WHAT TO EAT TODAY BY IVAN H'NG ZHENG QUAN

A REPORT SUBMITTED TO Universiti Tunku Abdul Rahman in partial fulfillment of the requirements for the degree of BACHELOR OF COMPUTER SCIENCE (HONOURS) Faculty of Information and Communication Technology (Kampar Campus)

MAY 2023

UNIVERSITI TUNKU ABDUL RAHMAN

REPORT STATUS DECLARATION FORM

Title: WHAT TO EAT TODAY

Academic Session: MAY 2023

I IVAN H'NG ZHENG QUAN

(CAPITAL LETTER)

declare that I allow this Final Year Project Report to be kept in Universiti Tunku Abdul Rahman Library subject to the regulations as follows:

- 1. The dissertation is a property of the Library.
- 2. The Library is allowed to make copies of this dissertation for academic purposes.



(Author's signature)

Address:

9, Lebuhraya Kurau, Taman Chai Leng Park, 13700 Perai , Pulau Pinang

Date: <u>13/09/2023</u>

Verified by,

(Supervisor's signature)

Aun Yichiet

Supervisor's name

Date: 15 Sep 2023

Universiti Tunku Abdul Rahman			
Form Title : Sample of Submission Sheet for FYP/Dissertation/Thesis			
Form Number: FM-IAD-004	Rev No.: 0	Effective Date: 21 JUNE 2011	Page No.: 1 of 1

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY

UNIVERSITI TUNKU ABDUL RAHMAN

Date: 10/09/2023

SUBMISSION OF FINAL YEAR PROJECT /DISSERTATION/THESIS

It is hereby certified that <u>Ivan H'ng Zheng Quan</u> (ID No: <u>19ACB04815</u>) has completed this final year project/ dissertation/ thesis* entitled "<u>WHAT TO</u> <u>EAT TODAY</u>" under the supervision of <u>Dr. Aun Yichiet</u> (Supervisor) from the Department of Computer and Communication Technology (DCCT), faculty of information and communication technology.

I understand that University will upload softcopy of my final year project / dissertation/ thesis* in pdf format into UTAR Institutional Repository, which may be made accessible to UTAR community and public.

Yours truly,



(Ivan H'ng Zheng Quan)

*Delete whichever not applicable

DECLARATION OF ORIGINALITY

I declare that this report entitled "**WHAT TO EAT TODAY**" is my own work except as cited in the references. The report has not been accepted for any degree and is not being submitted concurrently in candidature for any degree or other award.



Name : <u>IVAN H'NG ZHENG QUAN</u>

Date : <u>15 September 2023</u>

ACKNOWLEDGEMENTS

I would like to express my sincere thanks and appreciation to my supervisor Dr. Aun Yichiet who gave me this bright opportunity to work on IT projects. This is the first step in building my career in the field of data science and mobile applications. A million thanks to you. Finally, I must thank my parents and my family for their love, support and constant encouragement throughout the course.

ABSTRACT

In recent years, the food industry has seen a significant increase in the variety of dishes and catering options available to consumers. This has led to an overabundance of choices, especially for people living in culturally diverse areas such as Kampar Malaysia. I, in particular, have always wasted a lot of my precious time on my three meal choices. Therefore, in order to address this challenge, my final year project aims to collect information through consultation and questionnaires in the Kampar area in order to develop a mobile application that will help users to make better choices by selecting and discovering food based on their preferences, dietary restrictions, and location in the Kampar area. This project is a data science design project for development purposes. We will illustrate this by building the application. The application to help choose food was implemented in the project as it is well-suited for analysis. The focus of the project is on the process of designing the application from the perspective of analysing data. The data science lifecycle consists of five distinct phases ranging from acquisition (data collection and data extraction), maintenance (data warehousing, data cleansing), processing (mining data, classification, data modelling and aggregation), analysis (exploratory qualitative analysis, confirmatory analysis, predictive analysis, and qualitative analysis) to communication (data reporting). This project also highlights the importance of data as a factor influencing food choices and how it can be incorporated into data processes to aid analysis and use in design work. The tools used in this project were Flutter and Android Studio. Regarding data collection and data analysis/design, the application was developed by collecting restaurant data with the help of Google Maps Service and then performing manual calculations for classification and analysis. This includes using some questionnaires to get the user preferences etc. and then categorising them into data that can be calculated. The output material for this project will be DART, Flutter, and Android Studio programs etc.

