



Faculty of Computer Science and Information Technology

***Reseepy : Rice Recipe Recommendation Web-based System Using Hybrid  
Filtering***

**Full Report**

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2023

***Reseepy : Rice Recipe Recommendation Web-based System Using Hybrid  
Filtering***

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This project is being submitted in partial fulfillment of the requirements for the Bachelor  
of Computer Science with Honour s degree (Software Engineering)

Faculty of Computer Science and Information Technology

UNIVERSITY MALAYSIA SARAWAK

2023

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24 July 2023

Universiti Malaysia Sarawak.

UNIVERSITI MALAYSIA SARAWAK

THESIS STATUS ENDORSEMENT FORM

TITLE

RESEEPY : RICE RECIPE RECOMMENDATION WEB-BASED SYSTEM  
USING HYBRID FILTERING

ACADEMIC SESSION:

2022/2023

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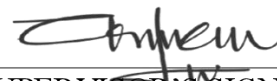
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## **ACKNOWLEDGMENT**

First and foremost, I would want to express my heartfelt appreciation to Almighty Allah for making the entire process of my Final Year Project sail smoothly and for providing me the strength to strive again when I am at my lowest. I would also like to thank my supervisor, Ts. Abdul Rahman Bin Mat, for always guiding and inspiring me, as well as giving me with support, patience, and useful advise during the entire voyage. I am particularly grateful to my examiner, Puan Hamizan Binti Sharbini, and my Final Year Project coordinator, Professor Wang Yin Chai, for their ongoing assistance in handling our Final Year Project.

I would also like to express my heartfelt gratitude to my dear family for all of their love, concern, motivation, and care while I struggled during my final year. I am very thankful to have you all by my side. Many thanks to my pals for their encouragement and support. You have been of great assistance to me, and I am grateful.

Last but not least, I'd like to express my gratitude to those who have directly or indirectly assisted me, those who have prayed for my success, and those who have been patient and understanding with me; I sincerely appreciate you all. I pray that Allah blesses each and every one of you.

## ABSTRACT

A unique kind of recommendation system known as a hybrid system can be thought of as a combination of the content filtering method and the collaborative filtering method. A hybrid approach overcomes the drawbacks of using collaborative and content-based filtering separately by combining them, and it may also be more efficient in some situations. The capabilities of collaborative-based methods can be added to a content-based approach (and vice versa), or hybrid recommendation system approaches can be implemented by using content and collaborative-based methods to generate predictions separately and then combining the predictions. This project is using Hybrid filtering method implementation because here it will give more options for users to select each ingredient that could make up the recipe as well as ease users in determining recipes that could be made with only rice. The methodology that has been used for this system is Knowledge Acquisition and Documentation Structuring (KADS). This methodology is chosen because KADS offers a systematic and structured approach to gaining knowledge from domain experts, making it easier to create a knowledge base and may assist organizations in developing high-quality knowledge-based systems to enhance their decision-making processes, increase efficiency, and improve decision-making accuracy. Recipe with mainly cooked up by rice is the main ingredient that must have in this system because this project is focusing on reducing rice wastage. According to a survey of the young people, the majority of them had no notion of what they can do with the rice. Based on the survey above, all the rice recipe data will be implement for this project so that it can give wide range good recommendation rice recipe for the users especially young people so that they know what to do with the leftover rice based on the ingredients that

they have. Additionally, the designation can be done based on the survey to make sure the requirements can be done properly. Through this project, an important goal for young people was achieved that can be applied by everyone in order to reduce rice waste while also increasing user lifestyle.

## ABSTRAK

*Satu sistem cadangan unik yang dikenali sebagai sistem hibrid boleh dianggap sebagai gabungan kaedah penapisan kandungan dan kaedah penapisan kolaboratif. Pendekatan hibrid mengatasi kelemahan penggunaan penapisan kolaboratif dan berdasarkan kandungan secara berasingan dengan menggabungkannya, dan ia juga mungkin lebih berkesan dalam beberapa situasi. Keupayaan kaedah berdasarkan kolaboratif boleh ditambah kepada pendekatan berdasarkan kandungan (dan sebaliknya), atau pendekatan sistem cadangan hibrid boleh diimplementasikan dengan menggunakan kaedah berdasarkan kandungan dan kolaboratif untuk menghasilkan ramalan secara berasingan dan kemudian menggabungkan ramalan tersebut. Projek ini menggunakan pelaksanaan kaedah penapisan hibrid kerana ia memberikan lebih banyak pilihan kepada pengguna untuk memilih setiap ramuan yang boleh membentuk resipi serta memudahkan pengguna dalam menentukan resipi yang boleh dibuat hanya dengan menggunakan nasi. Metodologi yang digunakan untuk sistem ini adalah Akuisisi Pengetahuan dan Struktur Dokumentasi (KADS). Metodologi ini dipilih kerana KADS menawarkan pendekatan yang sistematik dan terstruktur untuk memperoleh pengetahuan daripada pakar domain, menjadikannya lebih mudah untuk mencipta pangkalan pengetahuan dan dapat membantu organisasi dalam membangunkan sistem berdasarkan pengetahuan berkualiti tinggi untuk meningkatkan proses pembuatan keputusan, meningkatkan kecekapan, dan meningkatkan ketepatan pembuatan keputusan. Resipi yang terutamanya dihasilkan oleh nasi adalah bahan utama yang harus ada dalam sistem ini kerana projek ini memberi tumpuan kepada mengurangkan pembaziran nasi. Berdasarkan kajian mengenai golongan belia, majoriti dari mereka tidak mempunyai gambaran tentang apa yang boleh*

*dilakukan dengan nasi. Berdasarkan kajian tersebut, semua data resipi nasi akan dilaksanakan untuk projek ini supaya ia dapat memberikan cadangan resipi nasi yang luas dan baik untuk para pengguna terutamanya golongan belia agar mereka tahu apa yang perlu dilakukan dengan nasi baki berdasarkan ramuan yang mereka miliki. Tambahan pula, penetapan boleh dilakukan berdasarkan kajian tersebut untuk memastikan keperluan dapat dilaksanakan dengan betul. Melalui projek ini, satu matlamat penting untuk golongan belia telah dicapai yang boleh digunakan oleh semua orang untuk mengurangkan pembaziran nasi sambil meningkatkan gaya hidup pengguna.*

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## CHAPTER 1

### INTRODUCTION

#### 1.1 Introduction

Recommendation systems are programs that are designed to recommend items to users based on a variety of factors. These systems predict most likely product that users will purchase and are of interest to them (Dwivedi, 2020).

To recommend a wider range of goods to customers, hybrid recommendation systems use both content-based and collaborative filtering at the same time. This is an innovative recommendation system that is said to provide more accurate recommendations than other recommendation systems (Techlabs, 2022). This system can recommend the recipe for leftover rice that suitable with the ingredients that the user's or people have at their place.

Malaysia might well explore ways to reduce food waste in the country, as up to 17,000 tonnes of food waste are recorded daily. According to data from landfill operator SWCorp Malaysia, 24% or 4,005 tonnes of this total are still fine to eat, or simply avoidable waste (HANI, Malaysia throws away 17,000 tonnes of food daily - the Malaysian Reserve 2022). The food waste factor arises because people do not use all the ingredients and do not know what to do with the edible food, especially rice.

The implementation of hybrid filtering into a web-based system to give out recommendations for rice recipes in order for users to have more easy and saving time method to prepare ingredients. Aside, this web-based system will give a clear view of what they can do with leftover rice and ingredients that are available in their home.

## 1.2 Problem Statement

Malaysian dumped 4,081 tonnes of edible food per day, that enough to fill two and a half Olympic-sized swimming pools. This figure is based on Malaysia's total daily solid waste generation of 38,219 tonnes in 2021 (Meikeng, 2022). The reason for this kind of problem is that people do not use ingredients and serve the food in more economical way especially for young people.

Simple meal such as instant noodle, canned foods, instant spaghetti, instant rice are very easy to be prepare as it does not need much efforts to be serve. It is obvious that more time is necessary for preparing a whole complete meals, because all the process from purchasing the ingredients, preparing the ingredients, cooking process as well serving it on the table are taking time and it is need to be considered. (Jani, 2019).

Mostly commonly used system in web system are Collaborative Filtering Method, where this method able to predict what user's might take into consideration. This method analyses all the information about user's preferences, behaviours as well recent user activities search. By this mean, this method assumes that users who have look into the products would likely to look into it once again (Holewa & Miquido, 2022). However, this filtering method cannot recommend the recipe to user based on the ingredients that been selected and due to this it give out inaccurate result. As a solution, through recommendation system that using hybrid filtering method, the people or user especially youngster can cook based on the ingredient that are available on their home in order for them to save more time preparing ingredients as well cutting cost for their budget to prepare a meal. Other than benefiting to them, this recommendation system also can

encourage young people to not wasting their food to help reducing food wastage that harming the environment.

### **1.3 Aims and Objective**

The main reason for carrying out this project is to assist people, particularly young people, in reducing food waste and the time required to prepare the ingredients to cook the leftover rice. The aims and objective for this project based on the survey and research that been made are :

- 1) To capture the knowledge of the possible simple recipe that can be applied to the rice-based recipe. The recommendation of the various recipes will be focused on the one which is available in Malaysia, significantly in Kuching, Sarawak.
- 2) To develop a system that can recommend a suitable recipe based on the user's input.
- 3) To test the functionality of the recommendation system.

### **1.4 Brief Methodology**

The methodology that is chosen for this project is Knowledge Acquisition and Documentation Structuring (KADS) Methodology. KADS provides developers with a well-proven methodology for analysis and designing knowledge-based system (KBS) (Gary, 2002). It almost same with Waterfall Model but the difference between Knowledge Acquisition and Documentation Structuring and Waterfall Model is in KADS there are few phases that are not include on Waterfall Model which is Knowledge Refinement.



developed this system, user interface and knowledge data, is produced during this phases.

- Knowledge Refinement

On this phase, the data or requirements from Analysis phases will be delivered into this phases to approach automatic debugging that proposes rule base changes that would remove the fault in the rule based.

- Implementation

As the name implies, the source code is written according to the requirements during this phase. The physical design specifications are converted into functional code. The system is developed in small programmes known as units, which are then integrated. Unit Testing is when the functionality of each unit is tested before integration.

- Installation

The system is deployed into a live environment which is server to be tested for performance during this phase. End users can access the systems once it has been installed. This phase may also include tutoring real-time users to communicate the system's benefit.

- Use

After Installation Phase, the users will used this system to experiences the result of the system.

- Maintenance

During this phase, there might be countered some problem from the users side. In order to encountered this problem, Maintenance will be carry out in order to implement in users side

### **1.5 Scope**

This project is conducted to provide rice recipe and ingredients recommendation system that will be used by user especially youngster for cooking their leftover rice according to recipe and ingredients. The scopes of this project are :

- 1) Targeted user that will be used this recommendation system will be the user in Malaysia especially youngster aged 18 - 25.
- 2) This recommendation system will recommend the rice recipe that are available in Malaysia, significantly in Kuching, Sarawak.
- 3) For this time, This recommendation system will be provided rice recipe only.

### **1.6 Significance Of Project**

The completion of this project can help the user to find the recipes based on an ingredients that are available at their place to edible their leftover rice and from there the time taken to prepare the ingredients and searching for the recipes to cook the leftover rice will be reduce. Moreover, Food waste can give huge harm to our environment and with the existing of this recommendation system, the food waste can be prevent or decrease if the user utilize all the ingredients that are available at their places. This recommendation system only provided Malaysian rice recipe significantly in Sarawak.

### 1.7 Project Schedule

The project is expected to be completed within one semester following with the course Final Year Project 1.

No	Task	Duration	Start Date	Finish Date
1	Submission of the Approved Brief Proposal	5	23-Oct-22	28-Oct-22
2	Feedback and Comment From Reviewer / Examiner	6	29-Oct-22	4-Nov-22
3	Submission of Full Proposal	9	5-Nov-22	14-Nov-22
4	Submission of Chapter 1	6	15-Nov-22	21-Nov-22
5	Submission of Chapter 2	17	22-Nov-22	9-Dec-22
6	Submission of Chapter 3	20	10-Dec-22	30-Dec-22
7	Submission of FYP 1 Final Report & Paper for Assesment	12	31-Dec-22	12-Jan-23
8	FYP SYMPOSIUM	2	17-Jan-23	19-Jan-23
9	Submission of Final Report (Softcopy)	30	20-Jan-23	19-Feb-23

Figure 1.2 : Time Table for Final Year Project 1.

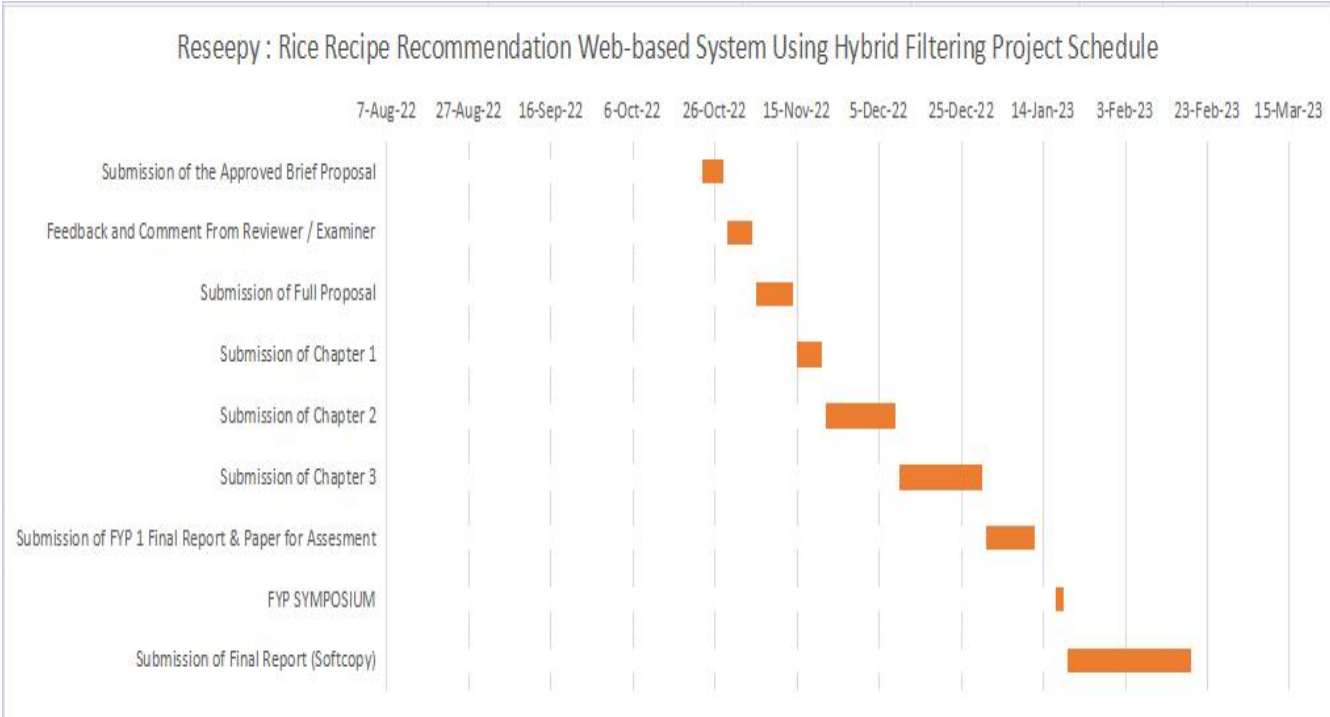


Figure 1.3 : Gantt Chart For Final Year Project 1.

## **1.8 Expected Outcome**

The expected outcome for this project are :

- 1) The system will be able to work efficiently.
- 2) The system is able to help the users to prepare the ingredients to cook the leftover rice.
- 3) The system will be able to recommend the recipe to cook the leftover rice.
- 4) This project will developed a system to help the users cook the leftover rice with the ingredient they have.

## **1.9 Thesis Outline**

The project of proposed system consist of 5 chapters which is 1) Introduction, 2) Literature Review, 3) Requirement Analysis and Design, 4) Implementation and Testing, and 5) Conclusion and Future Work. Chapter 1 until Chapter 3 will be focusing on Final Year Project 1 and Chapter 4 until Chapter 5 will be focusing on Final Year Project 2.

### **Chapter 1 : Introduction**

This project's proposed system is briefly discussed in Chapter 1 in terms of introduction, problem statement, objectives, project scope, methodology, expected outcome, project significance, project schedule, and thesis outline.

### **Chapter 2 : Literature Review**

Previous works are reviewed and studied in Chapter 2. The studies are based on journal papers or existing systems that have been analysed as guidance for the proposed system as a whole.

### **Chapter 3 : Requirement Analysis and Design**

In Chapter 3, the project methodology is elaborated in details depending on each phases of KADS Methodology Model. The proposed project's flows and design are depicted in UML diagrams and wireframes, respectively. The collected data is also thoroughly analyzed.

### **Chapter 4 : Implementation and Testing**

The documentation of the project's development and testing is completed in Chapter 4. This section is where the workstation, installation, software configuration, and project output are all discussed in detail with figures. Futhermore, the system is evaluated in order to determine both the functionality and non-functionality of the proposed system.

### **Chapter 5 : Conclusion and Future Work**

In Chapter 5, an overall conclusion is reached on the development of the proposed system based on the fact that the research project's objectives were met. This chapter also outlines and discusses future enhancements to the developed proposed system.

#### **1.10 Summary**

In conclusion, the proposed system called Reseepy : Rice Recipe Recommendation Web-based System Using Hybrid Filtering generally been discussed on this Chapter 1. The overview on this Chapter 1 include introduction, problem statement, aims and objective, methodology, scope, significance of project, project schedule, expected outcome of the project where this chapter to assist the proposed system.

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

In this chapter, the existing systems related to the project will be presented which is AllRecipes, CookPad and SuperCook. First component that will be presented are the tools or features that will be involved in developing this system and will also including any other components that will be involved indirectly in order to achieve a good working system. This chapter is crucial in order to understand and analyze other existing systems in order to have more view and understanding the purpose and functionality of system that will be develop.

At the end of the topic, the comparison on the existing system is discussed.

## 2.2 AllRecipes

### 2.2.1 Overview

With the advancing of new technologies, the entire manual cookbook, written recipes in book, or those that was posted in magazines now could be access just by one click away on the system called Allrecipes. Allrecipes makes it simple to locate and share food ideas by utilizing user-generated recipes, ratings, reviews, photo, and profiles based on the shared interests, needs and passion. Social filtering is another term for collaborative filtering. Collaborative filtering makes customized recommendations for users with similar preferences by using algorithms to filter data from user evaluations (Contributor, 2017). Allrecipes system using collaborative filtering method, which allow the system to recommend the food, based on what user preferences the most.

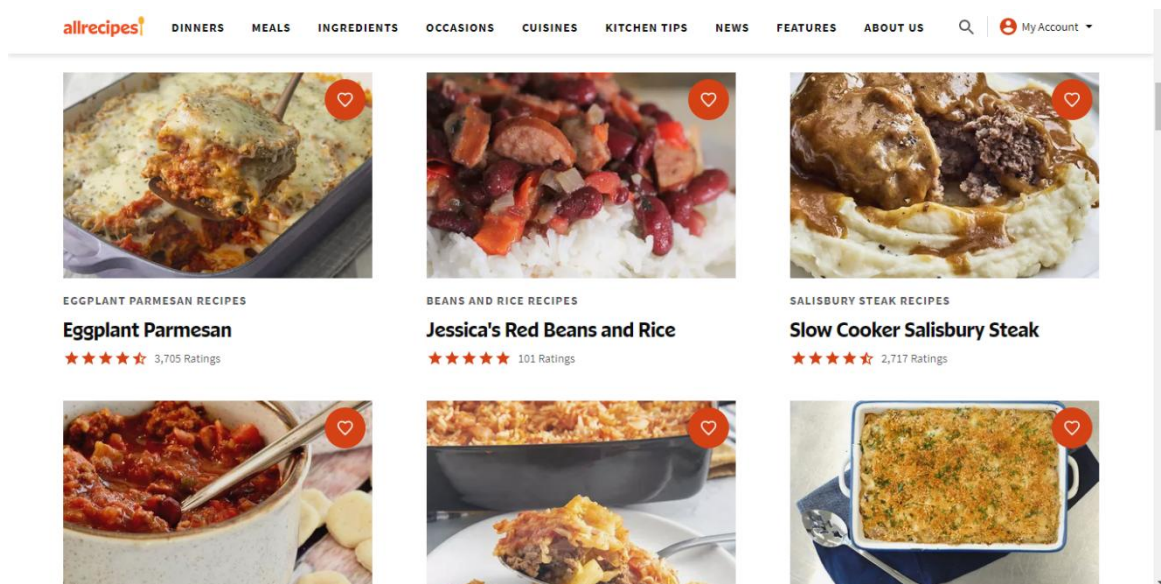


Figure 2.1 : Main Page of AllRecipes .

As shown in Figure 2.1, the system shown the food image with rate of each recipe. The people able to see the ingredients, recipe descriptions and instructions by clicking the image of the recipe. Other than that, the people able to give rate on the recipe.

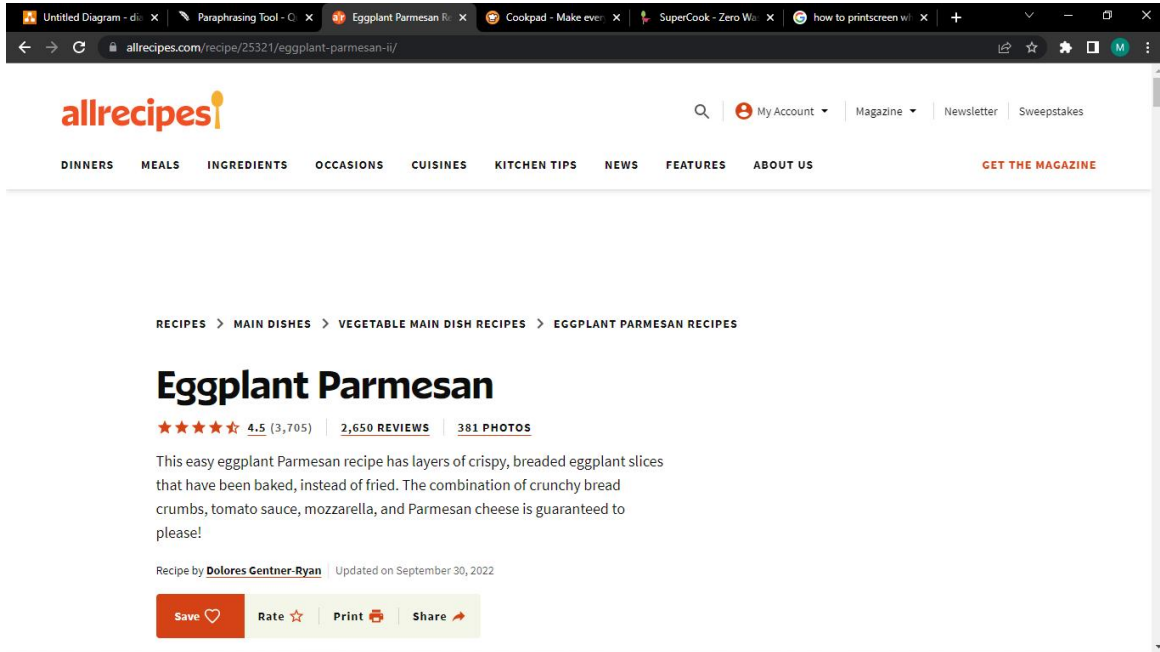


Figure 2.2 : Recipe Descriptions.

