective Evaluation

In this development of purchase list and recipe mobile applications involved three objectives which are personal nutrition guidance, recommendation of recipe based on available ingredients, and customization of ingredients and update nutrition information for a recipe. These three objectives are achieved. The recipe mobile application can **give user advice based on the nutrition information of the meal plan**. The system will help users to calculate their balanced nutrition needed through the user preferences setting. After the system gets the balanced nutrition needed by the user, the system will compare the balanced nutrition and the total nutrition of the day in the meal plan to give the advice to the user. For example, the total nutrition of the day has over the balance of nutrition. The system will advise users to substitute the recipe with other recipes to reduce the nutrition or advise users to conduct some exercise to reduce the calories.

The second objective is **to recommend recipes based on available ingredients**. Users can add the available ingredients to the pantry list through checking the ingredients in the grocery list. Then, users can choose which ingredients they want to use in the recipe. At the same time, the system will generate advice for choosing recipes like reducing fat, increasing carbohydrates and other advice for other nutrients. After that, the system will search and display the recipes that match the ingredients that are chosen by the user. Users can choose the recipes to view the recommendation recipes details through clicking the recipe in the message box.

The last objective is **customization of ingredients and updating nutrition information for a recipe.** Users can edit the ingredients amount, add new ingredients into the recipe and substitute the ingredients with other ingredients in the recipe ingredients page. After the user updates the ingredients data, the system will be based on the latest ingredients to recalculate the recipe nutrition and display it in the recipe nutrition page.

6.2 System Limitation

In this purchase list and recipe mobile application still has some limitations on the functionality. The first limitation is to **take a picture of the recipe and give calories of the recipe function, unable to detect the recipe with high accuracy**. This function is hard to detect the corrected recipe and give the corrected nutritional information to the user. For example, users take pictures of pizza, and it will give the toast nutritional information to the user. This is because the current detect photo function did not include the cropped photo function. For example, an apple is put on a table and there are many things put behind the apple so the air will not crop the apple out of the photo. This will cause the accuracy of the ai detection to become lower.

Besides that, the second limitation is that the **system will not give a notification to the user when the time for exercise is reached.** When users add the exercise on the day, they allow to set the starting time and ending time. The system should give notification to the user once the time is reached for exercise. Otherwise, the user may forget the exercise and not conduct the exercise.

Moreover, the third limitation is that the **system does not allow users to export the meal plan or import the meal plan in pdf form or another format**. Users can share their meal plan with their family, friends, or other people without needing the app. The other user can directly read the meal plan in the pdf format or print it out as paper form so the healthy meal plan can be shared to more people and encourage other people to have a balanced diet. For the import function, other users can directly import the meal plan already set to their own meal plan so they can save time and effort to conduct the same meal plan.

At the end, the **pantry list does not allow the user to directly insert.** Users need to add the ingredients into the grocery list then check the ingredients in the grocery list and only can insert into the pantry list. The system should provide the scan photo of receipts to add items into the pantry list. This allows users to quickly add the ingredients available in a short time.

6.3 Future Enhancement / Improvement

In the future, this recipe mobile application can be enhanced by introducing more advanced features to conduct a more practical and user-friendly application. The first enhancement is **adding a high accuracy artificial intelligence detection for detecting the recipe.** This functionality allows users to quickly check the calories or other nutritional information about the recipe so that the user can quickly decide the recipe suitable to add into the meal plan or not. To add this function, the system should have the auto detect and crop the recipe out of the picture. Therefore, the system will have higher accuracy than without cropping the recipe out of the picture because the other object in the picture will affect the detection rate.

Furthermore, the second enhancement is **the system can add the notification function.** The meal plan function should allow the user to choose the time to have the recipe. Therefore, the system will calculate the time for preparation for the user so the user can have the recipe on time. At the time that is set to having the recipe, the system will automatically send the notification to the user to announce they have the recipe. On the other hand, the exercise plan also needs to add the notification function so the user will be notified to conduct the exercise. This can reduce the forget conduct exercise problem.

Moreover, the third enhancement is that the **system should provide an export and import meal plan function to users.** After getting this function, the user can export the planned meal plan to the other user in pdf format or another format. For the elderly people might not have mobile phones so their children can help them print out the meal plan in physical form so they also will have the suitable meal plan for them. If other users want the same meal plan, they can import the planned meal plan from the user. This can highly save efficiency and time for planning the same meal plan for different users.

At the end, the last enhancement is **the system should provide scan photos and add ingredients to the pantry list.** After a user purchases the ingredient from a supermarket or grocery store, they will get the receipt from the store. In that time, the user is allowed to scan the photo, and the system will detect which grocery item and auto add it into the pantry list, so the user has no need to add the ingredient one by one. This highly increases the rate of user-friendly purchase list and recipe mobile applications.