TABLE OF CONTENTS

TITLE F	PAGE	i
REPOR	F STATUS DECLARATION FORM	ii
FYP TH	ESIS SUBMISSION FORM	iii
DECLA	RATION OF ORIGINALITY	iv
ACKNO	WLEDGEMENTS	v
ABSTRA	АСТ	vi
TABLE	OF CONTENTS	vii
LIST OF	FIGURES	Х
LIST OF	TABLES	xiii
LIST OF	ABBREVIATIONS	xiv
CHAPT	ER 1 INTRODUCTION	1
1.1	Problem Statement and Motivation	1
1.2	Objectives	2
1.3	Project Scope and Direction	3
1.4	Contributions	4
1.5	Report Organization	7
CHAPT	ER 2 LITERATURE REVIEW	8
2.1	Previous Works on the application that solve food-choice	8
	disorders	
	2.1.1 Zomato Application	8
	2.1.2 Foodpanda Application	10
	2.1.3 Grabfood Application	12
2.2	Limitation of Previous Studies	15
	2.2.1 Zomato Application	16
	2.2.2 Foodpanda Application	17
	2.2.3 Grabfood Application	17
	2.2.4 Zomato, Foodpanda and Grabfood Application	18
2.3	Proposed Solution	18

CHA	PTE	R 3 SY	YSTEM METHODOLOGY/APPROACH	19
	3.1	Projec	et Methodology	19
		3.1.1	Overview of Agile SDLC Methodology	19
		3.1.2	Breakdown of the phases in Agile SDLC	20
	3.2	Syster	n Design Diagram	22
		3.2.1	System Architecture Diagram	22
		3.2.2	Use Case Diagram	23
		3.2.3	Activity Diagram	25
СНА	PTE	R 4 SY	STEM DESIGN	32
	4.1	Syster	n Block Diagram	32
	4.2	Syster	n Components Specifications	33
		4.2.1	List Page	33
		4.2.2	Top-Rating Restaurant Page	35
		4.2.3	Detail Page	36
СНА	PTE	R 5 SY	STEM IMPLEMENTATION	39
	5.1	Hardw	vare Setup	39
	5.2	Softwa	are Setup	39
	5.3	User H	Requirement	40
	5.4	Setting and Configuration 40		
	5.5	Syster	m Operation	44
		5.5.1	Login Functionality	44
		5.5.2	Main Page	50
		5.5.3	List Page	51
		5.5.4	Detail Page	53
		5.5.5	Top 10 Rating Restaurant Page	56
		5.5.6	Settings Page	57
	5.5	Imple	mentation Issues and Challenges	60
	5.6	Concl	uding Remark	61

СНАРТ	ER 6 SYSTEM EVALUATION AND DISCUSSION	63
6.1	System Testing and Performance Metrics	63
6.2	Testing Setup and Result	63
6.3	Project Challenges	71
6.4	Objectives Evaluation	72
СНАРТ	ER 7 CONCLUSION AND RECOMMENDATION	74
7.1	Conclusion	74
7.2	Recommendation	75
REFER	ENCES	76
APPEN	DIX	A-1
WEEKI	LY LOG	A-2
POSTE	R	A-7
PLAGI	ARISM CHECK RESULT	A-8
FYP2 C	HECKLIST	A-9

LIST OF FIGURES

Figure Number Title

Figure 2.1.1(a)	Home Page (Zomato)	10
Figure 2.1.1(b)	Search Page (Zomato)	10
Figure 2.1.1(c)	Example of restaurant page (Zomato)	11
Figure 2.1.2(a)	Home Page Option (Foodpanda)	12
Figure 2.1.2(b)	Home Page Filter Function (Foodpanda)	12
Figure 2.1.2(c)	Favourite Page (Foodpanda).	13
Figure 2.1.3(a)	Grabfood Main Page 1	14
Figure 2.1.3(b)	Grabfood Main Page 2	14
Figure 2.1.3(c)	Example of a restaurant page (Grabfood)	15
Figure 2.1.3(d)	After pressing "View Details" (Grabfood)	16
Figure 2.2.1(a)	Comparison between Kuala Lumpur and Kampar (Zomato)	17
Figure 2.2.2(a)	Search Result Page (Foodpanda)	18
Figure 3.1	6 Phases of Agile SDLC	19
Figure 3.2.1	System Architecture Diagram	22
Figure 3.2.2	Use Case Diagram	24
Figure 3.2.3	Activity Diagram	25
Figure 3.2.4	Activity Diagram (Search Restaurant)	26
Figure 3.2.5	Activity Diagram (Top Rating Restaurant)	27
Figure 3.2.6	Activity Diagram (Questionnaire)	27
Figure 3.2.7	Activity Diagram (Favorite Restaurant)	28
Figure 3.2.8	Activity Diagram (Rate and Review)	29
Figure 3.2.9	Activity Diagram (Delete Review and Rate)	29
Figure 3.2.10	Activity Diagram (Wheel Of Restaurant)	30
Figure 3.2.11	Activity Diagram (Provide Feedback)	31
Figure 3.2.12	Activity Diagram (Sign Out)	31
Figure 4.1	System Block Diagram	33
Figure 4.2.1	The process to retrieve restaurant data	34
Figure 4.2.2	The progress of Searching Modules	34