As shown in Figure 2.2, the system display the the descriptions of the recipe with rate button for the people to give rate on the recipe. Other features that been displayed is save button, print and share button. The result of the rate will be shown at the main page as shown at Figure 2.1.

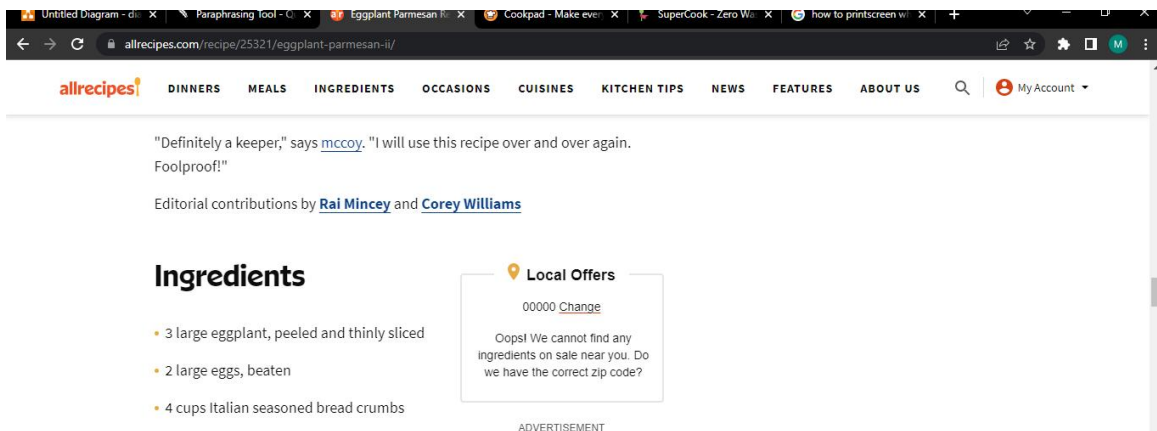


Figure 2.3 : Ingredients of the recipe.

## Directions

### Step 1

Preheat the oven to 350 degrees F (175 degrees C).

### Step 2

Dip eggplant slices in beaten egg, then in bread crumbs to coat. Place in a single layer on a baking sheet.

### Step 3

Bake in the preheated oven for 5 minutes. Flip and bake for 5 more minutes.

### Step 4

Spread spaghetti sauce to cover the bottom of a 9x13-inch baking dish. Place a layer of eggplant slices in the sauce. Sprinkle with mozzarella and Parmesan cheeses. Repeat layers with remaining sauce, eggplant, and cheese, ending with a cheese layer. Sprinkle basil on top.

### Step 5

Bake in the preheated oven until golden brown, about 35 minutes.

*Figure 2.4 : Cooking Recipe Instructions.*

The figure 2.3 shown the ingredients that need the people have to cook the recipe, while the figure 2.4 display the instruction of cooking the recipe. This details include Figure 2.2 will be display when the people click on the image of the recipe at main page that been shown at Figure 2.1.

## 2.2.2 Features

The features that been provided on this existing system is Rate features. This rate features is to give rate on the recipe. This system using Collaborative Filtering Method and this is the reason that Rate features been applied on this system to recommend the new user with most rating recipe. Other than that, Login features also been provided in this AllRecipes system. This login features provided to make the people can share their recipe on this existing system.

## 2.2.3 Advantages/Disadvantages of AllRecipes

The advantage for this existing system called AllRecipes is the people can save a lot such as time to preparing the meal because this system already provide the recipe

image for user to choose, cooking instructions and ingredients. Other than that, The advantages of this system is it can make new user that first time using this system to find the recipe will know which recipe is the most favourite by all people by looking the rate of the recipe. However, the disadvantages for this system is it can make the people spend a lot of money to buy ingredients to prepare the meal and this can cause the people waste a lot of time to find the ingredients.

## **2.3 CookPad**

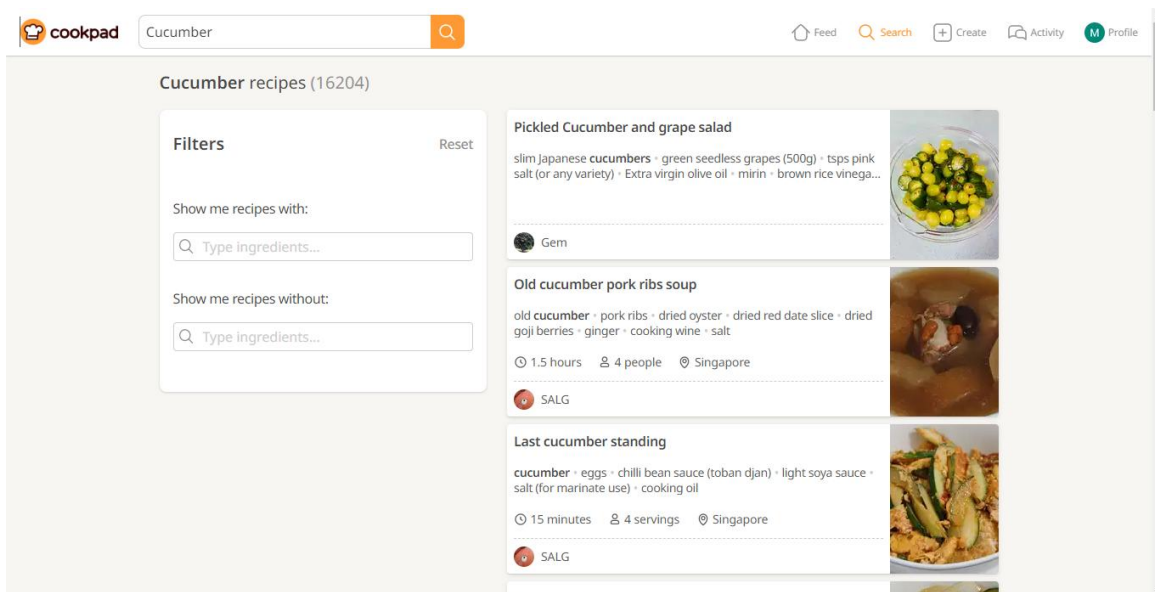
### **2.3.1 Overview**

There is an existing food recipe system that have use modernize method in order to ease their daily life by only search for their ingredients and will give the result based on the ingredients that been search that is CookPad and this system is much more than a recipe viewer system. It's a systems where the user can post their own recipes and search for the recipes from all around the world by searching the ingredients on the search tab features that been provided on the systems (India, 2018). CookPad is simple to use and makes the simplicity of searching for the recipes. In addition, this system using filtering method same as Allrecipes system which is Collaborative Filtering Method.



*Figure 2.5 : Main Page CookPad.*

The Figure above show the main page of the CookPad systems. The people need to insert the ingredients name on the search features to find the recipe and the result of the recipe will be followed by the ingredients that been inserted.



*Figure 2.6 : Display Result.*

After the people insert the ingredients on the search and click on search button that been shown in Figure 2.5, the people will be redirect into display result page as shown in Figure 2.6. The result will display the recipe based on the ingredients that user inserted.

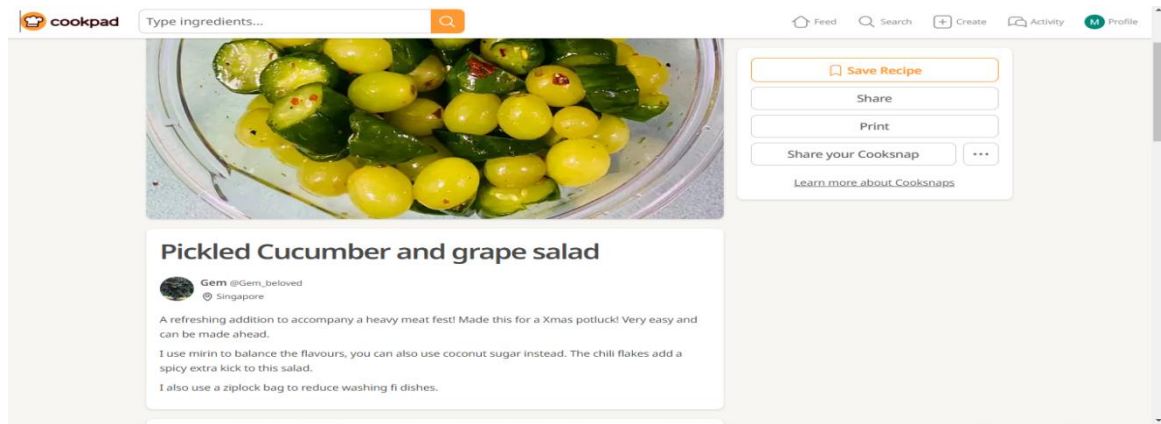


Figure 2.7 : Recipe Description.

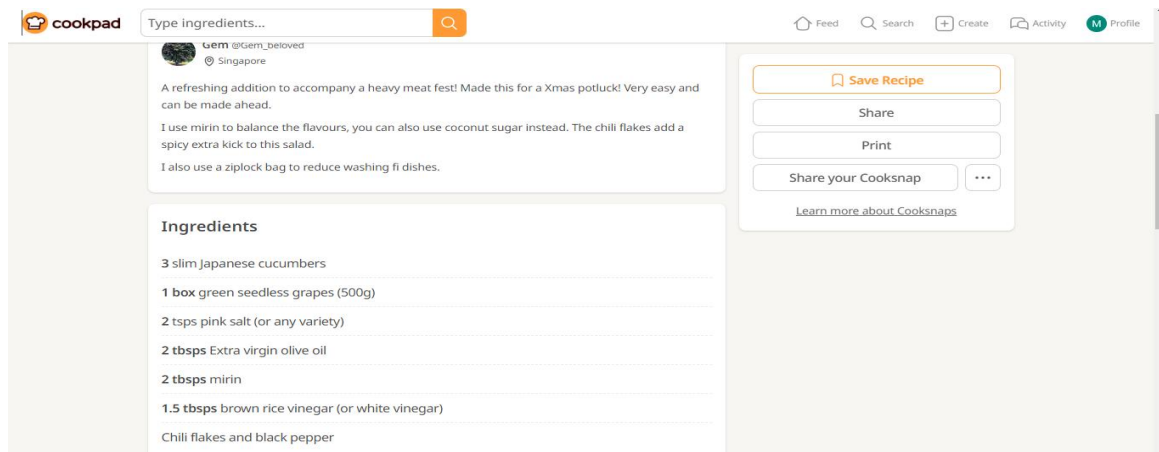


Figure 2.8 : Ingredients of the Recipe.

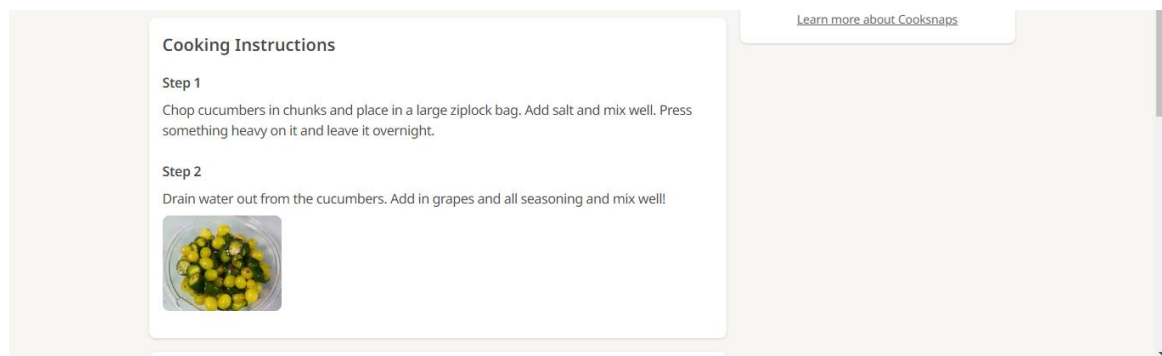
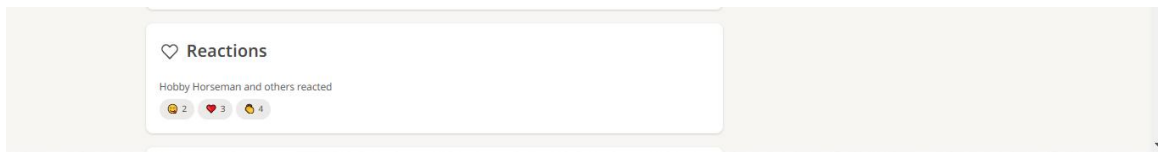


Figure 2.9 : Cooking Instructions.

Figure 2.7 shown the description of the recipe. This description will be displayed after the people click on the recipe result. In Figure 2.8 shown the ingredients of the recipe. This ingredients display to make the people know the ingredients they need to make this recipe. Other than that, Cooking Instructions also provided on the same page. The cooking instruction is shown in Figure 2.9.



*Figure 2.10 : Rate Section.*

This Rate Section that been shown in Figure 2.10 is important for this system. This is because this system using Collaborative Filtering Method same as AllRecipes that been stated on 2.2. This rate function is to enable the new user know which recipe is the most search or rate and delicious by other people.

### **2.3.2 Features**

The features that been provided in this CookPad systems is Search Features. This features been provided to ease the people to find the recipes. They just need to insert the ingredients name on the Search features and click the search button to find the recipe result based on the ingredients that been inserted. Besides, this existing system also provide Login features. This features act same as AllRecipes Login features that been stated on 2.2.2. The people able to share their recipe to other people. Other than that, this system also provide Rate features to ease the new user know which food is the most fav or rate by other people. This existing system is using Collaborative Filtering Method.

### **2.3.3 Advantages/Disadvantages of CookPad**

The advantage of CookPad is it can save lot of time. This is because with the Search feature that been provided, the people can search or find the recipe by insert the ingredients on the Search features. The result of the recipe will be display after the people click on search button. However there are few disadvantages for this system which is it does not give the accurate result for the recipe and make the people not utilize all the ingredients. Other than that, ingredients only can be insert once and cannot more than one ingredients. This can cause people waste their time to prepared their meal.

## **2.4 SuperCook**

### **2.4.1 Overview**

Another system that also mostly used by people to find the recipe and ingredients to cook a meal is SuperCook. SuperCook is a recipe search engine that aims to provide an easy-to-use search tool for those who cook at home by using ingredients they already have and looking on the internet for recipes that match (SuperCook - Remote Work From Home & Flexible Jobs | FlexJobs, n.d.). Users of SuperCook just enter the items they have at home, and recipes are displayed broken down into categories, and making home prepared meals a simple click away without the need to spend more time to searching through all the recipe on the system such as Allrecipes and CookPad systems. The filtering method that been used on this system is Content-Based Filtering Method. This system is very easy to use because of the simplicity of the system.

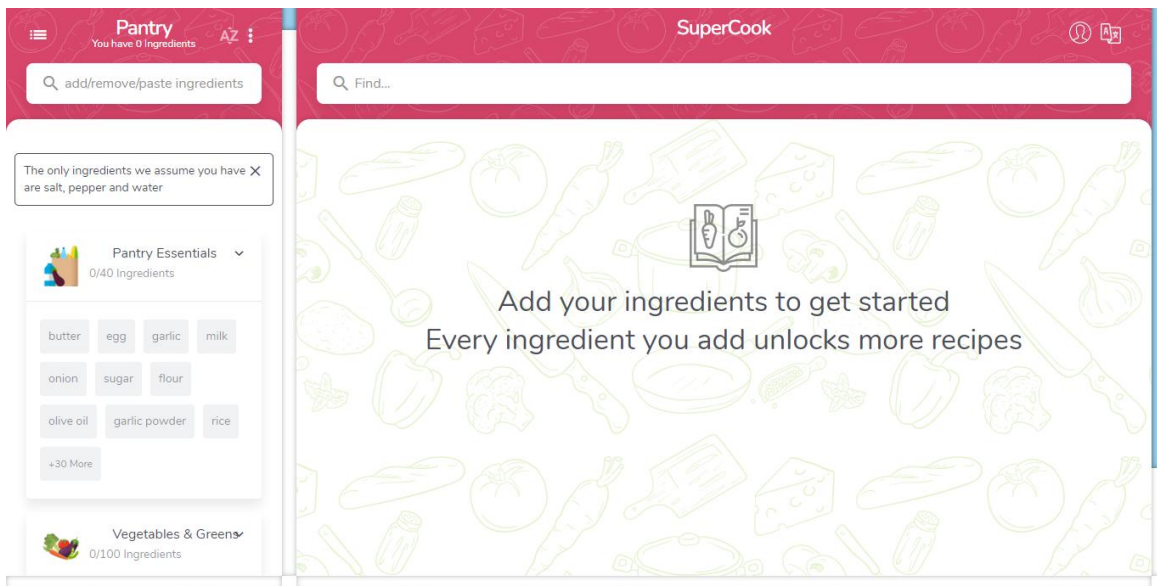


Figure 2.11 : Main Page for SuperCook.

There are 3 features that been shown in Figure 2.11 such as Search features, list of ingredients, and Login features. The simplicity of this system can make this existing system ease to use by all age people. To find the recipe the people only need to select the ingredients on the left that been shown in Figure 2.11.

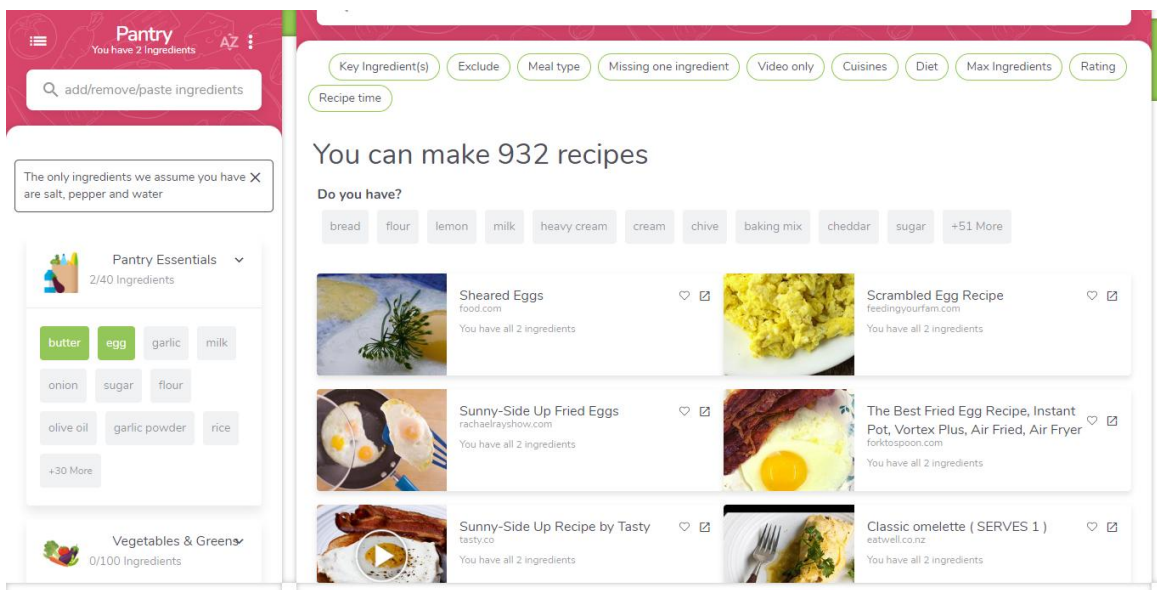


Figure 2.12 : Recipes Result.

As shown in Figure 2.12, the result of the recipe will be displayed based on the ingredients that been selected by the people.

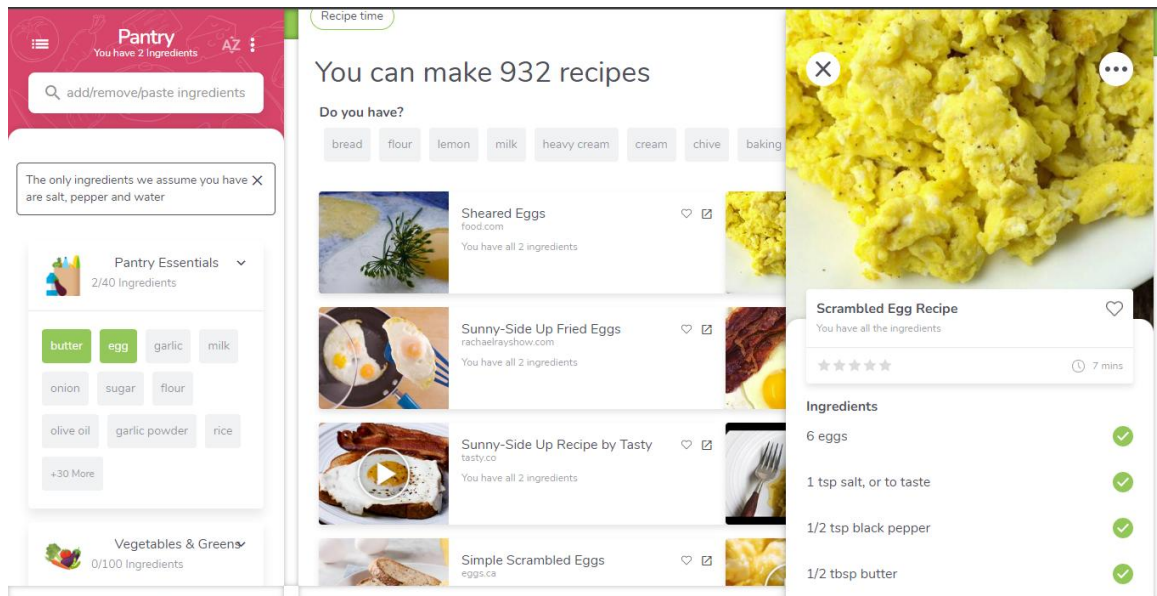


Figure 2.13 : Ingredients of the Recipe.

The ingredients displayed once the people click on the result that been shown based on their selected ingredients.

## 2.4.2 Features

The features that been provided in this existing system is Search, Login, List of ingredients, Rate. The search feature is to make the user search the recipe names. Beside that, List of ingredients is to able the user to select the ingredients to find the recipes based on the ingredients that the people have at their place. Login features is to able the people to share their recipe with others. Lastly, Rate features to give rating on the recipes and displayed the recipe followed with rating totals.

### **2.4.3 Advantages/Disadvantages for SuperCook**

The advantages for this existing system called SuperCook is it can help people to find the recipe without spend a lot of time by select the ingredients at list of ingredients on left that been shown at Figure 2.11. The ingredients can be select based on the ingredients that they have at their places (house). This can make the people utilize all the ingredients to prepared meal. Disadvantages for this existing system is it does not give accurate result. Some of the recipe result does not follow the ingredients that been selected by people and this can cause the food waste. Other than that, people might be spend a lot such as time and money to go groceries and buy new ingredients to prepared meals.

### **2.5 Filtering Method Section**

Based on finding that have been found on filtering method, it have been discovered that there 3 types of filtering method that are most commonly used which is Collaborative Filtering, Content-Based Filtering, and lastly Hybrid Filtering.