Chapter 7

Conclusion

7.1 Conclusion

This recipe mobile application had three functionality that most other mobile applications did not provide. The first functionality is a personalized guideline function. This can help users to know their balanced nutrition needed and the meal plan's nutrition to match their balanced nutrition needs. Also, the system will be based on different situations and give advice to the user like too many calories, protein, fat, fibre and carbohydrate.

The second functionality is a recommended recipe based on ingredients available. In this recipe mobile application, it allows users to store the ingredients into two different lists which are grocery list and pantry list. The grocery list will store the ingredients needed to purchase and the pantry list will store the ingredients that have already been purchased. The system will use the pantry list ingredient to search the recipe that can cook. This highly solves the ingredients waste problem because many people purchase the ingredients but do not want to cook the recipe. Therefore, they can use the same ingredients to cook other recipes, and they have learnt the new recipe.

The third functionality is customization ingredients of recipes and recalculating the nutrition of recipes. Most of the existing recipes mobile applications only allow users to view the ingredient needed in the recipe. Therefore, this recipe mobile application will provide a customized ingredients function. After the user updates the ingredient information, the system will be based on the latest ingredient information to calculate the nutrition and display it to the user. Due to having this function, users can have the recipes more suitable for their personal cuisine type.

During development this application had faced many challenges like identifying problem statements, not familiar language that was used to develop the mobile application and so on. At the end, all the challenges had been solved, and the application could work properly.

REFERENCES

[1] I. Yummly, "Yummly Recipes & Meal Planning," *App Store*, Sep. 13, 2013. https://apps.apple.com/us/app/yummly-recipes-meal-planning/id589625334

[2] "Apple Recipes - Tasty," *tasty.co*, 2024. https://tasty.co/ingredient/apple (accessed Nov. 29, 2024).

[3] A. N. Media, "Kitchen Stories easy Recipes," *App Store*, Feb. 11, 2014. https://apps.apple.com/us/app/kitchen-stories-easy-recipes/id771068291 (accessed Nov. 29, 2024).

[4] S. Media, "Kuali: Malaysia recipes & more," *App Store*, Aug. 16, 2019. https://apps.apple.com/my/app/kuali-malaysia-recipes-more/id1468254789

[5] ORGANIZEAT LTD, "OrganizEat Recipe Keeper," *App Store*, Dec. 30, 2015. https://apps.apple.com/ca/app/organizeat-recipe-keeper/id1059211083 (accessed Nov. 29, 2024).

[6] C. Co., "CookBook - Recipe Manager," *App Store*, Sep. 06, 2016. https://apps.apple.com/us/app/cookbook-recipe-manager/id1073341917 (accessed Nov. 29, 2024).

[7] SideChef Group Limited, "SideChef: Easy Cooking Recipes," *App Store*, Aug. 21, 2014. https://apps.apple.com/us/app/side%D1%81hef-easy-cooking-recipes/id905229928 (accessed Nov. 29, 2024).

[8] W. Bishop, "Pestle: Recipe Manager," *App Store*, Jan. 20, 2022. https://apps.apple.com/us/app/pestle-recipe-manager/id1574776971 (accessed Nov. 29, 2024).

[9] "Recipe Keeper," *App Store*. https://apps.apple.com/us/app/recipe-keeper/id974683711

[10] COOKPAD INC. (CA, "Cookpad Recipes, homemade food," *App Store*, Dec. 14, 2012. https://apps.apple.com/my/app/cookpad-recipes-homemade-food/id585332633 (accessed Nov. 29, 2024).

[11] Y. Wu *et al.*, "Awareness of nutrition and health knowledge and its influencing factors among Wuhan residents," *Frontiers in Public Health*, vol. 10, Oct. 2022, doi: https://doi.org/10.3389/fpubh.2022.987755.

POSTER

UTAR
UNIVERSITI TUNKU ABDUL RAHMAN

FACULTY INFORMATION COMMUNICATION AND TECHNOLOGY

RECIPE MOBILE APPLICATION

01. INTRODUCTION

To develop a mobile application that is used for storing recipes or reviewing new recipes. Also, record the ingredient that needed in a list

02. PROBLEM STATEMENT

- Lack of customization ingredient amount and update nutrition information
- Lack of recommend recipe based on remaining ingredient
- Lack of personal guideline nutrition function

03. OBJECTIVE

- allow user to customize ingredient amount and recalculate the nutrition information
- develop a recommend recipe based on remaining ingredient functioin
- develop a personal guideline nutrition function for user

04. CONCLUSION

User can have a more healthy cooking lifestyle because it allow each user know their balanced nutrition needed and user allow more easy to achieve their healthy goals based on the nutrition information