Figure 4.2.3	The progress of filter modules	35
Figure 4.2.4	Block Diagram of Top Rating Restaurant	35
Figure 4.2.5	Block Diagram of Getting detailed information	36
Figure 4.2.6	Example of detail/json (Rate & Review)	36
Figure 4.2.7	Block Diagram of Rate and Review modules	37
Figure 4.2.8	Example of canLaunchUrl and launchUrl	37
Figure 4.2.9	Block Diagram of favorite modules	38
Figure 5.4.1	Developer Options of Mobile Device	41
Figure 5.4.2	Declaring permissions in the AndroidManifest.xml	41
Figure 5.4.3	List of the flutter dependencies used	42
Figure 5.4.4	Initialization of Firebase	43
Figure 5.4.5	Setting up Google Maps API with API key	44
Figure 5.5.1	Logo of "GFood" application	44
Figure 5.5.2	Welcome Screen	45
Figure 5.5.3	Login Page	46
Figure 5.5.4	Reset Password Page	46
Figure 5.5.5	Email with Reset Password Link	46
Figure 5.5.6	Sign Up Page	47
Figure 5.5.7	Verify Email by link	47
Figure 5.5.8	Example of stored user login credentials	48
Figure 5.5.9	Questionnaire Page	48
Figure 5.5.10	User preferences store in FireStore	49
Figure 5.5.11	Surprise Wheel	49
Figure 5.5.12	Search feature in mainpage	50
Figure 5.5.13	Popup Menu	50
Figure 5.5.14	Search Page	51
Figure 5.5.15	Sort Icon in List Page	51
Figure 5.5.16	Filter Page	52
Figure 5.5.17	Example of the result (Cuisine: Chinese)	52
Figure 5.5.18	Example of Detail Screen	53
Figure 5.5.19	Review Screen	53
Figure 5.5.20	Delete Review and Rate	54
Figure 5.5.21	Examples of show the routes	54

Figure 5.5.21	Examples of phone calls	54
Figure 5.5.22	Favorite button in Detail screen	55
Figure 5.5.23	Example of Favorite list	55
Figure 5.5.24	Confirmation for delete all favorite restaurants	56
Figure 5.5.25	Top 10 Rating Restaurants Page	56
Figure 5.5.26	Setting Page	57
Figure 5.5.27	Notify user the password link sent	57
Figure 5.5.28	The reset password link	58
Figure 5.5.29	The dialog about the apps	58
Figure 5.5.30	Feedback border	59
Figure 5.5.31	Feedback Firebase	59

LIST OF TABLES

Table Number	Title	Page
Table 2.2.1	A summary of limitations of previous studies	15
Table 3.1	Phasing of the Agile SDLC	21
Table 5.1.1	Specifications of laptop	39
Table 5.1.2	Specifications of smartphone	39
Table 5.2.1	List of software used	39
Table 5.3	The Connectivity Requirement	40
Table 6.2.1	Test Results for Welcome Page	64
Table 6.2.2	Test Results for Login Page	64
Table 6.2.3	Test Result for Forget Password Page	65
Table 6.2.4	Test Result for Sign-Up Page	65
Table 6.2.5	Test Result for Questionnaire Page	66
Table 6.2.6	Test Result for Main Frame Page	67
Table 6.2.7	Test Result for List Page	67
Table 6.2.8	Test Result for Top 10 Rating Restaurant Page	68
Table 6.2.9	Test Result for Settings Page	68
Table 6.2.10	Test Result for Filter Page	69
Table 6.2.11	Test Result for Detail Page	69
Table 6.2.12	Test Result for Review Page	70
Table 6.2.13	Test Result for Favorite Restaurant Page	71
Table 6.2.14	Test Result for Surprise Wheel Function	71

LIST OF ABBREVIATIONS

API	Application Programming Interface
CPU	Central Processing Unit
RAM	Random Access Memory
RCQ	Restaurant-Choice Questionnaire
App	Application
HTML	Hyper Text Markup Language

Chapter 1 Introduction

"What's to eat today?" "What's for breakfast?" "What's for lunch?" "What's for dinner?"