Collaborative Filtering (CF) Method approaches play an important part in recommendation process, and as a result, Collaborative Filtering is the most widely used approach to construct recommended system, however Collaborative Filtering is frequently used in conjunction with other methods by using various filtering strategies such as Content-Based and Knowledge-Based. The method of collaborative filtering that is most widely used recommender system for design. Although collaborative filtering is frequently employed along with other techniques, they play a vital role in the recommendation process with additional filtering strategies like knowledge-based, content-based. The foundation of collaborative filtering techniques is the collection and

analysis of a huge quantity of data that is based on the behaviour, activities, or preferences and predicting that user's preferences by Using their similarities to other users allows them to be appropriately identified without depending on machine decomposable message promoting composite items, which makes it a major advantage of the collaborative filtering strategy. The recommended objects in a collaborative filtering recommendation system are chosen based on the previous assessments of a sizable number of users (B. Thorat, Goudar, & Barve, 2015).

Moving on to Content Based Filtering, it relies on previous user selections. Item descriptions and user orientation profiles play an important role in content-based filtering. Content-based filtering algorithms attempt to recommend articles based on similarity scores. Content-Based Filtering (CBF) attempts to recommend items to current users based on the number of similarities that the user has positively rated in the past. For example, if a user likes website with the word chicken, he will recommend pages related to food or maybe animal. Item description and user orientation profile play an important role in this content-based filtering. Content-based filtering algorithms try to recommend items based on the number of similarities. The most relevant entries were suggested by comparing different candidate entries with items that were previously rated by users. The tf-idf representation is the most widely used algorithm (also known as vector space representation). To create user profiles, the system mainly focuses on two types of information: 1. User preference model. 2. User interaction log with the recommender system. Essentially an item profile of is used by this approach to identify the item in the system. Content-based user profile generation is done using a weighted vector of item characteristics. The importance of each condition to the user is indicated by weights. It

can be determined from individually ranked asset aim using different skills (B. Thorat, Goudar, & Barve, 2015).

Finally would be Hybrid Filtering. Basically, hybrid filtering is a combination of more than filtering methods. The coalescing filter method was introduced to overcome some of the common problems associated with the filtering method above, such as the cold start problem, the over-specialization problem, and the sparse problem. chopping board. Another motive behind implementing hybrid filtering is to improve the accuracy and efficiency of the proposed process. Recent research has demonstrated that a hybrid approach can be more effective in some cases. Collaborative filtering and most widely used content-based filtering methods information filtering application. As we know that every The coin has two sides so each approach has its own reward and weak points. Basically, the main driver of the hybrid approach is an aggregate of collaborative filtering and content-based filtering to improve the accuracy of the recommendations. Mixture The methods can be implemented in different ways. Firstly to implement collaborative and content-based approaches individuals and aggregate their predictions, secondly to integrate several content-based features into one collaborative approach, thirdly integrate certain collaborative features into one content based approach, and lastly building a model of general consolidation both content-based and collaborative features. A good example of a hybrid recommender system is Netflix. They make recommendations by comparing research and discover the habits of similar miners (collaborative filtering) as well as providing movies share feature films with movies that an operator has appreciated (filtering based on content) (B. Thorat, Goudar, & Barve, 2015).

## 2.6 Comparison on Existing System and the Proposed System

Table 2.1 : Comparison on Existing System and the Proposed System table.

System Feature	Existing System			Proposed System
	Allrecipes	CookPad	SuperCook	Reseepy
Sign Up	✓	✓	✓	✓
Login	✓	✓	✓	✓
List Of Ingredients	✓	✓	✓	✓
Rate	✓	✗	✗	✓
Search Engine	✗	✓	✓	✓
Instructions	✓	✓	✓	✓
Recipe Description	✓	✓	✓	✓
Collaborative Filtering	✓	✓	✗	✓
Content-Based Filtering	✗	✗	✓	✓
Hybrid Filtering	✗	✗	✗	✓

## **2.7 Brief Overview of Proposed System**

The functions, filtering method and features of the proposed system will be developed by incorporating the positive aspects found in the existing system discussed above. This proposed system going to use Hybrid Filtering Method to make the recommendation more accurate.

The feature that will be implemented on this system is Login features. The user need to login before access the system because seen this system need a data to recommend the recipe based on what user preferences more accurate and can make the Hybrid Filtering Method work well on recommend recipe for a user.

Secondly, list of ingredients is the most important features that will provide on this proposed system because the main focus on developed this proposed system is to prepared a meal with leftover rice and ingredients that the user have at their place to prevent the food waste.

Other than that, the feature rate will be implemented in this proposed system so that the user can give rate on the meal recipe and the meal recipe will be filter more accurate based on the rate because Hybrid Filtering Method use a combination with filtering method that use Knowledge-Based which is Collaborative Filtering Method. Recipe description and cooking instruction will be provided on this system so that the user know what this recipe about and learn how to cook the recipe.

Lastly, the feature that will provide for this proposed system is search features. This feature will help the users to find their recipe or ingredients name more faster and can save a lot of time.

## **2.8 Summary**

In conclusion, This chapter is crucial in order to understand and analyze other existing systems in order to have more view and understanding the purpose and functionality of system that will be develop. The previous system was thoroughly examined in order to have a better understanding of the Recipe suggestion system.

## **CHAPTER 3**

### **METHODOLOGY**

#### **3.1 Introduction**

This chapter provides a brief overview of the approach used in the development of the proposed system called Reseepy. The first phase of the Knowledge Acquisition and Documentation Structuring (KADS) methodology, Analysis, is the main focus in this chapter. This chapter provides more detailed description of the project requirements specification, which refers to the technique approaches in gathering the requirements and analysis that performed on them.

#### **3.2 Methodology**

Knowledge Acquisition and Documentation Structuring (KADS) methodology is choose for this proposed system emphasize more on developing knowledge-based systems. It supports high-level analysis and design, as well as what is commonly referred to as knowledge acquisition or knowledge-based (Born, 1996). This methodology has a favourable impact on project development that involves with knowledge-based since this methodology used by knowledge expert to solve the problem on knowledge-based system. As a result, the project more efficient and the problem can be solved.

This methodology is divided into 7 phases which is Analysis, Design, Knowledge Refinement ,Implementation, Installation, Use, and Maintenance. The first phase on this methodology is Analysis where the requirements identified and analyzed.

### 3.3 Algorithms for Hybrid Filtering Method.

A hybrid recommendation system uses different recommendation strategies to produce the output. When comparing hybrid recommendation systems to collaborative or content-based systems, hybrid systems typically have superior recommendation accuracy. The reason for this is a lack of knowledge about domain dependencies in collaborative filtering and people's preferences in content-based systems. The combination of both leads to an increase in common knowledge, which helps to improved suggestions. The increased knowledge makes it especially appealing to investigate novel approaches to extending underlying collaborative filtering algorithms with content data and content-based algorithms with user behaviour data.

**Step1:** Use content-based predictor to calculate the pseudo user-rating vector 'v' for every user 'u' in the Database.

$v_{u,i} = r_{u,i}$  □ is user u rated item i

$v_{u,i} = \bar{r}_{u,i}$  □ otherwise

**Step2:** Weight all users with respect to similarity with the active user.

· Similarity between users is measured as the Pearson correlation between their ratings vectors.

**Step3:** Select n users that have the highest similarity with the active user.

· These users form the neighborhood.

**Step4:** Compute a prediction from a weighted combination of the selected neighbors' ratings.

In step 2, the similarity between two users is computed using the Pearson correlation coefficient, defined below:

$$P_{a,u} = \frac{\sum_{i=1}^m (r_{a,i} - \bar{r}_a) \times (r_{u,i} - \bar{r}_u)}{\sqrt{\sum_{i=1}^m (r_{a,i} - \bar{r}_a)^2 \times \sum_{i=1}^m (r_{u,i} - \bar{r}_u)^2}}$$

Figure 3.1 : Sample Algorithms for Hybrid Filtering Method.

Where,  $r_{a,i}$ , is the rating given to item  $i$  by user  $a$  ;

$\bar{r}_a$

$a$

is the mean rating given by user  $a$  ;  $m$  is the total number of items .

In step 4, predictions are computed as the weighted averages of deviations from the neighbor's mean:

$$p_{a,i} = \bar{r}_a + \frac{\sum_{u=1}^n (r_{u,i} - \bar{r}_u) \times P_{a,u}}{\sum_{u=1}^n P_{a,u}}$$

Where,  $p_{a,i}$ , is the prediction for the active user  $a$  for item  $i$  ;

$P_{a,u}$ , is the similarity between users  $a$  and  $u$  ;

$n$  is the number of users in the neighborhood .

*Figure 3.2 : Sample Algorithms for Hybrid Filtering Method.*

### **3.4 Requirement Analysis**

The first phase of the process, Requirement Analysis or Analysis, is used from the methodology that been applied for this project to identify the project requirements. During this phase, developers, and team members communicate to investigate the difficulties or problem that led to the development of this proposed project, identify projects need, and finalize it with clients or users.

#### **3.4.1 Method for gathering requirements**

The method for gathering requirements is by using questionnaire. Techniques define how actions are carried out in particular situations. There may be zero, one, or many related techniques for a given problem. A method must be connected to at least one task. Since this project involves with the engagement of users, survey / questionnaires have been conducted among at least 15 respondent in order to gain information on what are required in order to achieve a good results of the system. A survey or questionnaire can be used to gather information from a large number of people who are too many to interview given the time and financial restrictions. The survey may require respondents to choose an option, rate something ("Agree Strongly, agree"), or answer open-ended questions in their own words. Designing surveys is challenging since respondents may be skewed by the questions. The purpose of this questionnaire is to identify and collect the data to developing the proposed system called *Reseepy*.

*Table 3.1 : Questionnaire Demographics Information*

<b>Category</b>	<b>Respondents Result</b>
<b>Age</b>	
18 - 20 years old	2(10.6%)
21 - 23 years old	4(21.1%)
24 - 25 years old	13(68.4%)
<b>Employment Status</b>	
Student	10(52.6%)
Working	8(42.1%)
Unemployed	1(5.3%)
<b>Living Status</b>	
Living with parents	11(57.9%)
Alone	7(36.8%)
College	1(5.3%)

The questionnaire received responses from 19 peoples. The majority of respondents are between the ages 24 to 25 years old with totals 13 (68.4%), followed by those between ages 18 to 20 years old with totals 2 (10.6%) and 21 to 23 years old with totals 4 (21.1%). In terms of employment status, 10 respondents are students. The remaining 9 respondents or 47.4 %, are working followed by 8 (42.1%) and 1 (5.3%) for unemployed. As for living status, 11 respondents are living with their parents with totals 11 (57.9%), followed by living alone with totals 7(36.8%) and lastly living in college with totals 1 (5.3%).

Following the collection of questionnaire demographic information that been stated on table 3.1 from respondents, the following section of the questionnaire aims to collect the data of the respondents to developed this rice recipe recommendation systems.

4. Where do you usually eat ?

19 responses

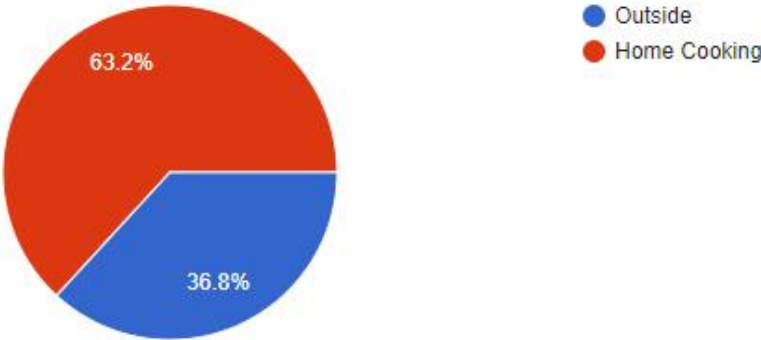


Figure 3.3 : Where respondents usually eat.

The first question ask where the respondents usually eat. A total of 12 respondents (63.2%) answered that they usually eat home cooking, leaving the remaining 7 respondents (36.8%) are eat outside.

5. Do you know how to cook ?

19 responses

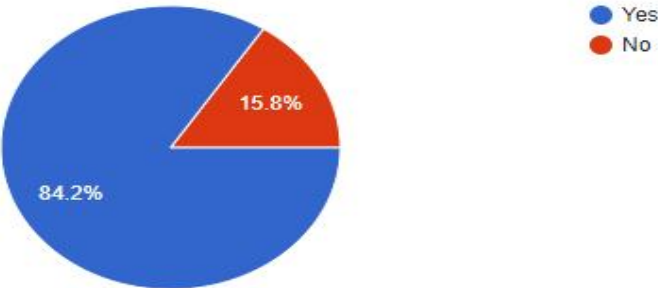


Figure 3.4 : Respondents cook experiences.

The following questions aims to find out whether the respondent has experiences cooking their own meals. Out of 19 respondents, 16 (84.2%) know how to cook, while the remaining 3 respondents (15.8%) do not know how to cook.

6. Do you usually cook your own rice (If yes, how much the quantity would you cook your rice for a day ? )

19 responses

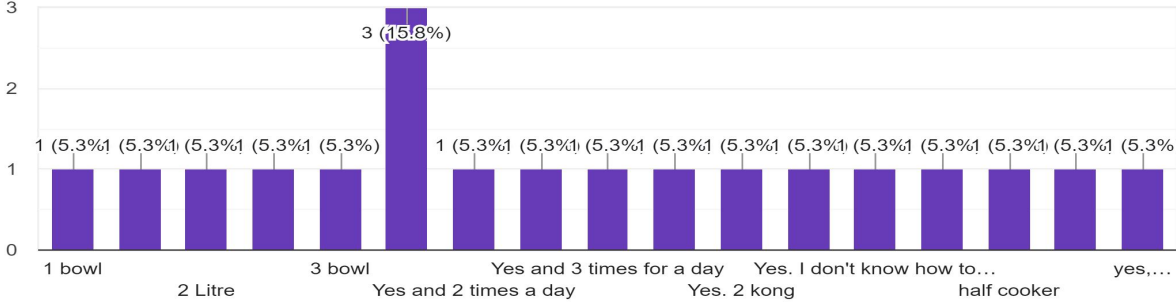


Figure 3.5 : Respondents cook their own rice.

This question asks respondents to share their experience of cooking rice. Only 3 (15.8%) respondents not usually cook their own rice and the remaining of respondents which is 16 (84.2%) usually cook their own rice with different quantity.

7. If there is many rice left from you have cook , what would you do ?

19 responses

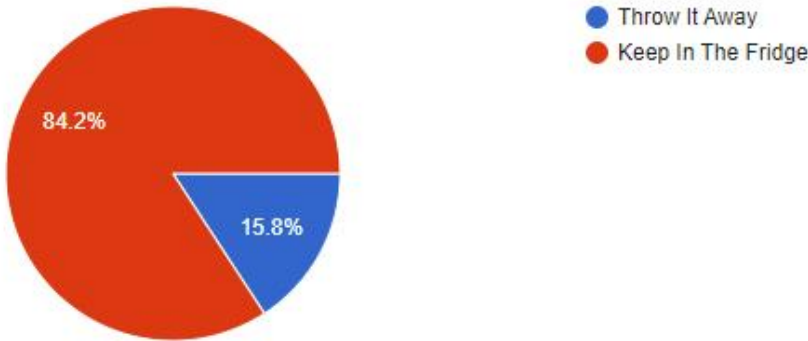


Figure 3.6 : Respondents experience on leftover rice.

This question is to gather experience of respondents about what would they do if there are leftover rice. 16 (84.2%) respondents out of 19 (100%) keep their leftover rice in the fridge and the remaining 3 (15.8%) respondents throw it away.

8. Do you have any ideas on what to do with left over rice that still edible to eat ?  
19 responses

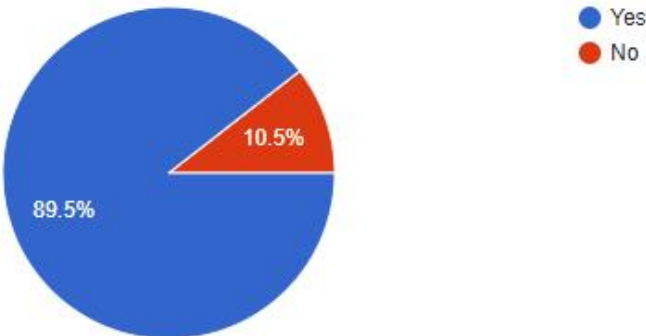


Figure 3.7 : Respondents ideas for leftover rice can still edible.

The following question aims to find out whether the respondents know what to do with the leftover rice. 17 (89.5%) respondents know what to do with the leftover rice and 2 (10.5%) of the respondents do not know what to do with the leftover rice.

9. Have you ever search up in any platform on how to not waste rice ? (If yes, state the name of the platform)  
19 responses

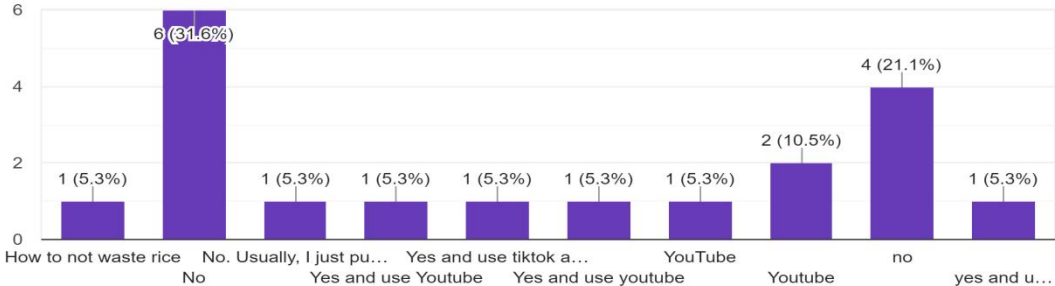


Figure 3.8 : Respondents platforms to not waste rice.

The question aims to know the platform that been search by respondents for gain information or knowledge on how to not waste leftover rice. 12 (58.0%) respondents never search any platform and the remaining respondents which is 7 (37.0%) have been search up the platform.

10. Have you engage in any apps/ website that help you to give ideas to restore back the leftover rice ?

19 responses

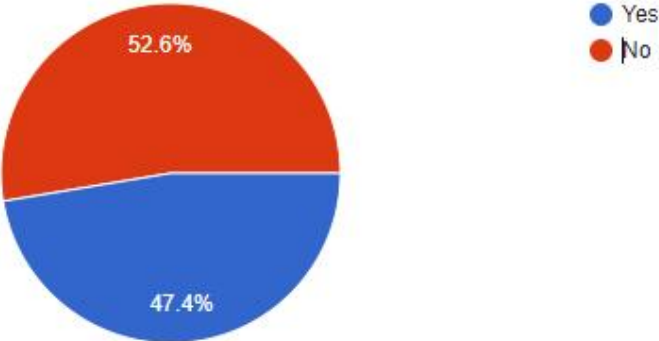
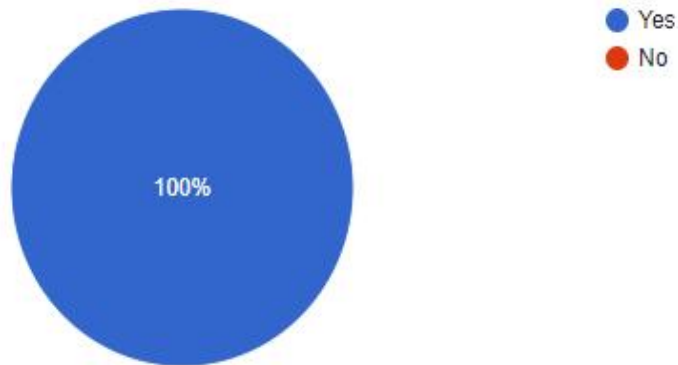


Figure 3.9 : Respondents experience on engage on any website or apps to restore leftover rice.

This questions aims to know if they ever engage with any website or apps to restore back their leftover rice. 10 (52.6%) of respondents never engaged with any website or any apps to restore their leftover rice while the remaining respondents which is 9 (47.4%) have engage with any website or apps.

11. Do you think it would save you a lot if you can recycle leftover rice ?

19 responses



*Figure 3.10 : Respondents information on leftover rice can save a lot.*

The next question ask the respondents about do they know that by restore the leftover rice, they can save a lot such as money, time to think what to eat. All the respondents which is 19 (100%) know that by recycle the leftover rice can save a lot.

The last part of questions ask the respondents would they love to try more rice recipes if they able to find the guideline on what do to with the leftover rice. Other than that, 13 of respondents responds that they love to try more rice recipes with different reasons and the remaining of the respondents do not want to try more rice recipes.

### 3.4.2 List of required requirements for The Proposed System

#### 3.4.2.1 Hardware Requirements

The proposed system requires web browser-capable PCs, laptops, and mobile devices. In terms of project development, the PC or laptop specifications required are as follows :

*Table 3.2 : PC or Laptop Specifications for developed this proposed system.*

<b>Component</b>	<b>Specification</b>
Processor	Intel(R) Core(TM) i5-6200U CPU @ 2.30GHz 2.40 GHz
Operating System	Windows 10 Home Single Language 64-bit
Storage	1)223GB KINGSTON SA400S37240G (SATA-2 (SSD)) 2) 931GB TOSHIBA MQ01ABD100 (SATA )
Memory	4.00GB Single-Channel DDR3 @ 797MHz
Graphics	2048MB ATI AMD Radeon R5 M330

### 3.4.2.2 Software Requirements

The proposed system requires only web browsers to function and can be used by all people in Malaysia especially Kuching, Sarawak. The software required to develop this proposed system is listed below :

*Table 3.3 : Software required to develop the proposed system.*

<b>Software</b>	<b>Specification</b>
Visual Studio Code	Editors tool or software to code to developed this proposed system.
HTML, CSS, JavaScript, Python	Programming Language that will be used to developed this proposed system.
Bootstrap	Framework used to make the proposed system become responsive web.
SQLite	To store the data into database and database itself.
Server	To make the system live and can be used by all people.

### **3.4.2.3 Functional Requirements**

Functional Requirements describe system behavior under specific conditions and include the product features and functions which web & app developers must add to the solution (Vodovatova, 2019). Based on the questionnaire replies, a list of functional requirements has been developed, as shown below.

- To find rice recipes, the system must require users to register and log in.
- Users shall be able to find rice recipe based on ingredients.
- Users shall be able to select the ingredients and give rate on rice recipes.
- System shall be able to display the rice recipe result.
- System shall be able to display the most rate rice recipe.
- Administrator able to update and add rice recipe and ingredients.
- Users and Administrator can view their profiles.

Users shall be able to search ingredients and recipes on the systems.

### **3.4.2.4 Non-functional Requirements**

Non-functional Requirements is system qualities such as security, dependability, performance, maintainability, scalability, and usability must be defined. They act as limits or restrictions on the system's architecture across the various backlogs (Leffingwell, 2021).

The following are the non-functional criteria for the proposed application:

- The system must be able to run continuously with few or no crashes.
- The system should check user input and instantly notify them of errors.
- The user interface should be easy to use, well-organized, and appropriate for all ages.

- Access to the system should not take too long.