These have become the 4 main questions I have to consider and think about every day. Almost everyone around me struggles with what to eat for breakfast, lunch and dinner. According to R. M. Hui (2019), people who have Restaurant choice disorder worry about factors such as the first factor which has limited sources such as: budget, time spent, stomach space, their health, and some people are bored with the food they eat and are afraid to try new foods. Currently, although there are many apps that introduce various restaurants around and provide delivery services, such as Zomato, Grab & Go and Food Panda, the dazzling restaurant choices make it more difficult for people to choose. This project aims to develop a user-friendly computational restaurant recommendation system that simplifies the decision making process by providing personalized restaurant suggestions based on the user's preferences, dietary requirements and location, and guides them to make a choice in a short period of time.

1.1 Problem Statement and Motivation

Whether in the past, present, or future, restaurant choices have always been influenced by a variety of factors, ranging from biological determinants such as hunger, appetite and taste, to complex socio-economic and psychological factors' France Bellisle emphasizes that while hunger may drive us to eat, our ultimate choices stem from an intricate interplay of economic, physical, social and psychological determinants, as well as our personal beliefs about food [1]. In an urban environment such as Kampong Glam, saturation of choices only complicates the decision-making process. One might think that having restaurant apps at one's fingertips would make it easier to make choices, but this tends to exacerbate a pervasive problem: restaurant choice disorder. This is a paradox of choice in which people struggle to make decisions amidst a plethora of choices, sometimes leading them to delay meals, choose foods with less nutritional value, or even skip meals altogether. Research by C. Segura-Garcia et al[2] has shown that inappropriate breakfast choices can lead to cognitive decline,

drowsiness and fatigue. Thus, the challenge is not just "what to eat," but how to make smart, quick, and nutritious choices among the many options available.

8/9 of every 10 people in the world suffer from restaurant-choice disorder. This comes from people around me (my family, and friends). When I was in middle school, I used to go out to eat with my friends after school. And when it comes to decision time, we always spend a long time deciding what to eat for lunch, sometimes 10 minutes, sometimes half an hour. This also led to many times being late, being punished for missing cram school, and even buying an unhealthy cup noodle to barely survive our lunch before deciding what to eat. In my family, the food is always decided for us by my grandmother. My grandmother likes to eat Chinese food, so the family eats Chinese food all the time. After a long time, there will always be times when you get bored, and at this time, grandma will have a headache and worry about what to eat for lunch and dinner. The above examples are all things that I have experienced.

According to C. Segura-Garcia., P. D. Fazio, F. Sinopoli., R. D. Masi. and F. Brambilla [2], a large part of the causes of eating disorders are restaurant choices, in the presence of unbalanced nutrition Ingestion not only makes it easy for people to be overweight or thin, but also affects a person's quality of life in a day. For example, if you eat too little carbohydrates for breakfast, this will lead to lower blood sugar, which will affect the function of the brain, resulting in problems such as inattention, drowsiness, and lethargy. So, to help people with their questions about restaurant choices. Therefore, I want to make a system that can help people choose suitable and favorite restaurant in a short period of time. This way, people don't waste precious time on options to use the system if they have very little time to eat. At the same time, you can also learn more about different cuisines.

1.2 Project Scope and Direction

The main scope of this project is to design and develop a assist restaurant selection/restaurant recommendation mobile app specifically for the Kampar area to enhance the dining experience and the people to the different preferences of residents or students. The app will facilitate easy discovery and decision-making in the restaurant and beverage sector and improve the overall user experience. The direction of the project is guided by the following key objectives:

1. <u>Comprehensive data collection:</u>

A complete and accurate dataset is collected on dining outlets, cuisines, dishes and eating options in the Kampar area. This includes basic details such as restaurant name, address, contact information, opening hours, type of cuisine, menu items, prices, as well as user reviews and ratings.

2. <u>User-friendly interface and design:</u>

Create an intuitive and visually appealing user interface to simplify navigation and ensure a smooth user experience. The design should adhere to established UX/UI best practices, making it easy for users to access the information and functionality they need.

3. <u>Personalized suggestions:</u>

Develop a system that generates personalized Restaurant suggestions based on user review, user input, dietary restrictions, location and other relevant factors. This will help users discover new dining options that cater to their unique preferences and needs.

4. Integrate additional functionality:

Incorporate additional features and functionality such as geolocation services, reviews, and rating systems. These features will add value to the app and enhance the user experience.