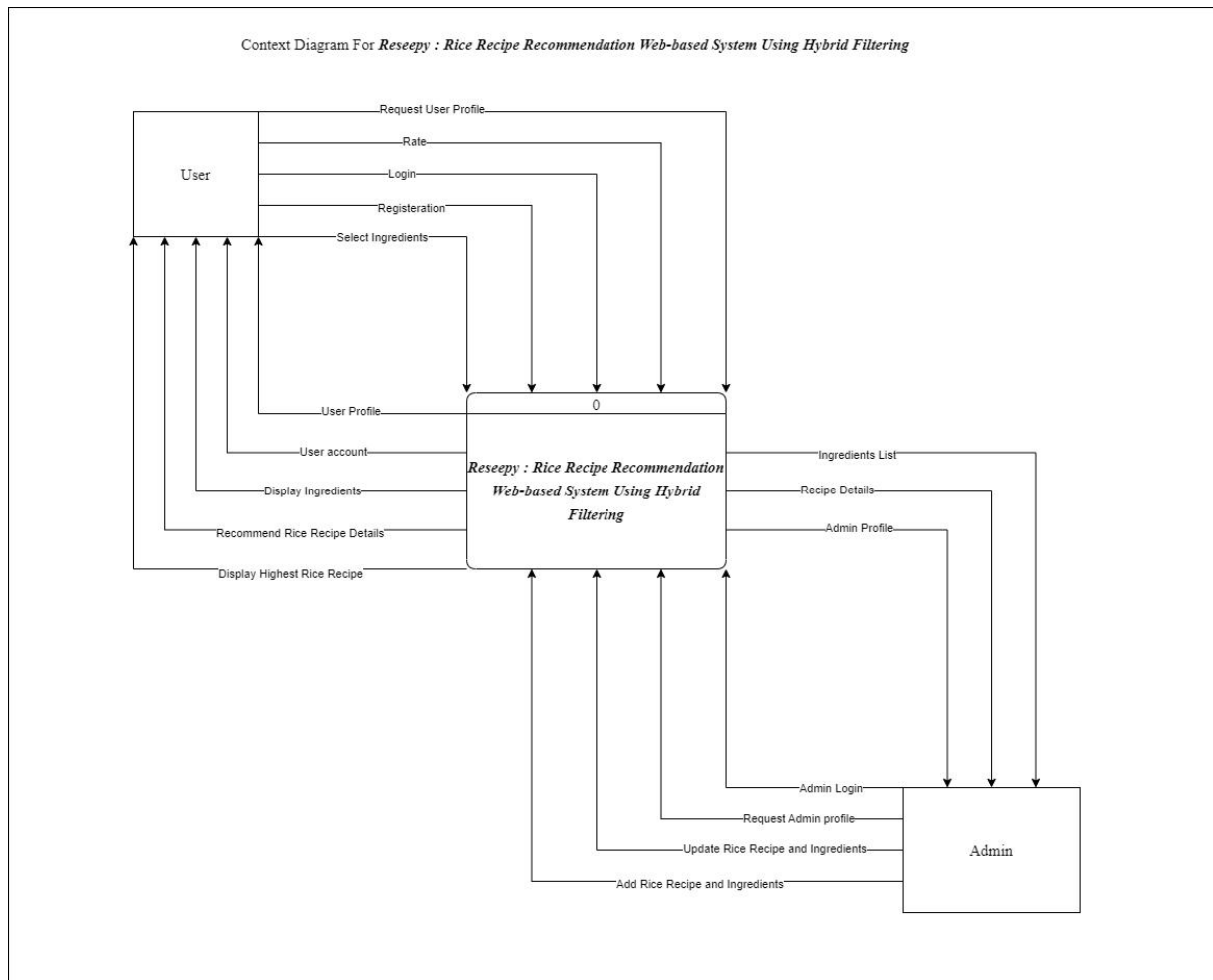
### **3.5 System Design**

The system design defines the components, modules, interfaces, and data required for a proposed system to meet the requirements. The design would then guide the next step of the system implementation or development. Context Diagram, Data Flow Diagram (DFD), Entity Relationship Diagram (ERD), Data Dictionary and Interface Design are used to design this proposed system called Reseepy : Rice Recipe Recommendation Web-based System Using Hybrid Filtering.

#### **3.5.1 Overview**

This part will explain on the system design. But first thing first, it is important to know what does it define. Systems design is the process of defining a system's components, including modules, architecture, components, their interfaces, and data, depending on the requirements that have been given. Systems that meet the unique goals and requirements of a business or organization are defined, developed, and designed in this manner. To simplify, this mean it was the phase of “how to implement “ into the solution. As for this project, it mainly focus on filtering method of a system and how to implement it to become a good working system. And it will be explain more on below details.

### 3.5.2 Context Diagram



*Figure 3.11 : Context Diagram for Reseepy*

Context diagrams (level 0 DFDs) are diagrams that depict the entire system as a single process. As shown in Figure 3.9, It show the interacting between the user, admin with the proposed system with the flow of data that been submitted to the proposed system and retrieved it from the proposed system.

### 3.5.3 Data Flow Diagram Level-1 (DFD)

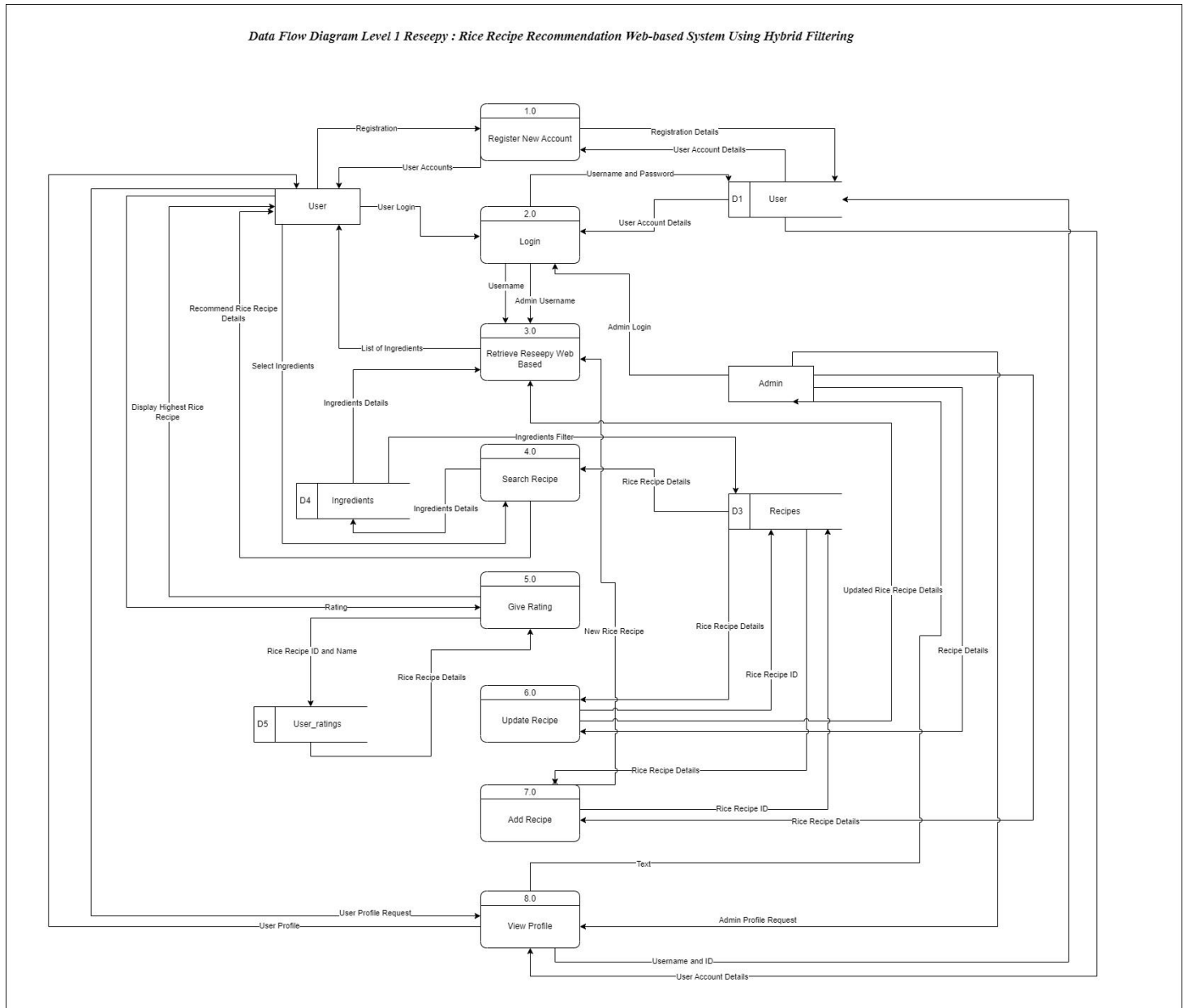
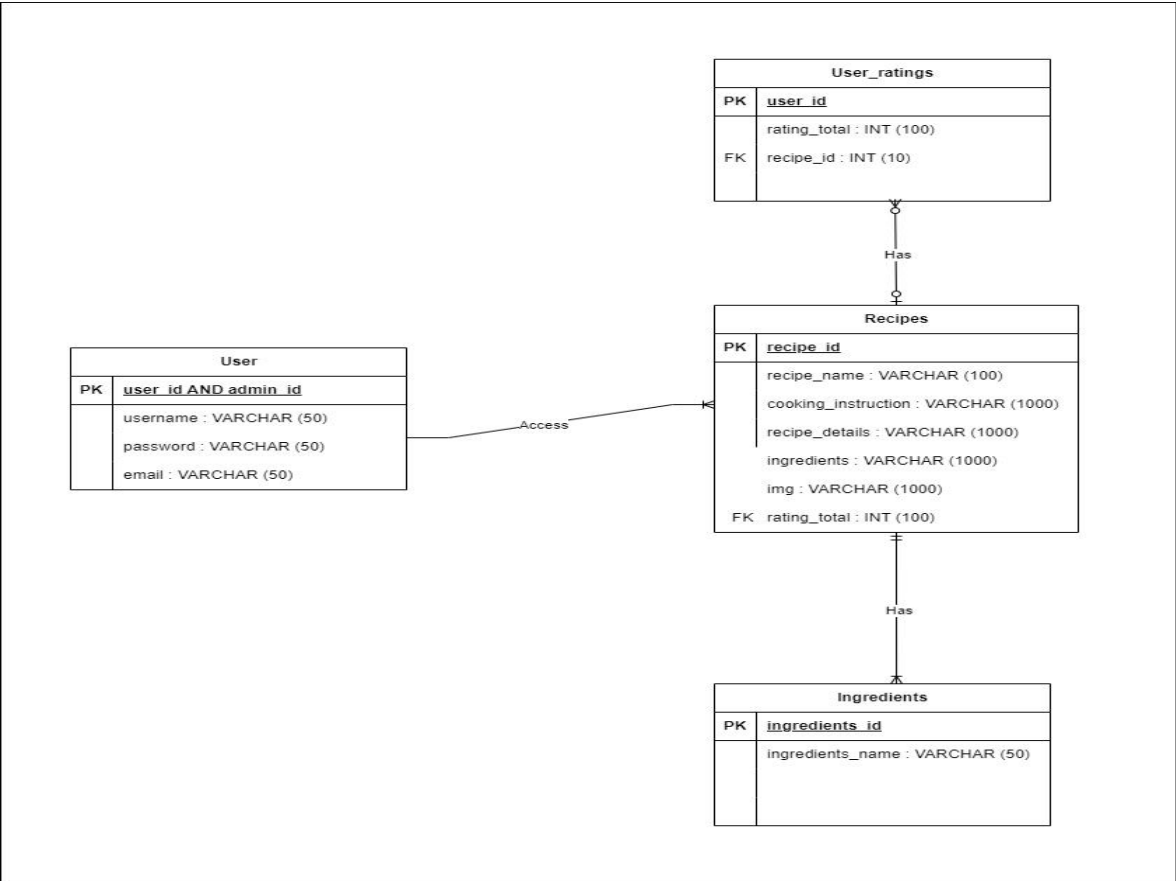


Figure 3.12 : DFD Level 1 for Reseepy

A level 1 DFD describes each of the major sub-processes that comprise the entire system. It can be thought of as a "exploded perspective" of the context diagram. Figure 3.10 shows DFD Level-1 for the proposed system. There are 8 processes, 4 data stores and 2 entities. The 8 processes includes Register, Login, Retrieve *Reseepy* Web Based, Search Recipe, Give Rating, Update Recipe, Add Recipe and View Profile. Beside that's, this DFD Level-1 contains 4 data stores that includes User, Recipes, Ingredients and lastly User\_rating. Lastly, there are 2 entities that been include in DFD Level-1 which is User and Admin.

**3.5.4 Entity Relationship Diagram (ERD)**



*Figure 3.13 : ERD for Reseepy*

Entity Relationship Diagrams (ER Diagrams, ER Models, or ERDs) are a type of structural diagram used in database architecture. The essential entities included in the system scope, as well as their interactions, are both visually represented by the different symbols and connectors on an ERD. Figure 3.11 shows the ERD for the proposed system called *Reseepy*. This ERD is based on data store that been provide in DFD Level-1 that been shown in Figure 3.10. There are 4 data stores include in ERD which is User, Recipe, User\_ratings and Ingredients. The User consists of 4 attributes which is user\_id and admin\_id as Primary Key, username, password, email. The next data stores is Recipes. This data stores consists of 7 attributes. The attributes for Recipes with Primary Key is recipe\_id, recipe\_name, cooking\_instruction, recipe\_details, ingredients, img, rating\_total as foreign key. The Ingredients consists of 2 attributes which is ingredients\_id as Primary Key, ingredients\_name. Last data stores that been include in ERD is User\_rating. User\_rating consists of 3 attributes which is user\_id as Primary Key, rating\_total and Foreign Key is recipe\_id. The ERD relationship show that a user can search for many recipes while one admin can update and create more recipe. Other than that, The relation between recipe and ingredients show that 1 recipe can have more ingredients while the relations between recipe and rating show 1 or 0 recipe can have more rating.

### 3.5.5 Flowchart

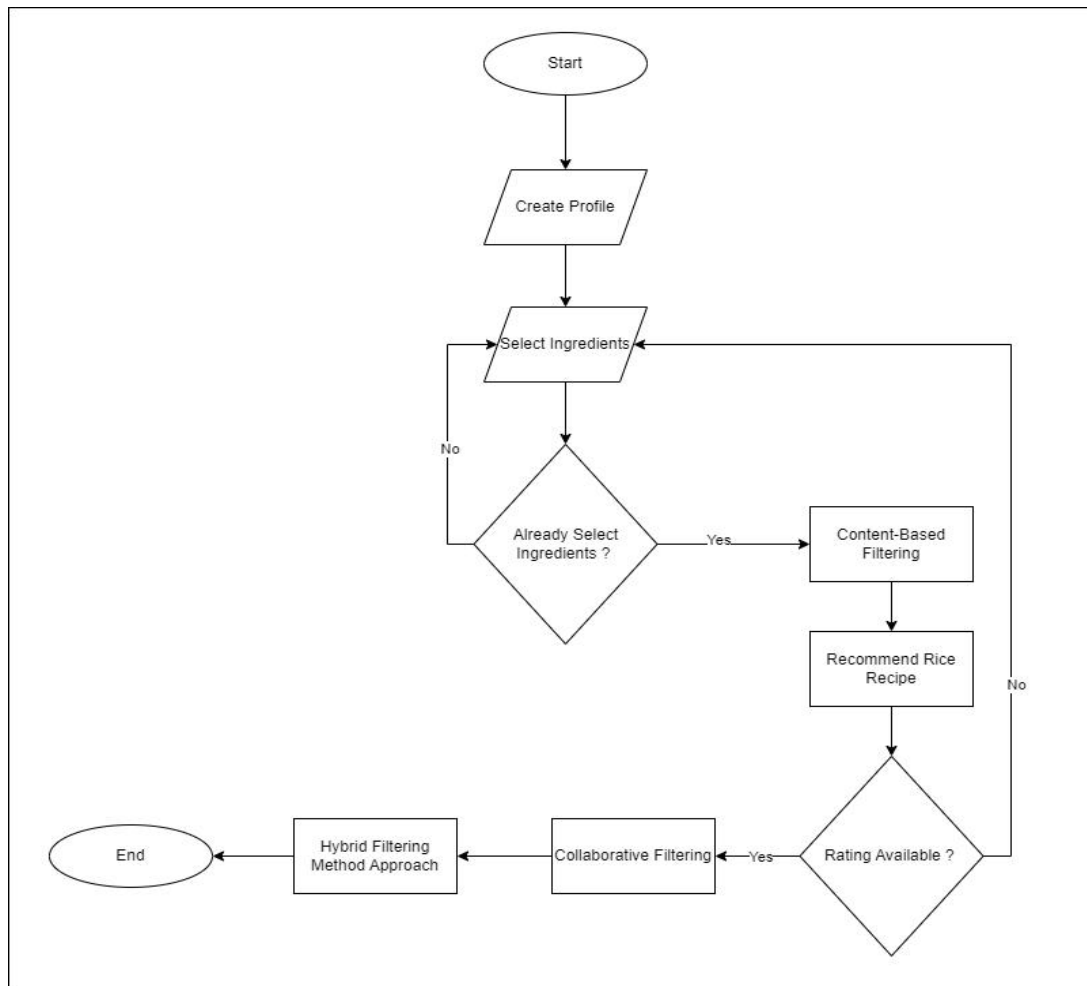


Figure 3.14 : Flowchart for Reseepy.

The figure 3.14 shown FlowChart for *Reseepy*. The input for this system is two which is create profile and select ingredients. Create profile is to make the system making decision whether the user is new or not. If the user is new, the system will display the most high rate rice recipe and ingredients and if the user is not new, the system will provide ingredients for the user to choose. After the user choose the ingredients, the system will go to Hybrid filtering method to recommend the rice recipe more accurate to the user.

### **3.5.6 Data Dictionary**

A Data Dictionary is a collection of names, definitions, and properties for data components utilized or captured in a database, information system, or research project. It defines the meanings and goals of data items in the context of a project, as well as gives direction on interpretation, accepted meanings, and representation. Metadata about data items is also provided via a Data Dictionary. A Data Dictionary's metadata can help define the scope and properties of data items, as well as the rules for their usage and application (What Is a Data Dictionary? | UC Merced Library, n.d.). Data dictionary can be done based on the data that been inserted on Entity Relationship Diagram and from this data dictionary, it briefly described every data type to make it more understandable.

Table 3.4 : Data Dictionary for user data store table.

Data Store ID	Data Store Name	Data Store Description	Data Store Element			
			Name	Description	Type Of Data	Size Of Data
D1	Users	To Store the detailed of users and registered users	user_id	Primary Key for every data that store in User Table. ID is unique	INT	10
			username	Users username to login to access the system	VARCHAR	50
			password	Users password to make the account more secure	VARCHAR	50
			email	Users email	VARCHAR	50

Table 3.5 : Data Dictionary for admin data store table.

Data Store ID	Data Store Name	Data Store Description	Data Store Element			
			Name	Description	Type Of Data	Size Of Data
D2	Users	To Store the detailed of admin and registered admin	admin_id	Primary Key for every data that store in Admin Table. ID is unique	INT	10
			username	Admins username to login to access the system	VARCHAR	50
			password	Admins password to make the account more secure	VARCHAR	50

Table 3.6 : Data Dictionary for recipe data store table.

Data Store ID	Data Store Name	Data Store Description	Data Store Element			
			Name	Description	Type Of Data	Size Of Data
D3	Recipes	To store the recipe details	recipe_id	Primary Key for every data that store in Recipe Table. ID is unique	INT	11
			recipe_name	Name of recipe	VARCHAR	100
			cooking_instruction	Cooking instruction for based on recipe	VARCHAR	1000
			recipe_details	Description of the recipe	VARCHAR	1000
			ingredients	Ingredients name	VARCHAR	1000
			img	Image of the rice recipe	VARCHAR	100
			rating_total	Foreign Key from User_Rating table	INT	100

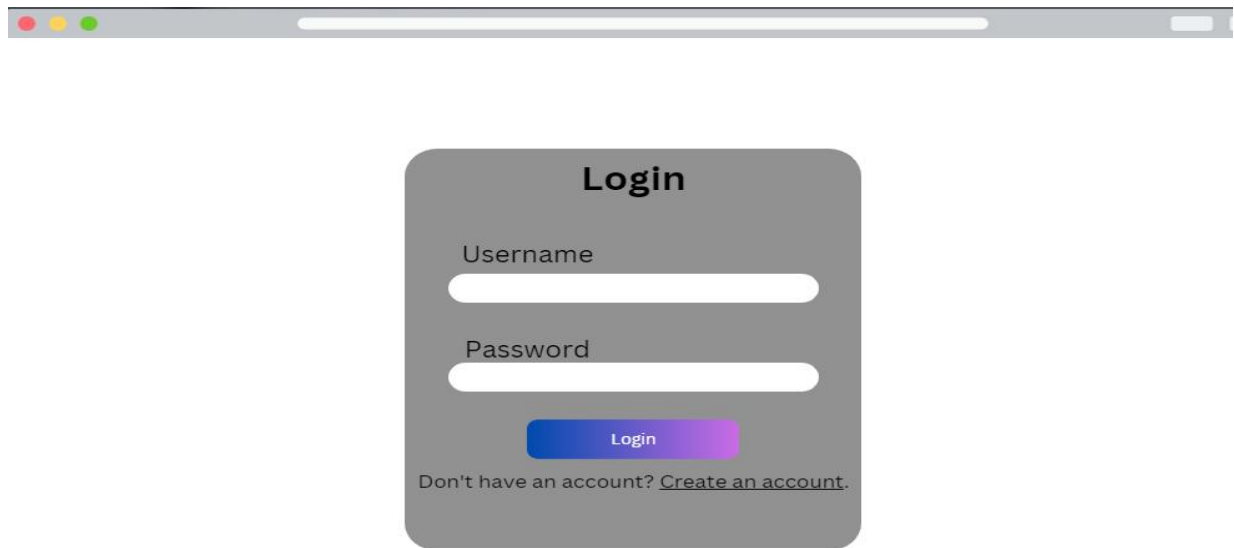
Table 3.7 : Data Dictionary for ingredients data store table.

Data Store ID	Data Store Name	Data Store Description	Data Store Element			
			Name	Description	Type Of Data	Size Of Data
D4	Ingredients	To store ingredients data	ingredients_id	Primary Key for every data that store in Ingredients Table. ID is unique	INT	10
			ingredients_Name	Ingredients name	VARCHAR	50

Table 3.8 : Data Dictionary for rating data store table.

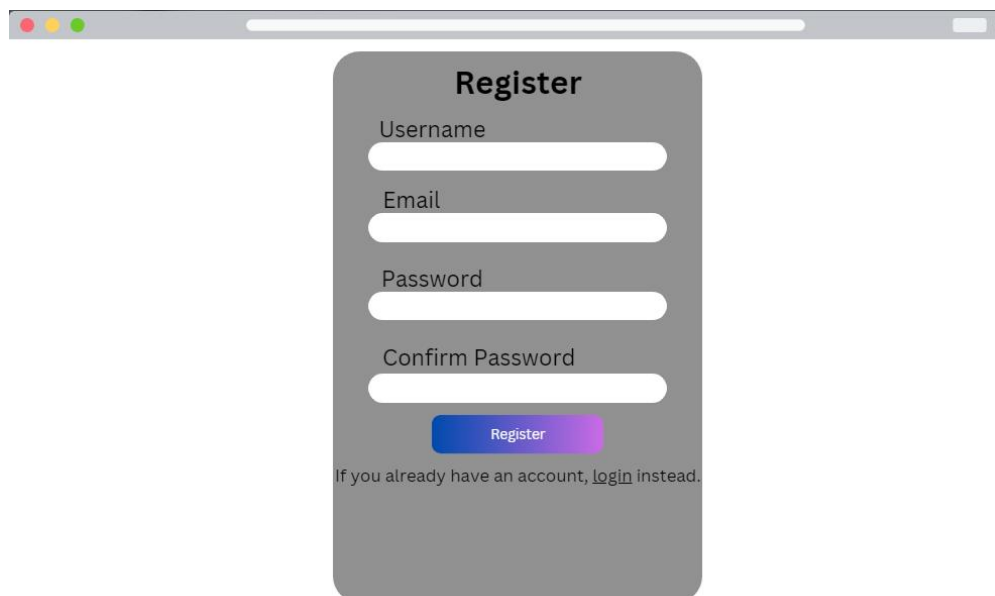
Data Store ID	Data Store Name	Data Store Description	Data Store Element			
			Name	Description	Type Of Data	Size Of Data
D5	User_rating	To store Recipe rating data	user_id	Primary Key for every data that store in Recipe Table. ID is unique	INT	10
			rating_total	Total of rating for the recipe	INT	100
			recipe_id	Foreign Key from Recipe data store table.	INT	10

### 3.5.6 Interface Design



The image shows a login page for Reseepy. It features a dark gray rounded rectangle centered on a white background. At the top of the rectangle is the title "Login" in bold black text. Below the title are two white input fields: "Username" and "Password". Underneath the password field is a blue button with the text "Login" in white. At the bottom of the rectangle, there is a link that says "Don't have an account? [Create an account.](#)". Above the form is a gray header bar with three colored circles (red, yellow, green) on the left and a white progress indicator on the right.

*Figure 3.15 : Login Page for Reseepy.*



The image shows a register page for Reseepy. It features a dark gray rounded rectangle centered on a white background. At the top of the rectangle is the title "Register" in bold black text. Below the title are four white input fields: "Username", "Email", "Password", and "Confirm Password". Underneath the "Confirm Password" field is a blue button with the text "Register" in white. At the bottom of the rectangle, there is a link that says "If you already have an account, [login](#) instead.". Above the form is a gray header bar with three colored circles (red, yellow, green) on the left and a white progress indicator on the right.

*Figure 3.16 : Sign Up Page for Reseepy.*

Figure 3.15 shows login page for the proposed system. To login, users must enter their username and password on this page. Their username and password will be validated once they have entered their valid username and password and clicked on Login button. If users have not yet made an account, they can do so by clicking on the *Create an Account* link, which will direct them to the Registration page as shown in Figure 3.13.

Figure 3.16 shows registration page. To register, users must create a username and password, as well as enter their email, confirm password. After users click on Register button and successfully create their account, the registration details to access this proposed system will be sent and store in database.

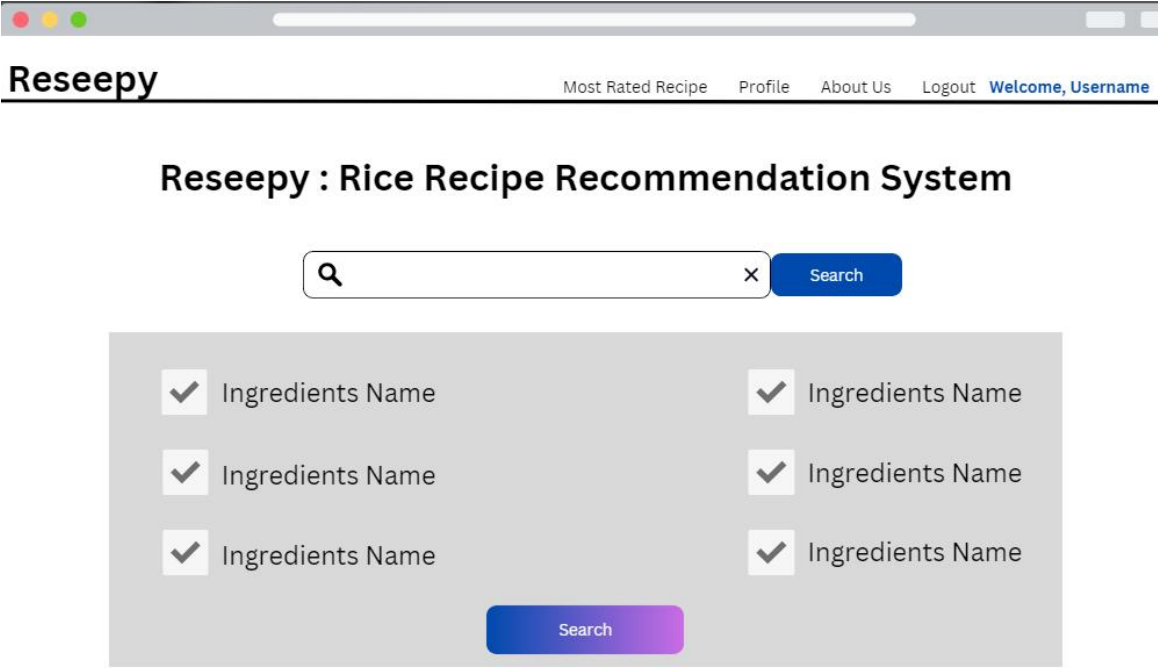


Figure 3.17 : Homepage of Reseepy.

Figure 3.17 shows the Homepage of *Reseepy*. When users access the system, this is the first page that will be display to them. This homepage contains search features, profile, about us, logout, list of ingredients checkbox and most rated rice recipe. The user

can select the ingredients on list of ingredients checkbox that been provided and when the user click on Search button, they will be directed to the page shown in Figure 3.18.

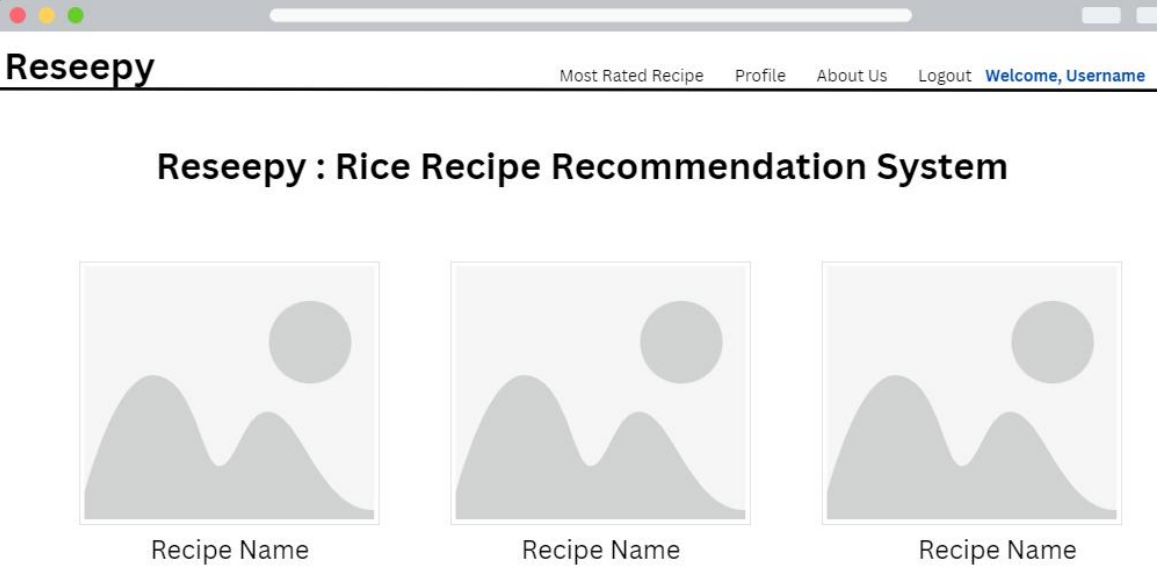
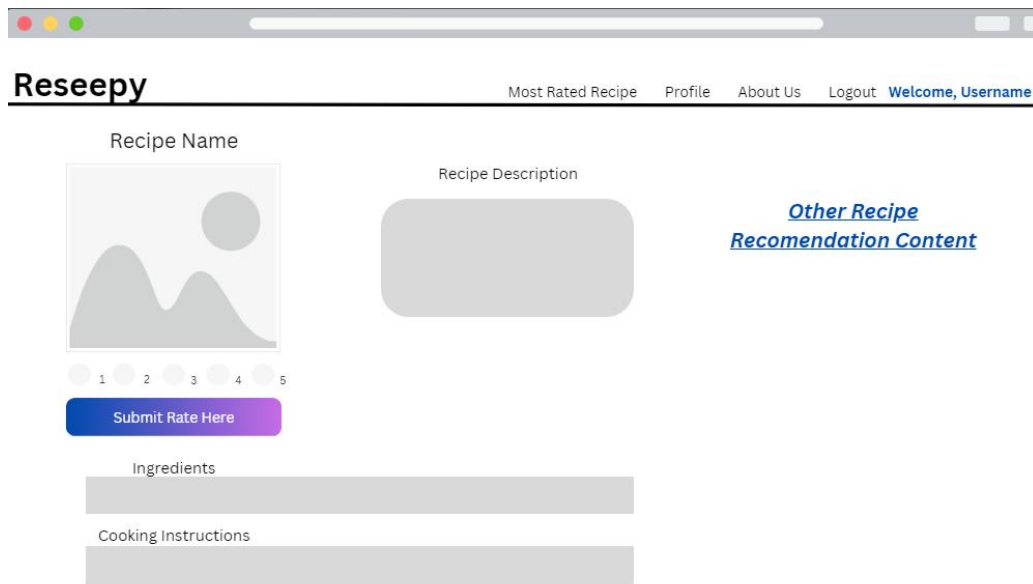


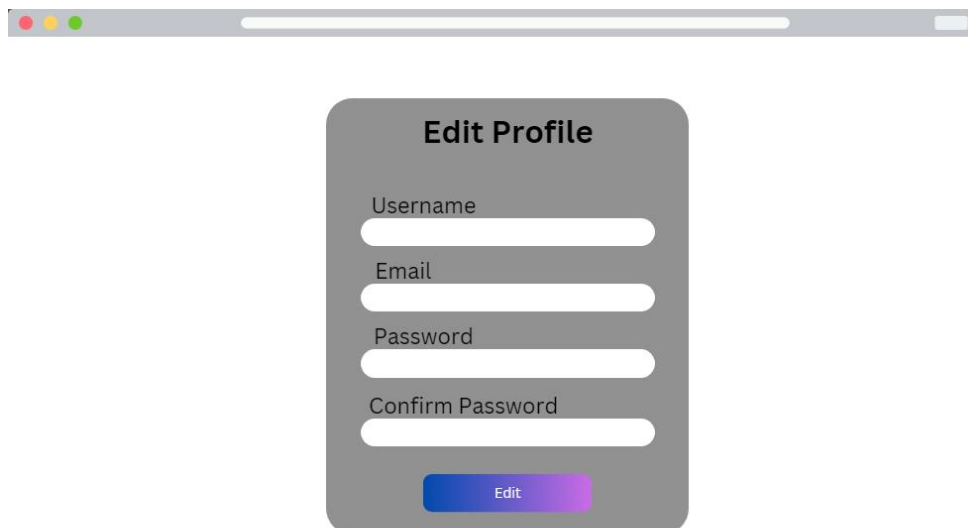
Figure 3.18 : Rice Recipe Result.

Figure 3.18 shows Rice Recipe Result page. This rice recipe result will be displayed after the users click on search button as shown in Figure 3.17. The result will come out and recommend the rice recipe based on the ingredients that been selected by user in Figure 3.17.



*Figure 3.19 : Recipe Details.*

Figure 3.19 presents the Recipe Details page. The user will be directed into this page after they click on the image of the recipe result as shown in Figure 3.18. This page will be displayed about the recipe description, ingredients, cooking instruction, rating features for the recipe result that been selected by the users. Other than that, there are other recipe recommendation content link on the right of recipe description area.



*Figure 3.20 : User Edit Profile*

Figure 3.20 shows the user profile which contains the users information details. This page enable the users to edit their profile such as username, password, email and confirm password.

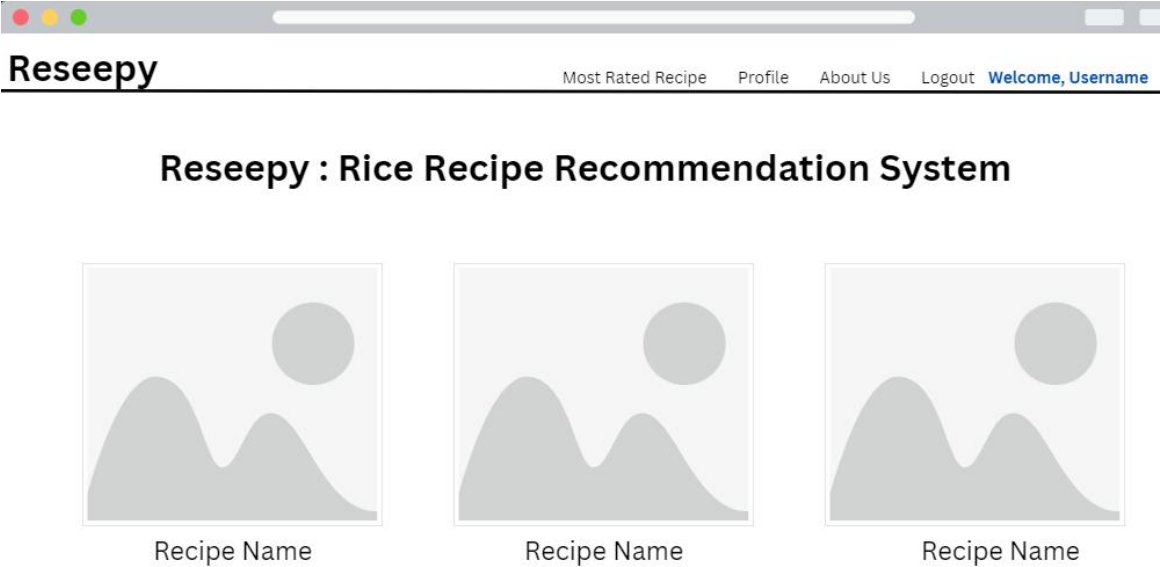
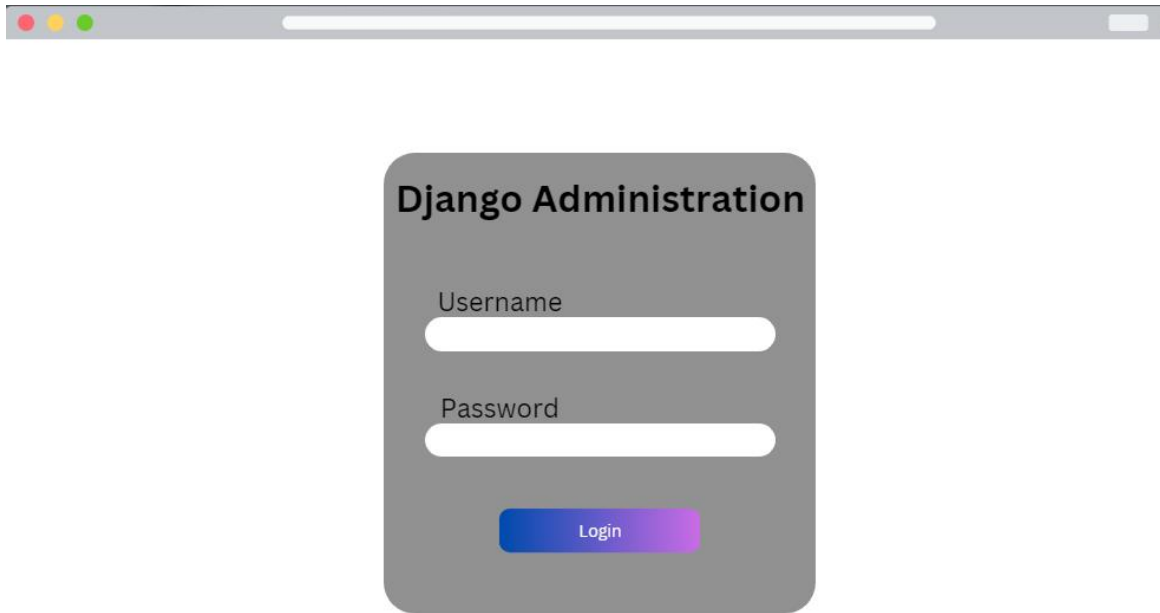


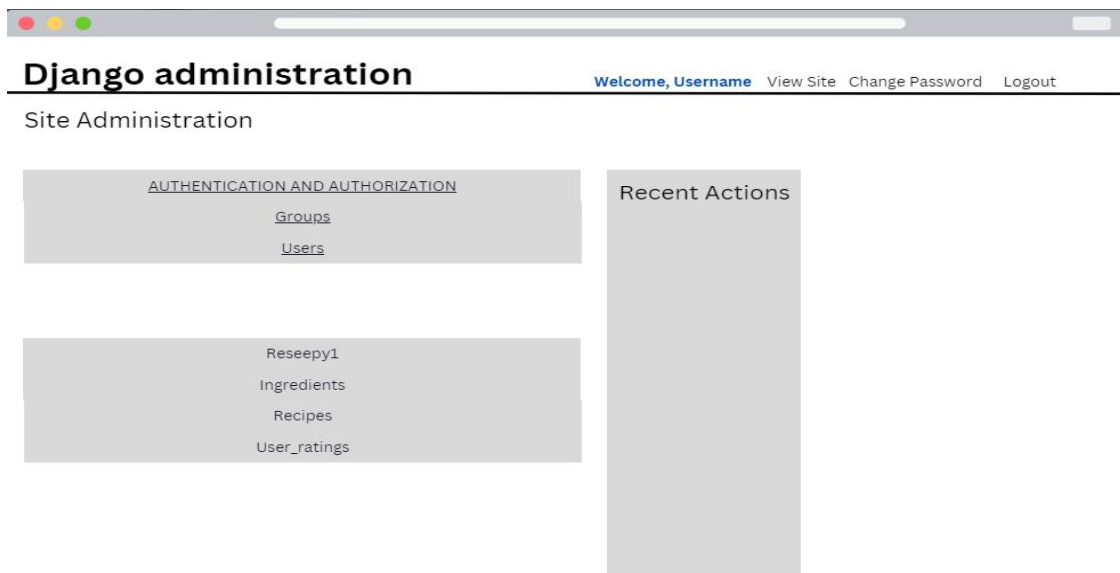
Figure 3.21 : Other Recommendation Recipe Content Page.

Figure 3.21 shows the Other Recommendation Recipe Content page. Here the other related rice recipe result will be show based on the ingredients that been selected by the user.



*Figure 3.22 : Admin Login Page.*

Figure 3.22 shows admin login page for the proposed system. To login, admin must enter their username and password on this page. Their username and password will be validated once they have entered their valid username and password and clicked on Login button.



*Figure 3.23 : Admin Homepage.*

Figure 3.23 shows Admin Homepage. There are 2 Categorizes that been shown which is Authentication and Authorization, and Reseepy1. For Authentication and Authorization category, this is to store, show, delete, edit the data inside the database for user and admin while for Reseepy1, its store, show, delete, edit the data for ingredients, recipe, and user\_rating. From this Admin Homepage, the admin can do CRUD actions towards both category.

### **3.6 Summary**

Overall, this chapter has covered the entire process of gathering project requirements and conducting analysis on these requirements. The system design has been successfully planned based on these requirements to guide for project next phase which is the execution phase.

## CHAPTER 4

### IMPLEMENTATION

#### 4.1 Introduction.

The implementation phase of the project was discussed in this chapter. The implementation of *Reseepy* will be explained in further detail in this chapter. This chapter will cover every technique, software, and hardware used in the development of this system, as well as the source code and user interface design. The system will be implemented by writing the source code for a web-based application and storing the data in the database that was created for this project.

Next, the system will go for the system testing phase. The main goal of testing is to ensure that the web based system is working effectively with minimal errors, as well as to test the web based system stability in all potential scenarios, so that it works well in the future. This system will be tested for functionality.

## 4.2 Reseepy : Rice Recipe Recommendation Web-based System Using Hybrid Filtering Prototype.

### 4.2.1 System Hierarchy

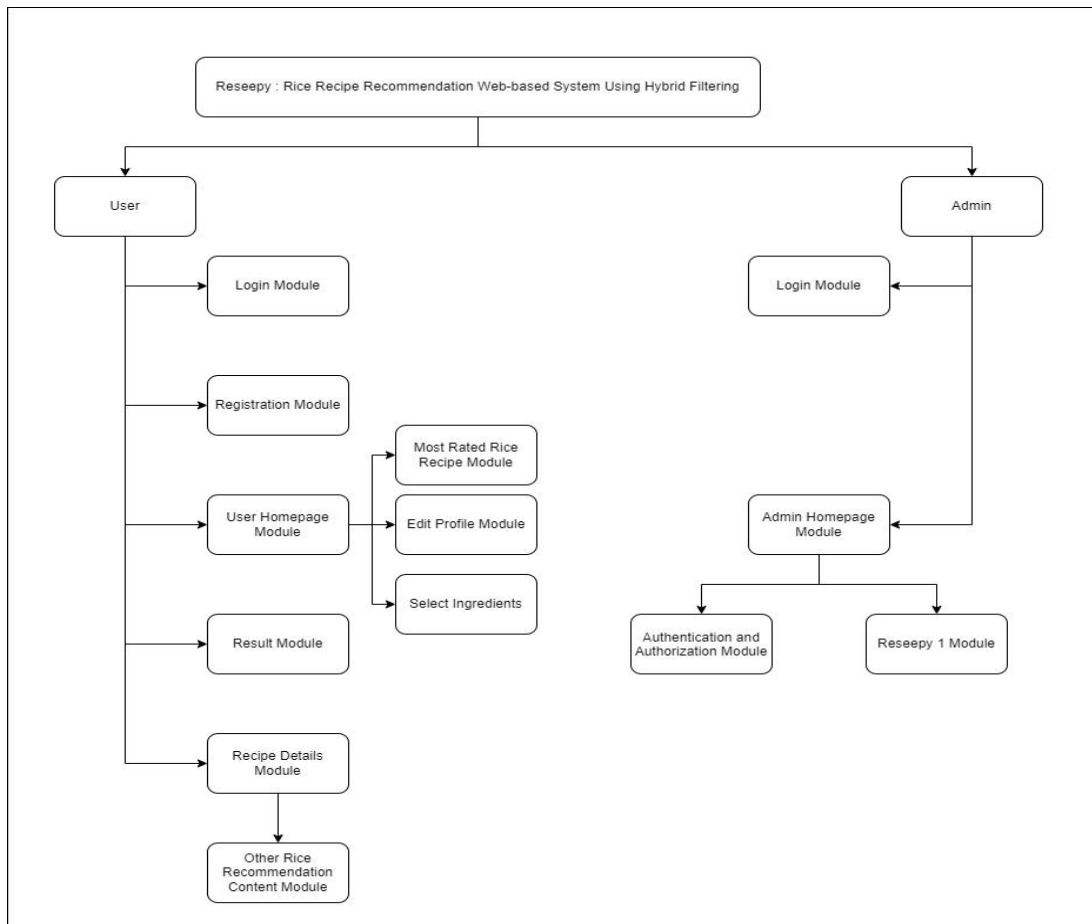
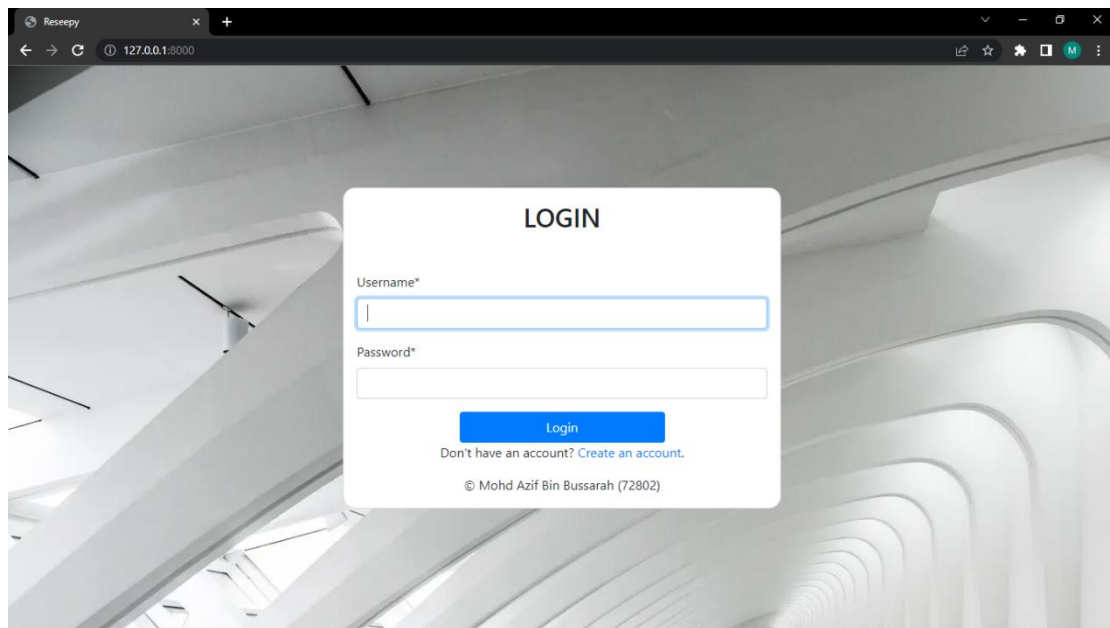


Figure 4.1 : Reseepy Hierarchy

Figure 4.1 show System Hierarchy for *Reseepy*. There are 2 parents that involved in this system which is User and Admin. The User consists 5 Module which is Login Module, Registration Module, Homepage Module, Result Module and lastly Details Module. On User Homepage Module consists 3 Sub Module which is Most Rated Rice Recipe Module, Edit Profile Module, and Select Ingredients while there are one Sub Module on Recipe Details Module which called Other Rice Recommendation Content Module. The Admin consists of 2 Module which is Login

Module, and Admin Homepage Module. On Admin Homepage Module consists of 2 Sub Module which is Authentication and Authorization Module, and Reseepy1 Module.