5. <u>Continuous improvement and support:</u>

An agile SDLC approach is used to enable iterative improvements throughout the development process. Provide ongoing maintenance and support to address user feedback and issues to ensure a seamless and enjoyable experience for users.

1.3 Project Objectives

The objectives of this project are

i. Improve local people's decision-making skills for restaurant choices

The main objective of this project is to improve the decision-making process of people who have difficulties in choosing what to eat by providing them with personalized restaurant suggestion. By analyzing the user's preferences, dietary restrictions, and location, the application will be able to suggest tailored options for the user, making it easier for them to decide on a meal.

ii. Develop a restaurant choice mobile application using Flutter with a recommended restaurant and assisted choice platform.

A mobile application with multiple functions will be developed using Flutter with the Dart programming language. Primarily, this mobile application will enable the user to discover nearby, recommended, or cold local cuisine through the application. Therefore, it will require the user to turn on GPS access when using it. ii.

iii. Facilitating the process of finding restaurant by using the Google Maps API's nearby restaurant finder

The Restaurant Recommendations app will include a restaurant finder to make finding restaurants easier. Users who want to use the app, their data will be collected and stored in a database. The location of the restaurant will be marked and displayed on the app's Google Maps widget using the Google Maps API.

1.4 Contributions

This project hopes to deploy computer computing technology into the system of each restaurant application so that each mobile phone user can use it to provide the user with suitable restaurant options at short notice each day. The mobile application will make several significant contributions to the food industry, the local community, and individuals seeking a better dining experience in the Kampar region.

These contributions include:

Personalized Restaurant recommendations:

The app will provide personalized restaurant suggestions based on individual preferences and dietary restrictions, enabling users to easily discover new and appropriate dining options in the Kampar area.

Location-based recommendations:

By utilizing geolocation services and google map services, the app will provide relevant suggestions based on the user's current location, allowing them to easily find nearby food outlets that match their preferences and dietary needs.

Enhanced user experience:

The app's user-friendly interface and seamless navigation will enhance the overall user experience, enabling users to access information easily, explore dining options, and make informed decisions.

User feedback and community engagement:

An integrated review and rating system will enable users to share their dining experiences, provide feedback and interact with other food lovers. This feature will help increase transparency and foster a sense of community among users.

Support for local food outlets:

By promoting local food outlets and highlighting their specialties, the app will contribute to the growth and success of these businesses, boost the local economy, and preserve the culinary heritage of the Kampar region.

Raising awareness of dietary restrictions and preferences:

The app will raise awareness of different dietary needs and preferences, such as vegetarian, vegan, halal, and gluten-free options, encouraging food outlets to cater to these needs and promoting inclusivity in the food industry.

Scalability and expansion potential:

The framework and functionality of the app can easily be adapted and extended to meet the needs of other regions and additional functions such as food delivery, event promotion, and integration with other digital platforms. This adaptability will allow the app to grow and evolve, ultimately benefiting more people and contributing to the entire food ecosystem. System can help users with restaurant-choice disorder to choose their favorite and suitable meals in a short period of time.

1.5 Background and Information

In today's fast-paced world, individuals are often faced with a plethora of restaurant choices, which can lead to decision fatigue and stress when choosing meals, and I am no exception, especially at Kampar. with so many restaurant choices, it always makes me hesitate for ages therefore wasting a lot of precious time. In today's world, using mobile apps to find information and make decisions relating to all aspects of daily life, including dining, has become increasingly common. However, while there is a large selection of restaurant available in Kampar, there is a lack of user-friendly and comprehensive tools that specifically cater to the town's unique restaurant landscape.

Furthermore, with the growing prevalence of dietary restrictions and preferences such as vegetarianism, veganism, and gluten-free diets, it can be challenging for people to discover new dishes that suit their unique needs. As a result, people stuck in Kampar are in greater need of a digital tool that can help them filter out unsuitable foods, so that they can avoid stepping on the toes and save a lot of time. This is especially true for students, who don't know what to eat because of the wide range of restaurant available. Therefore, by using a comprehensive dataset of local food outlets and restaurants, the project will enable the app to provide valuable insights and guidance to help users make informed dining decisions.

This is where food recommendation apps, designed to help users discover new dishes and cuisines based on their preferences and dietary restrictions, can provide a valuable service. Based on the user preferences, dietary restrictions and the categories and types of cuisine in restaurant, the app can generate personalised restaurant recommendations, alleviating decision fatigue and ultimately enhancing the dining experience.