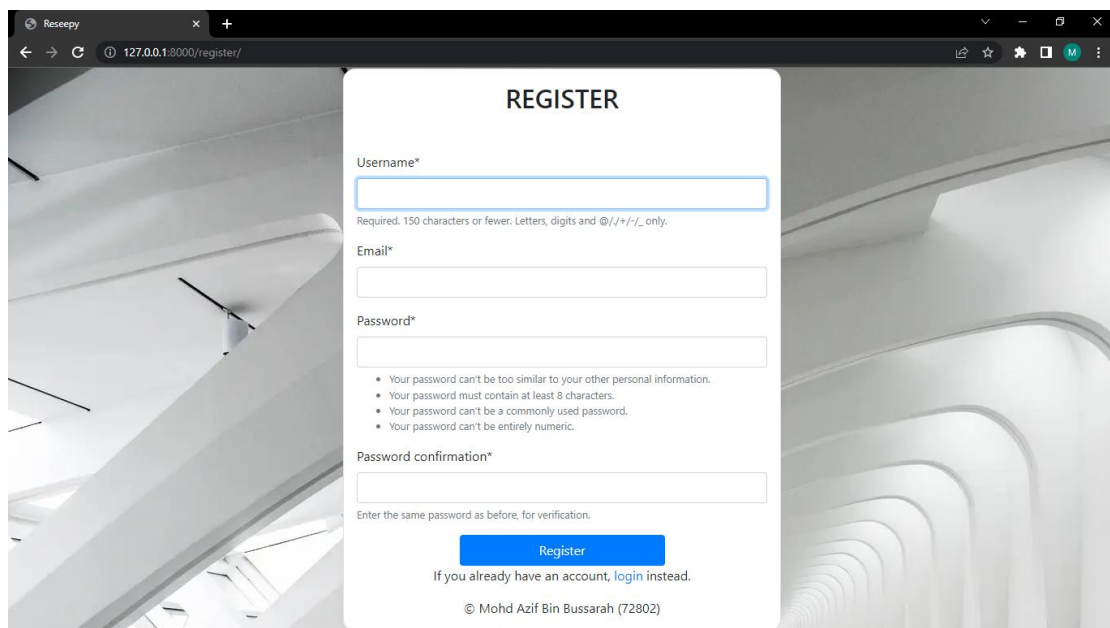
#### 4.2.2 Login Module (User)



*Figure 4.2 : User Login Module.*

Figure 4.2 show the login interface for user. This login function is to able the user access the *Reseepy*. The user need to fill their username and password on the input field. After they fill the input field, they need to click the Login button, they will be directed directly to the Homepage of the *Reseepy* that been shown in Figure 4.3. Before they can access the system, they need to register themselves in Figure 4.2.

### 4.2.3 Registration Module (User)

The image shows a web browser window with the URL '127.0.0.1:8000/register/'. The page title is 'REGISTER'. The form contains the following fields and instructions:

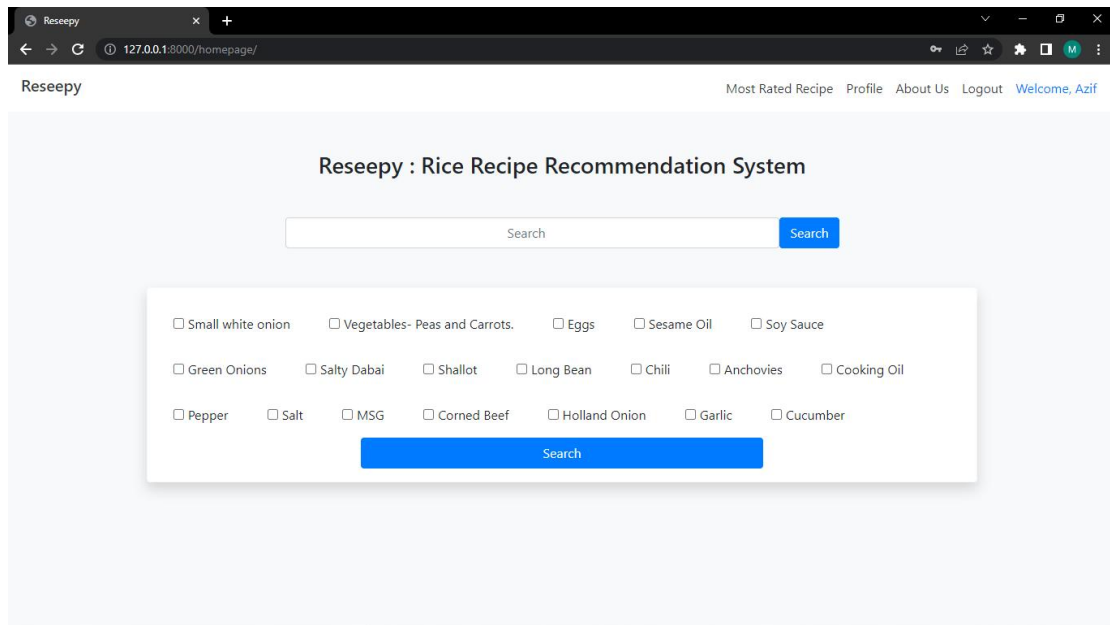
- Username\***: A text input field. Below it, the instruction reads: 'Required. 150 characters or fewer. Letters, digits and @/+/./\_ only.'
- Email\***: A text input field.
- Password\***: A text input field. Below it, the instructions are:
  - Your password can't be too similar to your other personal information.
  - Your password must contain at least 8 characters.
  - Your password can't be a commonly used password.
  - Your password can't be entirely numeric.
- Password confirmation\***: A text input field. Below it, the instruction reads: 'Enter the same password as before, for verification.'

At the bottom of the form is a blue 'Register' button. Below the button, it says 'If you already have an account, [login](#) instead.' At the very bottom, there is a copyright notice: '© Mohd Azif Bin Bussarah (72802)'.

*Figure 4.3 : User Registration Module*

Figure 4.3 show Registration Form interface for *Reseepy*. The registration function is to store the user data. User need to register themselves before they can access into the system. To register, the user need to fill the form and click register button to make their registration stored in database and the data that been stored can be used to login. The user need to follow the instruction below every input field to make the registration successful.

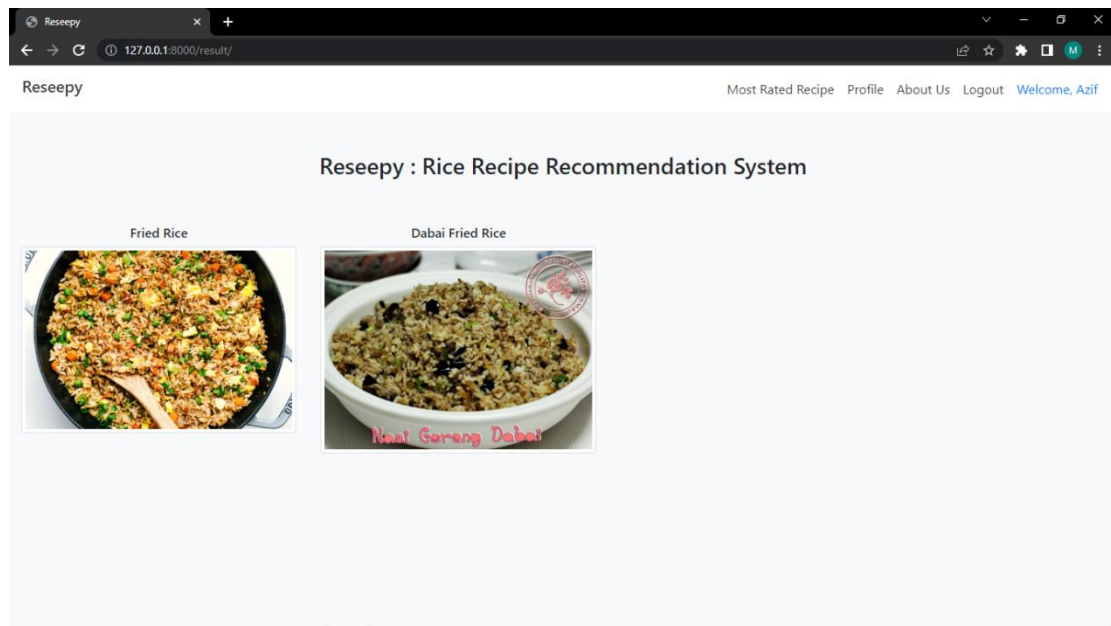
## 4.2.4 Homepage Module (User)



*Figure 4.4 : User Homepage Module*

Figure 4.4 show the Homepage for *Reseepy*. This Homepage include one of the Sub Module for Homepage Module which is Select Ingredients. The select ingredients function is to recommend the rice recipe based on the ingredients that been selected by the user. The ingredients data that been selected by the user will be used to recommend the rice recipe by Content-Based Filtering. User select the ingredients that are available at their place and after finish select the ingredients, the user need to click on search button below to get the recommendation of rice recipe as shown in Figure 4.5.

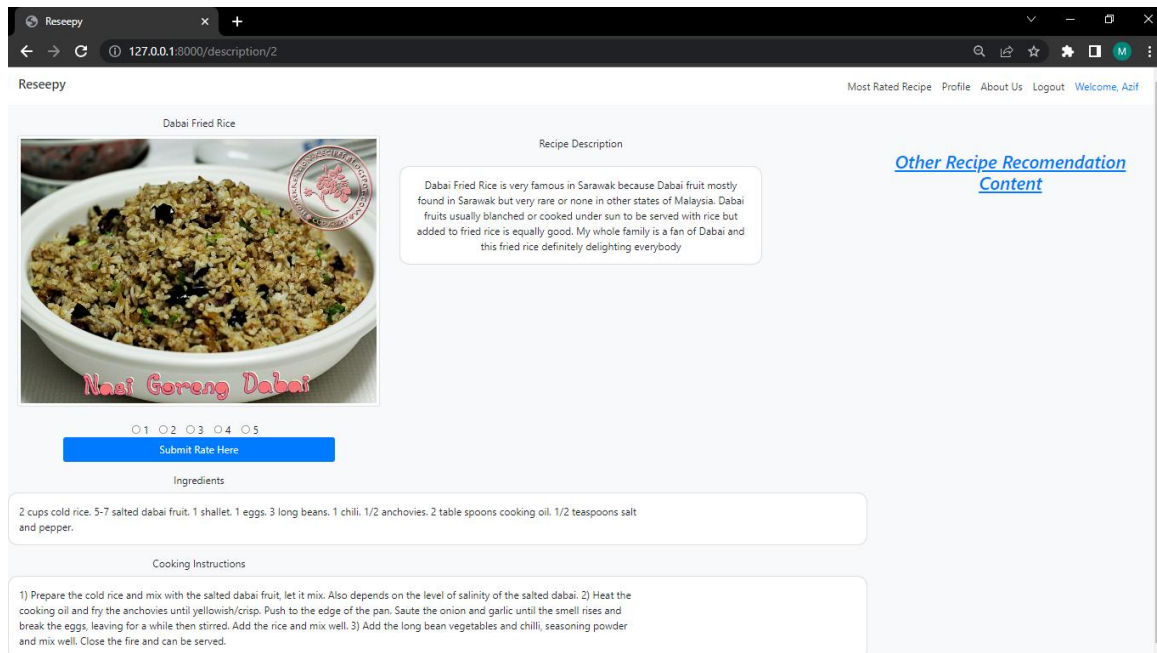
## 4.2.5 Result Module (User)



*Figure 4.5 : User Result Module*

Figure 4.5 show Result Page. This page will give the rice recipe result based on the ingredients that been selected by the user in Figure 4.4. The result will shown rice name and the image of the rice. User can choose and click the image of the result. After the user clicked on the image of the rice recipe result that been chosen by the user, they will be redirect into Recipe Details that been shown in Figure 4.6.

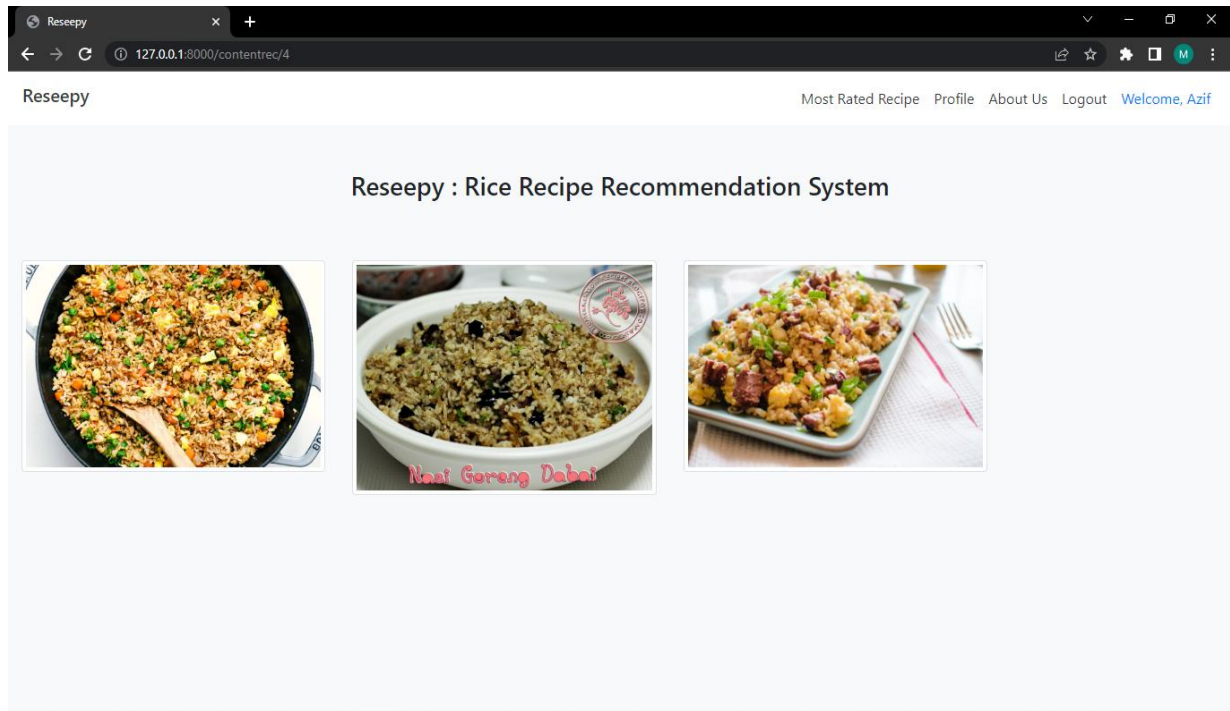
## 4.2.6 Details Module (User)



*Figure 4.6 : User Details Module*

Figure 4.6 show the Details of the recipe. After the user click the image on result page shown in Figure 4.5 based on the ingredients that been selected in Figure 4.4, the user will be redirect into this module based on the recipe name and image that been chosen or click by user. The function of this page is to retrieve all the recipe data that been chosen by the user. The rating under the image of the recipe is to get the rating total of the recipe and the rating total data will be used for Collaborative Filtering.

## 4.2.7 Other Rice Recommendation Content Module (User(Sub Module of Recipe Details Module))



*Figure 4.7 : Other Rice Recommendation Content Page.*

Figure 4.7 shows Other Rice Recommendation Content page. The data that been selected at Homepage that been shown in Figure 4.4 will be used to recommend other rice recipe that have same recipe based on the ingredients that been selected by user and recommend on Figure 4.5. The result shown in Figure 4.7 above, give the other recommend result for the rice recipe.

## 4.2.8 Edit Profile Module (User(Sub Module of Homepage Module))

**EDIT PROFILE**

Username\*

Azif

Required. 150 characters or fewer. Letters, digits and @,./+!/\_ only.

Email\*

mohd.azif04@gmail.com

Password\*

- Your password can't be too similar to your other personal information.
- Your password must contain at least 8 characters.
- Your password can't be a commonly used password.
- Your password can't be entirely numeric.

Password confirmation\*

Enter the same password as before, for verification.

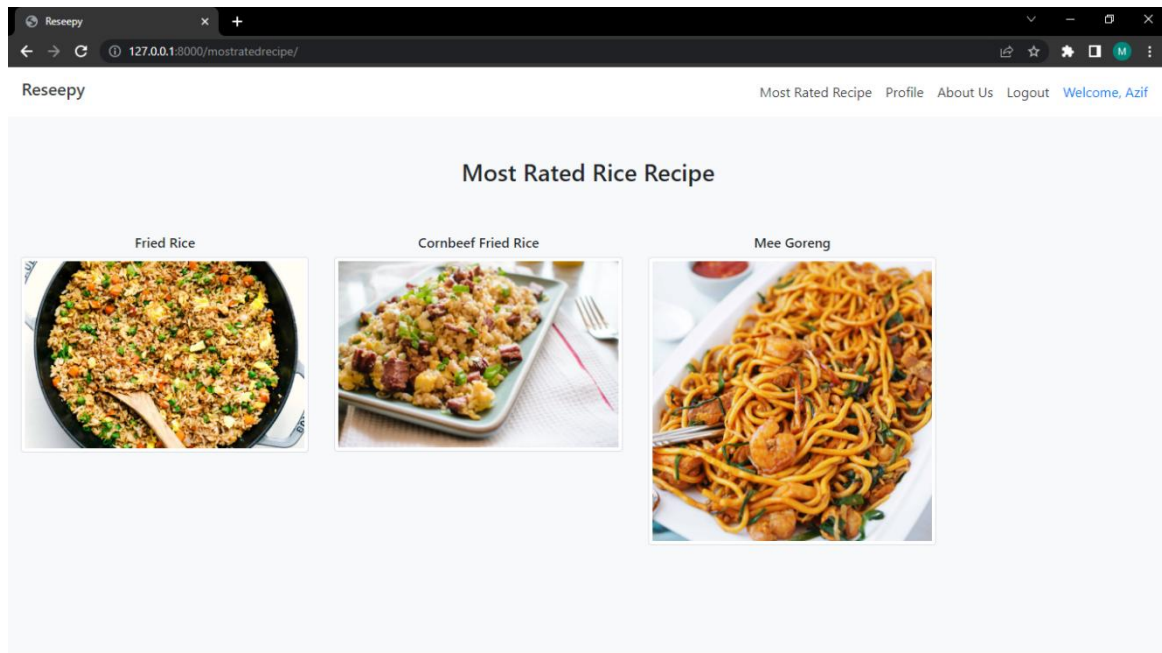
Edit

© Mohd Azif Bin Bussarah (72802)

*Figure 4.8 : Edit Profile Page.*

Figure 4.8 shows Edit Profile Page. The function of this edit profile page is to updated the exist user data information in database. The user need to fill the input field that been provide with new information such as username, email, and password. After the user fill all the input field, user need to click on Edit button to update the data inside the database.

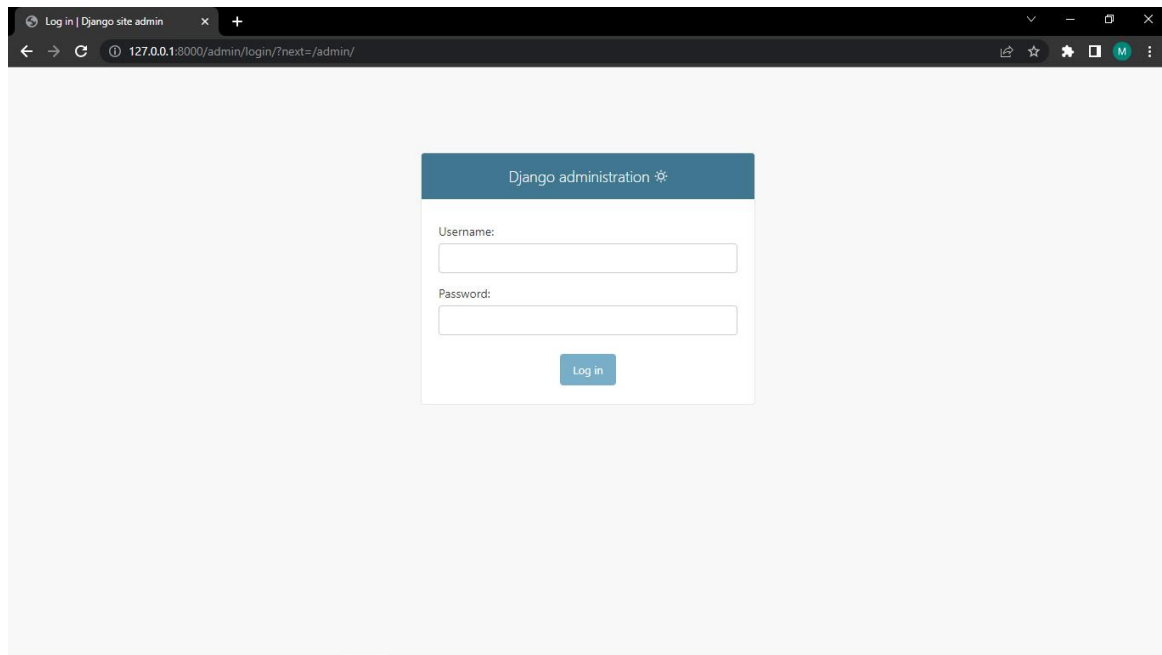
#### 4.2.9 Most Rated Rice Recipe Module (User(Sub Module of Homepage Module))



*Figure 4.9 : Most Rated Rice Recipe Page.*

Figure 4.9 shows the Most Rated Rice Recipe. The function of this page is to retrieve the rice recipe based on rating total that been done by the user in Figure 4.6. This page will show the rice recipe that have the rating total above 5. This page also to prove that the Collaborative Filtering also applied on this *Reseepy* since this proposed system using Hybrid Filtering Method.