1.6 Report Organization

This report is organized into seven chapters, providing a comprehensive overview of the development and evaluation of the Restaurant Selection and Recommendation Application. In Chapter 1 presents the problem statement, motivation, objectives, project scope and direction, contributions, and report organization. In Chapter 2 presents the literature review with a complete description of the prior work and research.; Chapter 3 will discusses the system methodology and system design diagram; Chapter 4 presents the overview of the system and presents the system block diagram; Chapter 5 will presents the hardware setup, software setup, settings and configurations, system operation, implementation issues and challenges, and concluding remarks; Chapter 6 will focuses on the system testing and performance metrics, project challenges, and objective evaluation; And lastly, Chapter 7 offers a conclusion for this report and provide recommendations for future improvements and enhancements to the mobile tethering and sharing application.

Chapter 2 Literature Review

Due to the advancement of technology, people can use the Internet, application software, etc. to search for a variety of food, and some applications use a lot of various method to help people choose the restaurant contain the food that they want to eat. In this section, its approach is explained in detail and critically reviewed for its shortcomings and limitations. After that, better solutions proposed by the project will be discussed.

2.1 Previous Works on the application that help restaurant-choice disorder

In this subsection, the website and application that help to recommend restaurant or solve restaurant-choice disorder will be studied, and the methodologies employed in each system will be discussed in detail.

2.1.1 Zomato application for Android/IOS (Free)

Regarding from Zomato [3], Zomato is an Indian multinational restaurant aggregator and food delivery company. It was founded in 2008 by Deepinder Goyal and Pankaj Chaddah. Zomato's technology platform started rolling out in 2010. It primarily connects customers, restaurant partners, and delivery partners to meet their multiple needs. Through Zomato's platform, customers can search and discover restaurants, read and write customer-generated reviews, view and upload photos, order takeout, reserve a table and pay when dining at a restaurant. The service is available in 24 countries and over 10,000 cities.

Zomato's operation is very simple and suitable for everyone. It can be used without creating an account, just launch the app and set the location, the main screen will provide themes and popular recommendations as we can see in the below figure 2.1.1(a). Users can also change sorting options by clicking filters by some other common factors, such as rating, cost, and distance. At the same time, customers can also further filter the user's results by specific food types, ratings, costs for two, etc. For even more convenience, Zomato also provides its users with one-click filters on

the home page such as "Nearest to me", "Rated (4.5+)", "Book a table", "Cafe", "Open now" and "Good food" as we can see in below figure 2.1.1(a). So, whether the user has time to study carefully or need to find a place quickly, Zomato can provide users with fewer but high-quality restaurant options in a short time, which is very friendly for people with food-choice disorder.



Figure 2.1.1(a): Home Page of Zomato Figure 2.1.1(b): Search Page of Zomato

In above Figure 2.1.1(a) and Figure 2.1.1(b), we can see that Zomato has a search function. As soon as a user presses the search bar, Zomato will immediately recommend the top brands around you. Once you start typing, it also recommends the type of food or any restaurants nearby, which greatly reduces the time users spend searching and can learn more about restaurants they haven't eaten before.



Figure 2.1.1(c): Example of restaurant page (Zomato)

We can see from Figure 2.1.1(c) that when the user clicks on the restaurant's page, the user can see a lot of information about the restaurant from the page, such as the current distance between the restaurant and the user, rating, business hours, price and variety of food, menus, customer-generated reviews, and more. Users can use this information to understand the style and reputation of the restaurant, and then make a choice after considering it.

2.1.2 Foodpanda application for Android/IOS (Free)

Foodpanda, an online food and grocery delivery platform from Delivery Hero, is Delivery Hero's leading brand in Asia and is based in Singapore. It was founded in 2012 by Swiss nationals Lukas Nagel and Rico Wyder. [4] It is currently the largest food and grocery delivery platform in Asia outside of China. It operates in 12 Asian markets, including Malaysia, Indonesia, the Philippines and Thailand. Foodpanda's main focus is to give users the option to place orders at nearby restaurants either through its website or via its mobile app. Users simply need to set their location to find nearby restaurants in the fastest way possible through the app's search function and filtering.



Figure 2.1.2(a): Home Page Option (Foodpanda)

In above Figure 2.1.2(a), the main page of Foodpanda provides users with some choices, such as: Food delivery, pick-up, Dine-in, etc. This classification can prevent users from choosing the wrong restaurant. For example, it can prevent users who want to take out from choosing a restaurant without take-out service, etc.



Figure 2.1.2(b): Home Page Filter function (Foodpanda)

There is also a one-click filter for food types below the main page. "Asian", "Beverages", "Cakes", "Chinese", "American", "Burgers", "Chicken" and "Desserts",

as shown in above Figure 2.1.2(b). In this way, users can quickly find restaurants with related food types through this function.