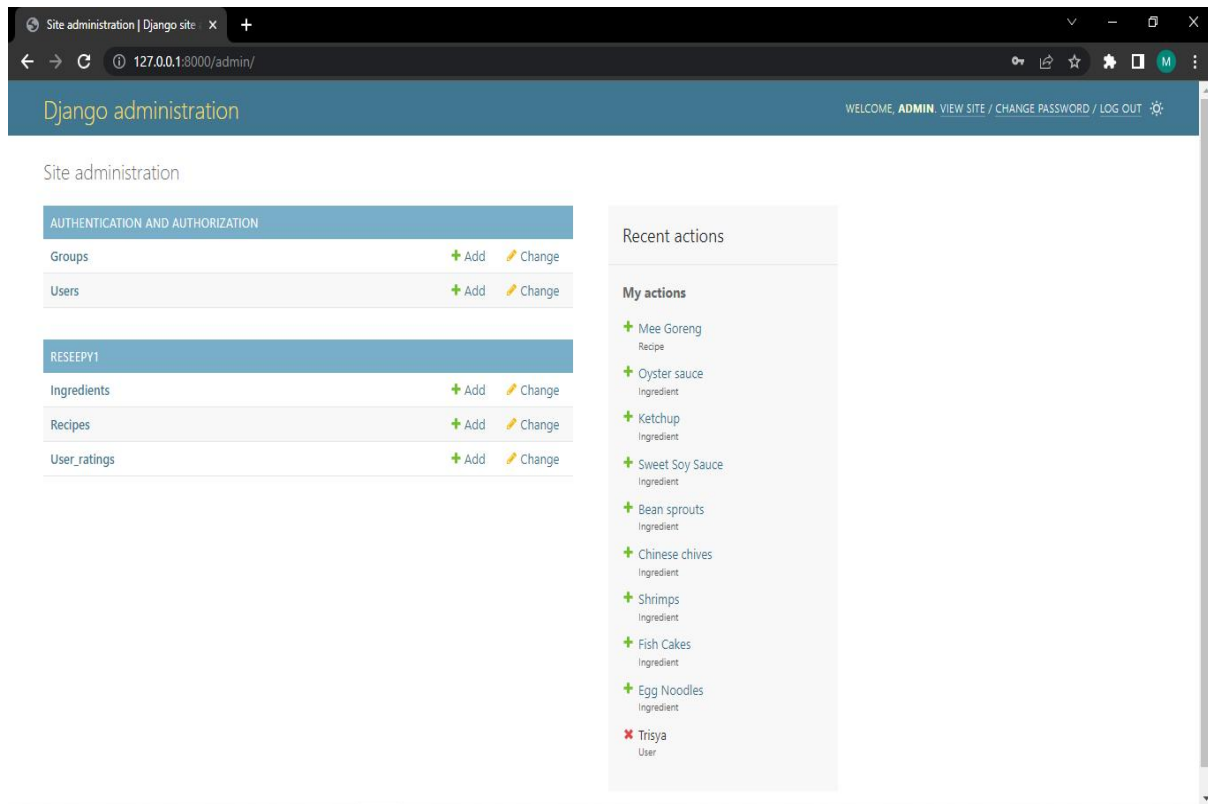
## 4.2.10 Login Module (Admin)



*Figure 4.10 : Admin Login Page Module.*

Figure 4.10 show Login interface for Admin. This login function is to able the admin access the Admin site. The admin need to fill their username and password on the input field. After they fill the input field, they need to click the Login button, they will be directed directly to the Homepage of the Admin that been shown in Figure 4.11.

## 4.2.11 Homepage Module (Admin)



*Figure 4.11 : Admin Homepage Page Module*

Figure 4.11 shows Admin Homepage. The function of this admin homepage is to enable the admin to do Create, Read, Update, Delete (CRUD) action on Users, Ingredients, Recipes, and User\_ratings database table. If the admin want to do CRUD action on Users database table, the admin need to clicks Users on Authentication and Authorizations category. After the admin clicks on Users, they will be redirected to the page that been shown in Figure 4.12. Beside that, if the admin want to do CRUD action on Ingredients, Recipes, and User\_rating database table, they need to click the link that been provide on Reseepy1 category. The page for Ingredients, Recipes, and User-rating will be shown in Figure 4.13, Figure 4.14, and Figure 4.15.

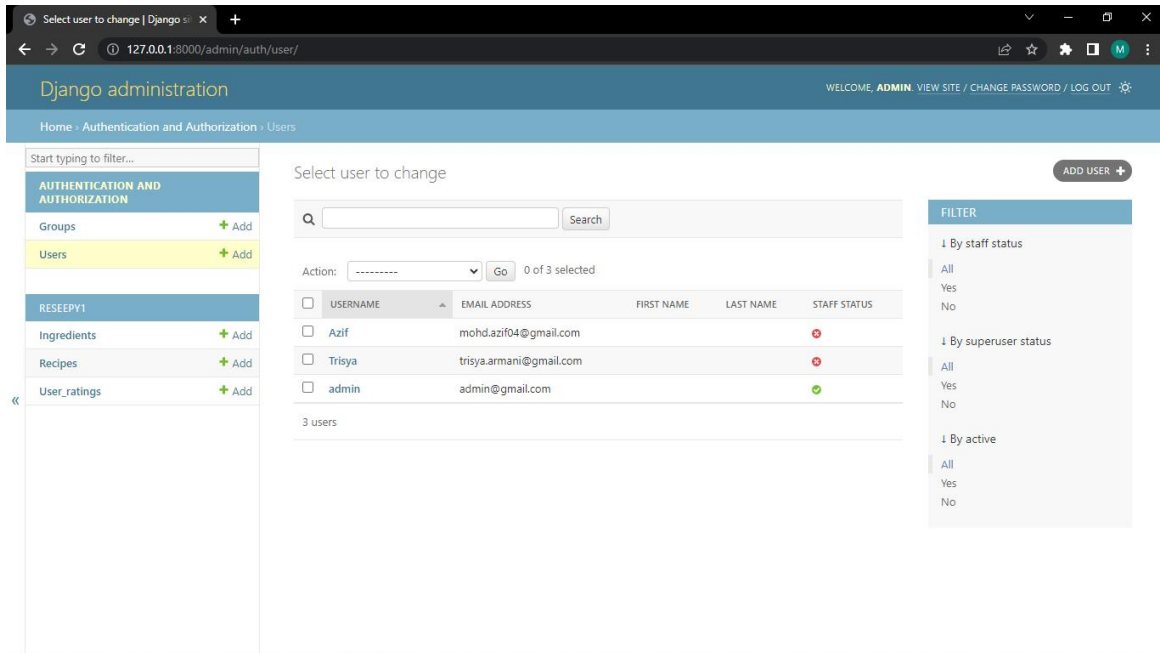


Figure 4.12 : Users Data Page.

If the admin want to edit the users data, they need to click the username data that they want to edit. To delete data, they need to click the checkbox and click on dropdown button at the top of the data table and selected *Deleted selected users*. After selected the Deleted selected users, click go and the data that been chosen will be removed from database. This method is same for other database table such as Ingredients, Recipes and User\_rating.

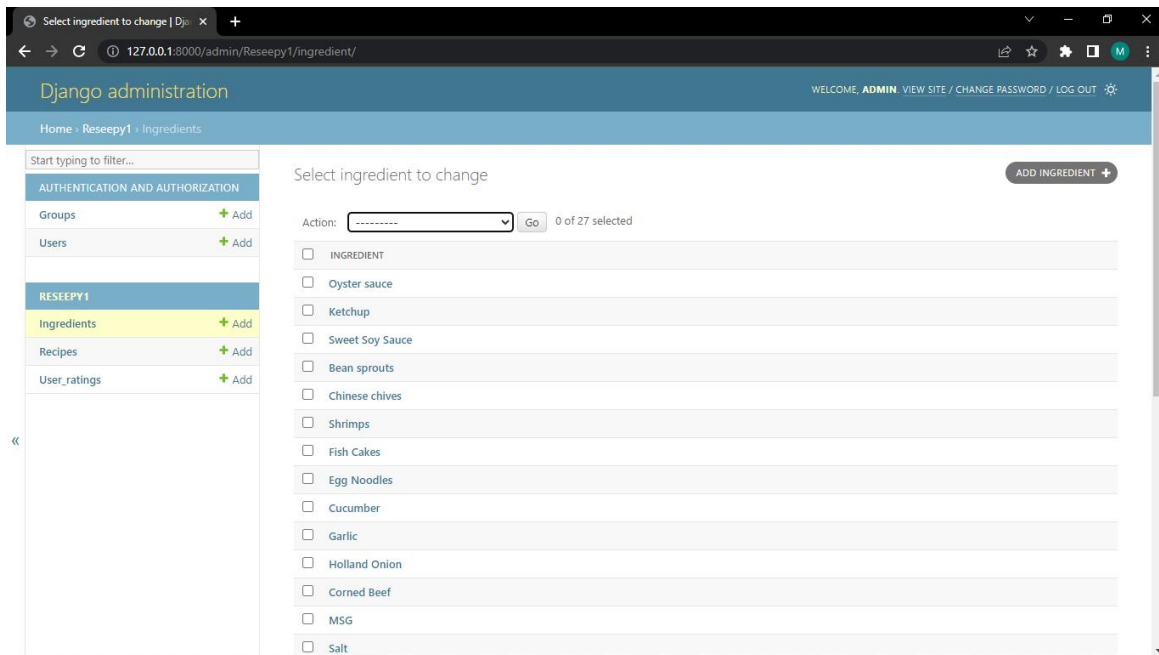


Figure 4.13 : Ingredients Data Page.

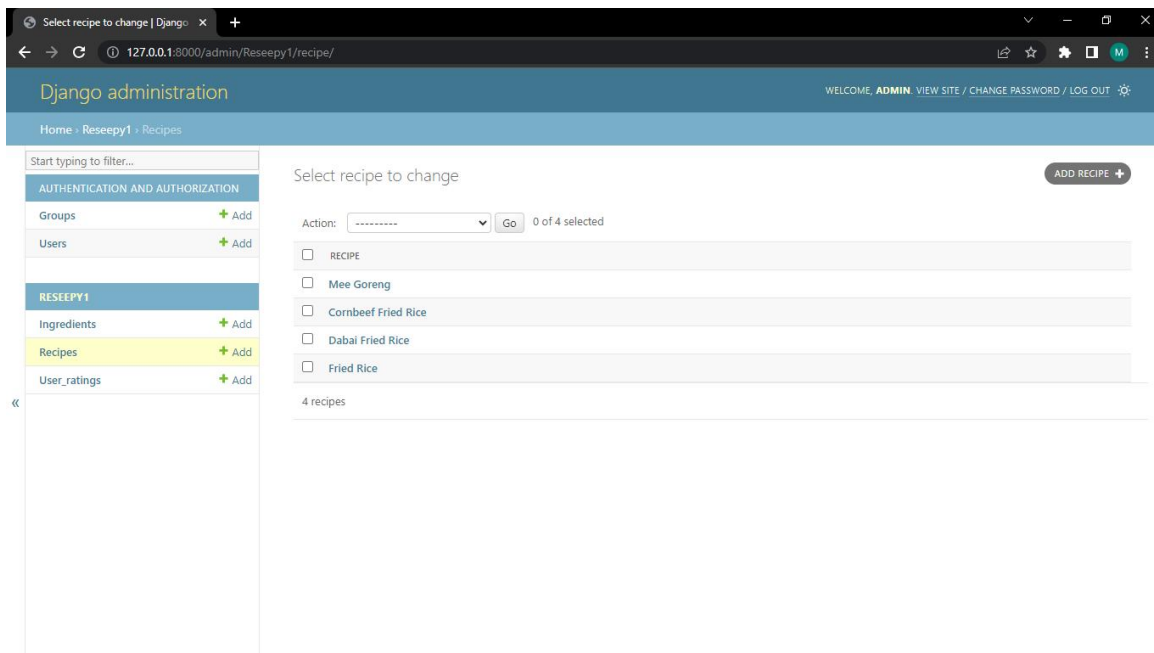


Figure 4.14 : Recipes Data Page.

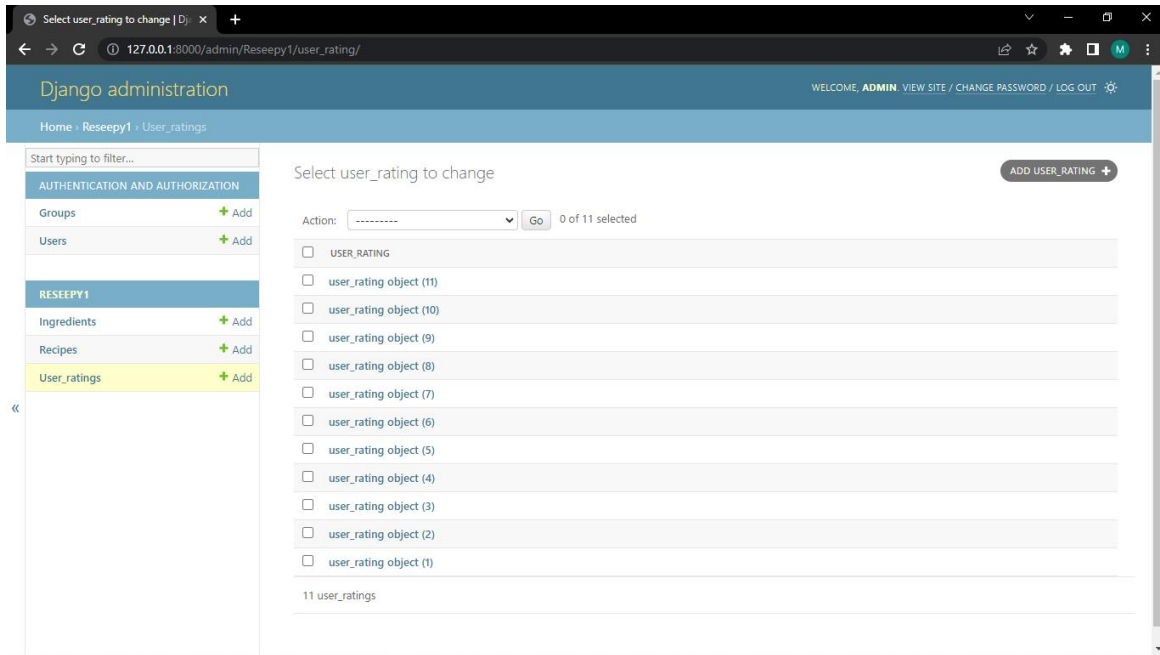


Figure 4.15 : User\_rating Data Page

### 4.3 Discussion

Learning a new programming language, such as Python, can present challenges to individuals entering the world of coding. Python, known for its simplicity and versatility, is widely used in various domains of software development. However, mastering the language requires effort and dedication. One common difficulty is understanding the syntax and grammar rules unique to Python. The language's indentation-based structure can be confusing for beginners. Additionally, learning how to use Python libraries and frameworks effectively can be overwhelming. However, with perseverance, consistent practice, and utilizing resources like online tutorials, coding exercises, and interactive coding platforms, one can overcome these hurdles and become proficient in Python programming.

When it comes to changing an Entity-Relationship Diagram (ERD), discrepancies and inconsistencies can arise if the modifications are not handled properly. An ERD serves as a visual representation of the relationships and attributes within a database system. Ensuring that the ERD accurately reflects the structure and relationships is crucial for maintaining data integrity. Problems may arise when changes are made without proper reconciliation, leading to data inconsistencies and errors in the database. To avoid these issues, a careful and systematic approach should be followed, which includes analyzing the required changes, documenting the modifications, and collaborating with stakeholders to ensure a coherent and accurate ERD that aligns with the system's requirements.

Finding suitable hosting for a Django framework, a popular Python web framework, can be a challenging task for individuals who are not well-versed in web development. Django offers a powerful and comprehensive toolkit for building web

applications, but selecting the right hosting provider that supports Django and meets performance and scalability requirements can be a daunting process. Factors such as server compatibility, available resources, scalability options, and technical support need to be considered. Conducting thorough research, reading user reviews, and seeking recommendations from experienced developers can help identify hosting providers that cater to Django-based applications, ensuring a smooth and efficient deployment process.

Algorithm development often poses difficulties, even for experienced programmers. Creating efficient algorithms requires a strong understanding of data structures, problem-solving techniques, and algorithmic patterns. Complex computational problems or large datasets can make the process even more challenging. Breaking down problems into smaller, manageable components and applying logical thinking are essential steps in algorithm development. Additionally, studying existing solutions, collaborating with peers, and continually improving algorithmic skills through practice and learning can help overcome the challenges associated with algorithm development.

Locating authentic rice recipes originating from Kuching, a city in Malaysia known for its rich culinary heritage, can be a daunting task for food enthusiasts. The unique flavors and cooking techniques specific to Kuching's culinary traditions can be challenging to find in mainstream recipe sources. Language barriers, limited availability of resources, and the need for detailed and accurate recipes can further complicate the search. To overcome these difficulties, it is recommended to explore local cookbooks, engage with the local community, and connect with individuals who have knowledge of Kuching's traditional recipes. Additionally, seeking out local food blogs, websites, or social media groups dedicated to Kuching cuisine can provide valuable insights and lead

to the discovery of authentic rice recipes that showcase the flavors and cultural heritage of Kuching.

#### **4.4 Summary**

The formation of the system has been mentioned and analyzed in this chapter from the perspectives of admin and users. All of the functionalities are built around the requirements outlined in Chapter 3.

## CHAPTER 5

### TESTING

#### 5.1 Introduction

Testing is an important part of the development and deployment of any software system. As software applications get more complicated and important, assuring their dependability, usefulness, and performance becomes increasingly important. This is especially important in final-year projects, when implementing creative solutions and demonstrating their effectiveness are critical goals. A final year project's testing phase allows you to examine the project's functionality, robustness, and adherence to specifications, proving its success and potential effect.

This chapter will provide a thorough summary of the testing process for the final year project, *Reseepy: Rice Recipe Recommendation Web-based System Using Hybrid Filtering*.

## **5.2 Functionality Testing**

### **5.2.1 Overview**

Functionality testing for a rice recipe recommendation web-based system using hybrid filtering involves testing various features to ensure they work correctly. This includes verifying user registration and authentication, testing the recipe search functionality, evaluating the effectiveness of content-based and collaborative filtering, checking the system's ability to personalize recommendations, testing user feedback integration, and assessing performance and error handling. Compatibility with different browsers and devices should be tested, along with usability testing. The goal is to ensure that the system provides accurate and personalized rice recipe recommendations to users while maintaining a smooth and error-free user experience.

### 5.2.2 List of Functionality Testing Results

Table 5.1 : Functional Testing for Registration Table.

Module (or Sub- module) Name:	Register							
Test Case Descripti on:	To Test and Verify the register page working							
Testing Objective :	Able to register the user and store the data into database.							
Remarks:								
Test Case ID	Test Scenario	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail/Not	Severity Failure	Notes

						Executed/Suspended)	(Low/Medium/High/Critical)	
FT0001_1	Verify register with <b>invalid</b> format of information on	1. Click on Create an Account. 2. Provide invalid format of information 3. Click Register button	Username : Azif Email : mohd.azif Password : budakbaik98 Confirm Password : Budakbaik98	Show errors and the registration unsuccessful	As expected	Pass	Medium	Email format is invalid without @ .
FT0001_2	Verify register	1. Click on Create an	Username : Azif	Show errors and the	As expected	Pass	Medium	Confirm Password must be same with

	with <b>invalid</b> format of informati on	Account. 2. Provide invalid format of information 3. Click Register button	Email : mohd.azif@g mail.com Password : budakbaik98 Confirm Password : Budakbaik97	registration unsuccessful				Password.
FT0001_ 3	Verify register with <b>valid</b> format of informati on	1. Click on Create an Account. 2. Provide invalid format of information	Username : Azif Email : mohd.azif@g mail.com Password : budakbaik98	Account Registered	As expected	Pass	Low	

		3. Click Register button	Confirm Password : Budakbaik98					
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Table 5.2: Functional Testing for Login Table.

Module (or Sub- module) Name:	Login							
Test Case Descripti on:	To Test and Verify the login page working							
Testing Objective :	Able to access the system.							
Remarks:								
Test Case ID	Test Scenario	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail/Not Executed/Sus pended)	Severity Failure (Low/Mediu m/High/Criti	Notes

							cal)	
FT0002_ 1	Verify login with <b>invalid</b> username	1. Navigate to login page 2. Enter invalid username and password 3. Click login button	Username : Hariz@gmail.com Password : Budakbaik98	Login unsuccessfull	As expected	Pass	Medium	Must login by using username.
FT0002_ 2	Verify login without fill the	1. Navigate to login page 2. Enter	Username : Password :	Login unsuccessfull and error message	As expected	Pass	Medium	Must fill the input field with <b>valid</b> information and make sure the

	input field.	invalid username and password 3. Click login button		appeared.				input field not empty.
FT0002_3	Verify login with <b>valid</b> information	1. Navigate to login page 2. Enter invalid username and password 3. Click	Username : Azif Password : @Budakbaik98	Login successful	As expected	Pass	Medium	

		login button						
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Table 5.3 : Functional Testing for Manage Profile Account Table.

Module (or Sub- module) Name:	Manage Profile Account							
Test Case Descripti on:	To Test and Verify the edit profile, change password function.							
Testing Objective :	Able to edit profile account.							
Remarks:								
Test Case ID	Test Scenario	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail/Not Executed/Sus	Severity Failure (Low/Mediu	Notes

						pended)	m/High/Critical)	
FT0003_1	Verify edit profile function	1. Navigate to profile at navbar. 2. Click edit button. 3. Enter new username, email, password and confirm password.	Username : Abu Email : <a href="mailto:Abu@gmail.com">Abu@gmail.com</a> Password : @Qwertyuio p98 Confirm Password : @Qwertyuio p98	The username and email is updated successfully.	As expected	Pass	Medium	None
FT0003_1	Verify	1. Navigate	Password :	Show current	As expected	Pass	Medium	Confirm password

2	change password function with incorrect current password d	to profile at navbar. 2. Click edit button. 3. Enter new username, email, password and confirm password.	@Qwertyuio p98 Confirm Password : @Qwertyuio p97	password is incorrect and change password unsuccessful				must be tally with Password.
FT0003_3	Enter exist username e	1. Navigate to profile at navbar. 2. Click edit button.	Old Username : Azif New Username :	Edit Profile Unsuccesfull	As expected	Pass	Medium	New Username cannot same with Old Username

		3. Enter new username, email, password and confirm password.	Azif					
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Table 5.4 : Functional Testing for Select Ingredients Table.