Figure 2.1.2(c): Favourite Page (Foodpanda)

In above Figure 2.1.2(c), we can see that there is a special function in FoodPanda that makes it a little different from other food applications, that function is the Favourite function. When a user finds a favourite restaurant from the app, he/she only needs to press the heart-shaped button in the upper right corner of the restaurant to add the favourite restaurant. If you want to eat at that restaurant next time, you can directly find the restaurant that has been liked from the favourite list, which is very friendly to people with food selection disabilities.

2.1.3 Grabfood

Grab is the number one cycling app in Southeast Asia, which includes food delivery services (grabfood) and cashless payment methods (grabpay). Users can get the most convenient private car and taxi booking service from the largest community of drivers in the region, deliver food from favorite restaurant to meet their needs, and pay cash on the app and in stores around the city.



Figure 2.1.3(a): Grabfood Main Page 1

Grabfood is friendly to everyone. After clicking on the order page, user can see many recommended foods. The attractive point of Grabfood is that it has many street foods that other applications do not have, and it also recommends different foods according to the time, such as Figure 2.1.3(a): In the morning, it will recommend some special foods nearby popular breakfast etc.



Figure 2.1.3(b): Grabfood Main Page 2

Grabfood also has a search function, users can find the food they want to eat more quickly through keywords, and there are many different discounts for users, as shown in Figure 2.1.3(b).



Figure 2.1.3(c): Example of a restaurant page (Grabfood)

In Figure 2.1.3(c), you can see that in addition to the menu, Grabfood's ordering page has some other small information, such as: the distance between the restaurant and the user, the approximate delivery time, coupons, etc. Wait. These can help users understand in a short period of time what kind of treatment the restaurant will have when ordering, and so on.

Ammani id Bandar Ba	li Stall - Ta ru	aman
In-Store Prices, Chi	cken, Indian, Na	si Lemuk, Noodles
相关信息		
HANN		
周一 · 周五 周六 周日	07.00 09:00 Closer	- 11:00 - 22:00 3
10.02		
No 358, Jalan Per Bandar Baru, Kar	ak 11, Taman npar, 31900	0
20 分钟 - 2.6 手術		01

Figure 2.1.3(d): After pressing "View Details" (Grabfood)

In Figure 2.1.3(d), after the user clicks "View Details" on the ordering page, more detailed information will be displayed, such as business hours, address and so on. These are of great help to users in choosing restaurants.

2.2 Limitation of Previous Studies

In this subsection, the disadvantages and limitations of each reviewed system or application will be identified and explained. A summary of the limitation of each reviewed system is shown in table 2.2.1.

Previous Studies	Limitation
Zomato application	No information for remote
	areas
	• Expenses
FoodPanda application	Not much street food
	• Can only order food nearby

Table 2.2.1: A summary of limitations of previous studies

Grabfood application	Cannot order from different
	places

2.1.1 Zomato application

The main disadvantage of this system is no information for remote areas. In the process of using Zomato by myself, I found that the Zomato app does not collect data about remote locations.



Figure 2.2.1(a): Comparison between Kuala Lumpur and Kampar (Zomato)

From the comparison of the two pictures in Figure 2.2.1(a), we can see that when the user selects the area of Kuala Lumpur, it can display the restaurants in Kuala Lumpur. However, when the location is set to Kampar, the page displays "No restaurants available at this location at the moment. Please select a different location.". It can be seen that Zomato does not pay attention to remote places. Besides, the food that order from Zomato is quite expensive. If users order food online on Zomato instead of dining in a restaurant, users need to pay related fees, which include commissions, taxes, packaging fees, and delivery fees. As a result, customers may end up paying more when placing an order on the Zomato app. And some unscrupulous restaurants can also jack up prices for online customers without users ever knowing because they've never seen a regular menu. There are even many other factors that affect the price, such as weather conditions and peak-hour deliveries, which further makes Zomato an expensive platform.

2.2.2 FoodPanda application

Although FoodPanda already has information on many different restaurants, there is still a lack of information on many street foods, such as the food in Pasar Pagi. From Figure 2.2.2(a), it can be seen that It did not display the corresponding food information by searching for the related words "Pasar".



Figure 2.2.2(a): Search Result Page (Foodpanda)

Besides, FoodPanda can only order food from nearby restaurants. When you set the location, FoodPanda will only display the information of nearby restaurants, and restaurants that are far away will not be displayed to users.

2.2.3 Grabfood

The main disadvantage of Grabfood cannot place order from the different restaurants. When users order food from different restaurants, they need to order separately. For example, when ordering fried rice at booth A, grilled chicken wings at booth B, and milk tea at booth C, users need to order separately and pay the delivery fee three times.