Module (or Sub- module) Name:	Select Ingredients							
Test Case Descripti on:	To test the selection of ingredients							
Testing Objective :	Able the user get recommendations of rice recipe based on selected ingredients.							
Remarks:								
Test Case ID	Test Scenario	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail/Not Executed/Sus pended)	Severity Failure (Low/Mediu m/High/Criti	Notes

							cal)	
FT0004_1	Select the ingredients less than 3.	1. Login into the system. 2. Select the ingredients. 3. Click Search button	Ingredients name data.	The submit button disabled.	As expected	Pass	Low	User must select more than 3 ingredients
FT0004_2	Select unrelated ingredients for rice recipe.	1. Login into the system. 2. Select the ingredients. 3. Click search button	Ingredients name	Recommendation not generated	As expected	Pass	Low	User must select the ingredients that related to rice recipe.

FT0004_3	Select more than 3 ingredients	1. Login into the system. 2. Select the ingredients. 3. Click search button	Ingredients name	Rice recipe recommendations generated based on ingredients that been selected.	As expected	Pass	Low	None
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Table 5.5 : Functional Testing for Insert Ingredients Table.

Module (or Sub- module) Name:	Insert ingredients							
Test Case Descripti on:	To test and verify the insertion of ingredients data in database.							
Testing Objective :	Able to store the ingredients data							
Remarks:								
Test Case ID	Test Scenario	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail/Not Executed/Sus pended)	Severity Failure (Low/Mediu m/High/Criti	Notes

							cal)	
FT0005_1	Insert ingredients name in Admin side on ingredients input field.	1. Login as admin at Admin side. 2. Click on ingredients under Reseepy1 category. 3. Click add ingredients on top right.	Ingredients data	Able to save and store the data.	As expected	Pass	Low	None

Table 5.6 : Functional Testing for Delete Ingredients Table

Module (or Sub- module) Name:	Delete Ingredients							
Test Case Description:	To test the delete function for ingredients in Admin site							
Testing Objective :	Able to delete the ingredients name in database.							
Remarks:								
Test Case ID	Test Scenario	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail/Not Executed/Sus	Severity Failure (Low/Mediu	Notes

						pended)	m/High/Critical)	
FT0006_1	Select the ingredients name.	1. Login as admin at Admin side. 2. Click on ingredients under Reseepy1 category. 3. Select ingredients name. 4. After selected,	Ingredients data	The alert will appeared to ask weather we want to delete the data.	As expected	Pass	Low	The data deleted.

		click on drop down at top. 5. Choose delete selected ingredients. 6. Click on go button.						
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Table 5.7 : Functional Testing for Edit Ingredients Table

Module (or Sub- module) Name:	Edit Ingredients							
Test Case Descripti on:	To test edit function for ingredients in Admin site							
Testing Objective :	Able to edit the ingredients name.							
Remarks:								
Test Case ID	Test Scenario	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail/Not Executed/Sus	Severity Failure (Low/Mediu	Notes

						pended)	m/High/Critical)	
FT0007_1	Select ingredients name	1. Login as admin at Admin side. 2. Click on ingredients under Reseepy1 category. 3. Click on the ingredients name that want to edit.	Ingredients data	The ingredients name that been selected will be retrieve.	As expected	Pass	Low	The ingredients name updated.

Table 5.8 : Functional Testing for Insert Recipe Table

Module (or Sub- module) Name:	Insert Recipe							
Test Case Description:	To test insert function for recipe in Admin site.							
Testing Objective :	Able to store the recipe data.							
Remarks:								
Test Case ID	Test Scenario	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail/Not Executed/Sus	Severity Failure (Low/Mediu	Notes

						pended)	m/High/Critical)	
FT0008_1	Verify insert function	1. Login as admin at Admin side. 2. Click on recipe under Reseepy1 category. 3. Click add recipe on top right.	Recipe data	Able to save and store the data.	As expected	Pass	Low	None

Table 5.9 : Functional Testing for Delete Recipe Table

Module (or Sub- module) Name:	Delete Recipe							
Test Case Description:	To test delete function for recipe at Admin site							
Testing Objective :	Able to delete the recipe data							
Remarks:								
Test Case ID	Test Scenario	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail/Not Executed/Sus	Severity Failure (Low/Mediu	Notes

						pended)	m/High/Critical)	
FT0009_1	Verify delete function	1. Login as admin at Admin side. 2. Click on recipe under Reseepy1 category. 3. Select recipe name. 4. After selected, click on drop down at top.	Recipe data	The alert will appeared to ask weather we want to delete the data.	As expected	Pass	Low	The recipe name deleted.

		5. Choose delete selected recipes. 6. Click on go button.						
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Table 5.10 : Functional Testing for Edit Recipe Table

Module (or Sub- module) Name:	Edit Recipe							
Test Case Description:	To test the edit function for recipe in Admin site							
Testing Objective :	Able to edit recipe data							
Remarks:								
Test Case ID	Test Scenario	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail/Not Executed/Sus	Severity Failure (Low/Mediu	Notes

						pended)	m/High/Critical)	
FT0010_1	Verify edit function.	1. Login as admin at Admin side. 2. Click on recipes under Reseepy1 category. 3. Click on the recipes name that want to edit.	Recipe data	The recipe name that been selected will be retrieve.	As expected	Pass	Low	Recipe name updated.

Table 5.11 : Functional Testing for Admin Login Table.

Module (or Sub- module) Name:	Admin Login							
Test Case Descripti on:	To Test and Verify the login page working for admin							
Testing Objective :	Able to access the admin system.							
Remarks:								
Test Case ID	Test Scenario	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail/Not Executed/Sus	Severity Failure (Low/Mediu	Notes

						pended)	m/High/Critical)	
FT0011_1	Verify login with <b>invalid</b> username and password	1. Navigate to admin login page 2. Enter invalid username and password 3. Click login button	Username : Ali Password : Budakbaik98	Login unsuccessfull	As expected	Pass	Low	Must login by using the data that been registered at Authentication section.
FT0011_2	Verify login with	1. Navigate to admin login page	Username : admin Password :	Login Successful and	As expected	Pass	Low	Use the data that been registered to login.

	<b>valid</b> username and password	2. Enter valid username and password 3. Click login button	@Budakbaik98	redirected into the Admin Homepage Page Module.				
FT0011_3	Verify login with <b>invalid</b> password	1. Navigate to admin login page 2. Enter <b>invalid</b> password 3. Click login button	Username : admin Password : @Budakbaik98	Login Unsuccessful and error message appeared	As expected	Pass	Medium	Must use valid password that been registered.

## **5.3 Reliability Testing**

### **5.3.1 Overview**

The Rice Recipe Recommendation system recommends personalised rice dishes based on user preferences, and reliability testing ensures consistent and accurate results. Functional, load, stress, accuracy, usability, and data integrity testing methods are used. Performance under extreme loads, accuracy validation for user profiles, and response time evaluation are all test cases. Response time, throughput, accuracy, and system availability are among the metrics assessed. Testing is carried out in a realistic context, and the results are documented in reports that highlight problems and make suggestions for improvement.

### 5.3.2 List of Reliability Testing Results

Table 5.12 : Reliability Testing for Algorithm Testing Table.

Module (or Sub- module) Name:	Algorithm Testing							
Test Case Descripti on:	To Test the accuracy of Recommendations							
Testing Objective :	To verify the accuracy of the hybrid filtering algorithm in suggesting relevant rice recipes based on user preferences and ratings.							
Remarks:								
Test Case ID	Test Scenario	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail/Not)	Severity Failure	Notes

						Executed/Suspended)	(Low/Medium/High/Critical)	
RT0001_1	User with specific preferences and rating is selected.	1. Input specific user preferences which is selecting the ingredients and rating the rice recipe.	Select ingredients and give rating on the rice recipes.	Accurate and relevant rice recipe recommendations are generated.	As expected	Pass	Medium	None
RT0001_2	User with incomplete	1. Input incomplete user	Select less than 3 ingredients.	No rice recipe recommendations	As expected	Pass	Medium	Select more than 3 ingredients to generated the

	te preferences preferen by not ces and selecting no rating more than 3 is required selected. ingredients.		ions are generated				recommendations result for rice recipe
RT0001_3	User not giving rating on the recipe.	1. Click on the rice recommendations result. 2. Proceed without giving rate.	Not give rating on the rice recipe that been selected.	The recommendat ions for most rated rice recipe will not generates.	As expected	Pass	Medium Need to give rating to make the most rated rice recipe recommendations generate.

Table 5.13 : Reliability Testing for Data Integrity Table.

Module (or Sub- module) Name:	Data Integrity							
Test Case Description:	Consistency of Rice Recipe Data							
Testing Objective :	To verify the consistency and accuracy of storing, updating, and retrieving rice recipe data.							
Remarks:								
Test Case ID	Test Scenario	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail/Not Executed/Susp	Severity Failure (Low/Mediu	Notes

						ended)	m/High/Critical)	
RT0002_1	Rice recipe data is stored and updated in database.	1. Add , update, and delete rice recipe in database. 2. Retrieve the rice recipe data.	Rice recipe data, databases queries.	Rice recipe data is correctly stored, updated and retrieved without data inconsistencies	As expected	Pass	Medium	None
RT0002_2	Rice recipe data is stored	1. Add a rice recipe to the database with missing or	Incomplete or missing data for a rice recipe.	The system should reject or handle the incomplete	The system still stored the incomplete data.	Fail	Medium	The system still able to recommend the recipe.

	with incomplete information such as ingredients or cooking instructions.			data properly, and the recipe should not be stored with missing information				
RT0002_3	Inconsistent rice recipe data is updated in the database.	1. Update a rice recipe in the database with conflicting or contradictory information, such as contradictory	Inconsistent or contradictory data for a rice recipe.	The system should detect and handle the conflicting data properly, ensuring that the updated recipe remains	The system still able to updated the inconsistent data.	Fail	Medium	The system still able to store the updated data.

		ingredient names or conflicting cooking instructions.		consistent and accurate.				
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## **5.4 Usability Testing**

### **5.4.1 Overview**

Usability testing for a web-based Rice Recipe Recommendation system that employs a Hybrid filtering method include assessing the user experience and interface. Real users are recruited to execute tasks like searching for recipes, filtering alternatives, rating recipes, and saving favourites, in exchange for meaningful feedback on their interactions. Defining objectives and scenarios, recruiting representative users, coaching them through activities, and analysing data are all part of the testing process. A usability test report is prepared, highlighting the system's strengths, problems, and ideas for improving usability. This iterative approach aids in the refinement of the user interface, navigation, search functionality, and overall user experience, ensuring that the system efficiently satisfies user needs and improves user satisfaction.

### 5.4.2 List of Usability Testing Results

Table 5.14 : Usability Testing for User Interface Table.

Module (or Sub- module) Name:	User Interface
Test Case Description:	Navigation and rice recipe ingredients usability
Testing Objective :	Evaluate the ease of navigation and usability of the ingredients on the systems
Remarks:	

Test Case ID	Test Scenario	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail/Not Executed/Suspended)	Severity (Failure (Low/Medium/High/Critical))	Notes
UT0001_1	Users explore the ingredients options	1. Login to Access into the system by using data that been registered.	Ingredients	Redirect into Result Page Module after selected ingredients options.	As expected	Pass	Low	None
UT0001_2	Users attempt to navigate	1. Attempt to access the system without	User Data	The input field required the user to login.	As expected	Pass	Medium	The user need login before access the system by registered the data.

	without logging in	logging in						
UT0001_3	Users attempt to not select the ingredients	1. Not choose the ingredients	Ingredients	Message appeared to inform user select at least 3 ingredients.	As expected	Pass	Medium	The user need to selected at least 3 ingredients to proceed to next page.

Table 5.15 : Usability Testing for User Interface Table.

Module (or Sub- module) Name:	User Interface							
Test Case Descripti on:	Recipe browsing and filtering usability.							
Testing Objective :	Assess the ease of browsing rice recipes.							
Remarks:								
Test Case ID	Test Scenario	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail/Not Executed/Susp	Severity Failure (Low/Mediu	Notes

						ended)	m/High/Critical)	
UT0002_1	User wants to find rice recipes	1. Access the recipe browsing section. 2. Select Ingredients. 3. Click Search button.	Rice recipe ingredients.	Relevant rice recipes are displayed based on selected ingredients after click on search button.	As expected	Pass	Medium	None
UT0002_2	User wants to find the rice	1. Access the rice recipe browsing section.	No ingredients selected	The recommendations not generated the	As expected	Pass	Medium	User need to select the ingredients minimum 3

	recipes	2. Not select ingredients 3. Click on search button		result of rice recipe.				ingredients to generate recommendations.
UT0002_3	User filters rice recipe ingredient	1. Access the recipe browsing section. 2. Not insert ingredients name in Search input field at the middle top.	Ingredients name	Does not appear or filter any ingredients name	As expected	Pass	Low	Need to insert ingredients name in Search
UT0002_	User	1. Access the	Ingredients	The system	As expected	Pass	Low	None

4	filters rice recipe ingredient	recipe browsing section. 2. Insert ingredients name in Search input field at the middle top.	name	able to filter the ingredients name based on user input in Search				
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## **5.5 Efficiency Testing**

### **5.5.1 Overview**

Efficiency testing for a Hybrid Filtering-based Rice Recipe Recommendation web-based system entails evaluating the system's performance and responsiveness in giving recipe recommendations. This testing focuses on examining the system's ability to manage a high number of users, monitoring response times for browsing, searching, and filtering recipes, and evaluating scalability and resource utilization under various load levels. Potential bottlenecks and performance concerns can be found through efficiency testing, ensuring that the system can handle a large user base, offer recommendations quickly, and maintain high performance levels. As a result, user happiness and overall system usability improve.

### 5.5.2 List of Efficiency Testing Results

Table 5.16 : Efficiency Testing for Algorithm Table.

Module (or Sub- module) Name:	Algorithm							
Test Case Descripti on:	Recommendation generation speed							
Testing Objective :	Evaluate the speed of generating recipe recommendations.							
Remarks:								
Test Case	Test	Test Steps	Test Data	Expected	Actual Result	Status	Severity	Notes

ID	Scenario			Result		(Pass/Fail/Not Executed/Suspended)	Failure (Low/Medium/High/Critical)	
ET0001_1	User requests recipe recommendations	1. Select ingredients. 2. Request recipe recommendations by click Search button.	Ingredients and Rice Recipe.	Rice Recipe recommendations are generated within an acceptable time.	As expected	Pass	Medium	None

Table 5.17 : Efficiency Testing for Data Retrieval Table.

Module (or Sub- module) Name:	Data Retrieval							
Test Case Descripti on:	Recipe database query performance							
Testing Objective :	Assess the performance of retrieving recipe data from the database.							
Remarks:								
Test Case ID	Test Scenario	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail/Not Executed/Sus	Severity Failure (Low/Mediu	Notes

						pended)	m/High/Critical)	
ET0002	System retrieves rice recipe data.	1. Execute rice recipe data retrieval queries.	Database, rice recipe data.	Rice Recipe data is retrieved quickly and without significant delays.	As expected	Pass	Medium	None

### **5.3 Summary**

This chapter successfully completed the testing phase, a critical part of the project. The team carefully tested the functionality, accuracy, and performance of the developed hybrid recommendation system through comprehensive and rigorous examination. The system, which combines content-based and collaborative filtering methods, has shown to be effective in meeting the project's stated objectives.

All aspects and functionalities of the hybrid recommendation system were rigorously tested during functional testing to verify they operated as intended. This included putting the recipe search, user input management, suggestion creation, and other essential components through their paces. The system passed the functional tests, demonstrating its ability to provide a consistent user experience.

The hybrid recommendation system is now ready for implementation and widespread use, with the testing phase completed.

## CHAPTER 6

### CONCLUSION AND FUTURE WORK

#### 6.1 Introduction

The success and limitations of *Reseepy*: Rice Recipe Recommendation Web-based System Using Hybrid Filtering will be discussed further in this chapter. At the end of this Chapter 6, future work on this project will be described, as well as any improvements to the project, to ensure that this project can work as an effective system to help young people find their rice recipe based on the ingredients that are available in their areas.

#### 6.2 Contribution

The proposed project accomplished the goals outlined in Chapter 1.

##### 6.2.1 Objectives

- 1) To capture the knowledge of the possible simple recipe that can be applied to the rice-based recipe. The recommendation of the various recipes will be focused on the one which is available in Malaysia, significantly in Kuching, Sarawak.
- 2) To develop a system that can recommend a suitable recipe based on the user's input.
- 3) To test the functionality of the recommendation system.

##### 6.2.2 Achievements

- 1) The system successfully captures a wide range of simple rice-based dishes typical in Malaysia, with a particular emphasis on popular rice recipes in Kuching, Sarawak.

- 2) The system has been successfully designed to recommend rice recipes based on user input which is the name of the ingredients.
- 3) To ensure optimal operation, the recommendation system is subjected to extensive functionality testing.

### **6.3 Constraint / Limitation**

There are some limitation that been faced in order to achieve a proper working recommendation system called *Reseepy*. First limitation is this system only can recommend rice-based recipe. Secondly, the data still can be stored in database by Admin even the recipe data is not consistent and incomplete. Thirdly, The user not able to use same Username. This kind of limitation can make the user need to find their new username in order to access the system. Other than that, this system only provide the ingredients name to recommend the rice recipe and not provide the quantity of the ingredients to be used for the rice recipe. Fourthly, this system does not provide the quantity of meal. Laslty, this system only in one Language which is English.

### **6.4 Future work / Future direction**

Some future works can be added more into this recommendation system called *Reseepy* from admin site and user site even all the primary objectives is achieve.. From user site, the future work that can be done is this recommendation system able to recommend other recipe such as noodles, meat, chicken. Other than that, the user can still keep the old username in edit profile part. Thirdly, the user able to find the recipe by select the ingredients name and insert the quantity of the ingredients. Lastly, the future

work for this system is this system able to recommend the quantity of meal based on quantity of ingredients that will be used to cook the recipe and able in multilanguage.

For admin site, the future directions is the interface of the admin site. Second, the system should should detect and handle the conflicting data properly, ensuring the recipe data remain consistent.

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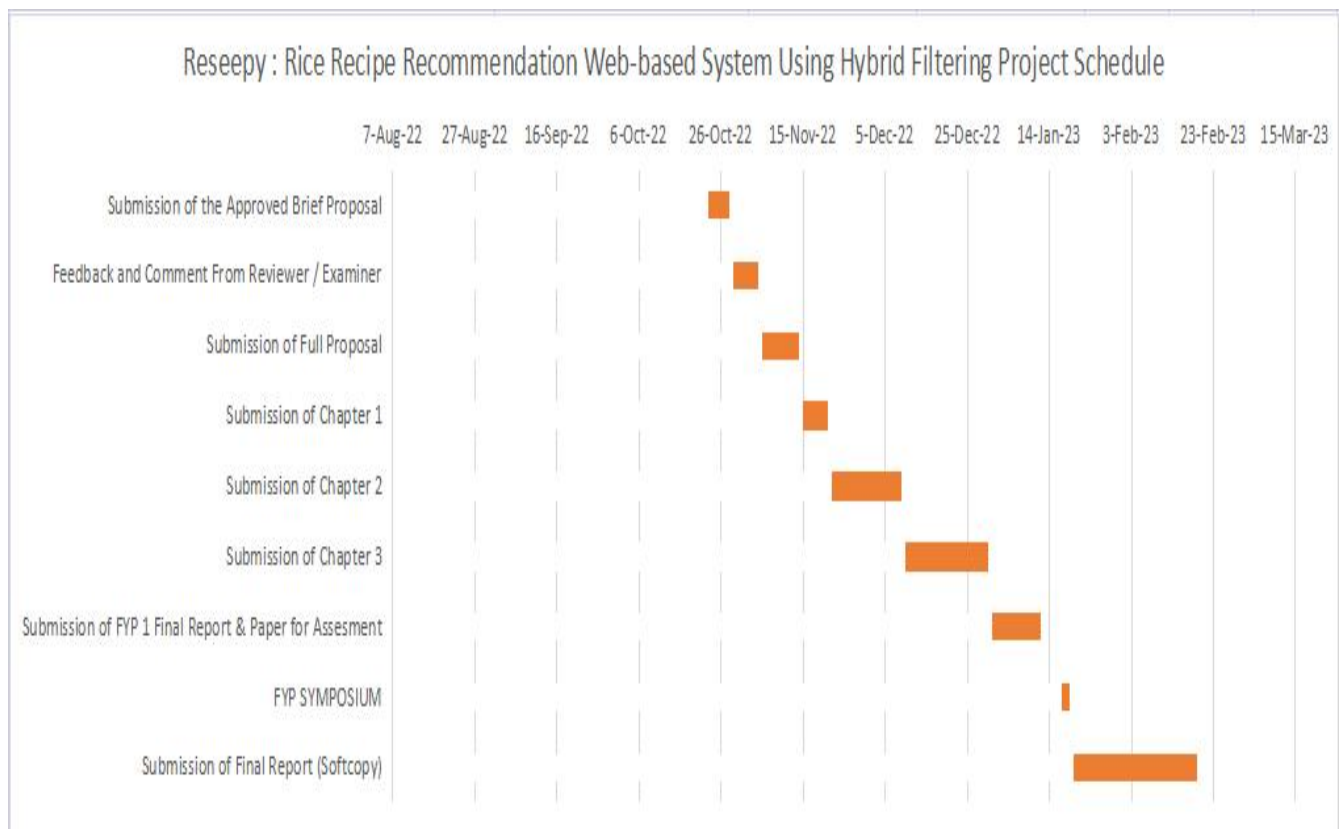
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## Appendix A : Gantt Chart for Project Schedule

No	Task	Duration	Start Date	Finish Date
1	Submission of the Approved Brief Proposal	5	23-Oct-22	28-Oct-22
2	Feedback and Comment From Reviewer / Examiner	6	29-Oct-22	4-Nov-22
3	Submission of Full Proposal	9	5-Nov-22	14-Nov-22
4	Submission of Chapter 1	6	15-Nov-22	21-Nov-22
5	Submission of Chapter 2	17	22-Nov-22	9-Dec-22
6	Submission of Chapter 3	20	10-Dec-22	30-Dec-22
7	Submission of FYP 1 Final Report & Paper for Assesment	12	31-Dec-22	12-Jan-23
8	FYP SYMPOSIUM	2	17-Jan-23	19-Jan-23
9	Submission of Final Report (Softcopy)	30	20-Jan-23	19-Feb-23



## Appendix B : Questionnaire

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1. How old are you ? \*

18

19

20

21

22

23

24

25

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2. What do you do for living ? \*|

Student

Working

Unemployed

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3. Do you live alone ? \*

- Living With Parent
- Staying Alone
- Stay In College

4. Where do you usually eat ?

- Outside
- Home Cooking

5. Do you know how to cook ? \*

- Yes
- No

6. Do you usually cook your own rice (If yes, how much the quantity would you cook your rice \* for a day ? )

Short answer text

.....

7. If there is many rice left from you have cook , what would you do ? \*

- Throw It Away
- Keep In The Fridge

8. Do you have any ideas on what to do with left over rice that still edible to eat ? \*

- Yes
- No

9. Have you ever search up in any platform on how to not waste rice ? (If yes, state the name of the platform) \*

Short answer text

10. Have you engage in any apps/ website that help you to give ideas to restore back the leftover rice ? \*

- Yes
- No

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11. Do you think it would save you a lot if you can recycle leftover rice ? \*

Yes

No

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12. Would you love to try more rice recipes if you able to find a guideline on what to do with leftover rice ? (If yes, state the reason). \*

Long answer text

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