2.2.4 Zomato, Foodpanda and Grabfood

I think that the application of the above studies is not sufficient to fully address the problem of people with food-choice disorders. Although sometimes people with the

food-choice disorder have fewer choices, they don't necessarily make choices because they have fewer choices. They may also be hesitant to choose both which they are interested.

2.3 Proposed Solutions

This project aims to propose a solution that will help people with restaurant selection disorder to choose their favorite and suitable restaurant by means of recommendation and guidance, especially for Kampar locals. The system will be developed with several features. First of all, the application will have dedicated pages for each restaurant, which will show some details about the restaurant, such as: whether it is open at that time, opening hours of each week, phone number, address, ratings, etc. The application will be used to attract users to get the information about the restaurant by submitting the information. Users will be able to use this information to make a quicker choice of the right restaurant. Finally, to address the problem of "difficult to choose" patients who are still hesitant after reducing their choices, the second solution of this project is to add the Lucky Wheel function to help them make their choices, e.g., if they are still hesitant after being provided with their choices, they can use the Lucky Spin button to spin out the final choice for them. This feature will help them to reduce time wastage and it is quite interesting for them.

Chapter 3 System Methodology/Approach

3.1 Project Methodology

3.1.1 Overview of Agile SDLC Methodology

In this project, Agile SDLC was used to build the food selection application. According to Anitha et al [5], Agile SDLC is the best method for developing mobile applications. This is due to the nature of Agile SDLC being a combination of iterative and incremental approaches, where the whole SDLC is divided into small iterations. As a result, Agile SDLC allows projects to adapt to changes quickly. In addition, Agile SDLC has a cyclical process where work is completed in regular iterations. This allows for many sprints and improvements to the final deliverables. The final deliverable. Agile SDLC is divided into six phases which include: (i) planning phase, (ii) analysis phase, (iii) design phase, (iv) development phase, (v) testing phase and finally (v) support and maintenance phase. Figure 3.1 shows the 6 phases of the Agile SDLC Figure 3.1 shows the flow of the 6 phases of the Agile SDLC in a sprint phase.



Figure 3.1: 6 Phases of Agile SDLC

The phases of Agile SDLC are breakdown as below:

I. Planning phase

- Identify the problems encountered by users
- Define the project scope and project objectives

- Data collection and pre-processing
- Establish a project schedule to monitor the progress of the project

II. Analysis phase

- Analyse the user requirements for the application
- Identify the core functionality to solve the problem

III. Design phase

- Develop the system architecture of the mobile application
- Designing the user interface of the application
- Identify the tools required for the project development process

IV. Development phase

- Develop the functionality and features of the mobile application
- Identifying the challenges and obstacles in the implementation process

V. Testing phase

- Conduct alpha testing of the developed MVP
- Identify potential bugs and erroneous results

VI. Support and Maintenance phase

- Collect feedback from alpha testers
- Analyze and document the feedback provided
- Start a new agile SDLC sprint for further improvement

3.1.2 Phasing of the Agile SDLC

The table below has summarized the tasks completed for this project. Each development phase details the corresponding tasks for each phase.

Development Phases	Task accomplished
Planning Phase	 Identify existing problems faced by users
	- Create project timeline and plan project schedule Progress

Analysis Phase	Devices 2 existing Destaurant Decommondation and Assist
Allarysis Filase	- Review 3 existing Restaurant Recommendation and Assist
	Selection applications.
	 Identify problems with the applications.
	- Analyse the strengths and weaknesses of each particular
	application.
	- Determine the scope and objectives that this project aims to
	address.
Design Phase	- Research tools used for system development.
	- Design the user interface (UI).
	- Identify the major functions to be developed.
	- Provide brief details of the system flow.
Development Phase	- Set up the required hardware and software.
	 Develop the basic modules of the project.
	- Integrate the project modules.
	- Identify challenges and issues in the implementation of the
	prototype.
	– Implement the prototype.
	- Make some modifications to the prototype to Overcome
	challenges.
Testing Phase	- Prepare test cases.
	- Unit test the prototype.
	- Document the test results.
	- Document the results of the testing process.
Support and	- Prepare questionnaires and obtain user feedback.
Maintenance Phase	

Table 3.1: Phasing of the Agile SDLC

3.2 System Design Diagram



3.2.1 System Architecture Diagram

Figure 3.2.1: System Architecture Diagram

The system architecture diagram of this project consists of three layers, which are the presentation layer, the logic layer and the database layer.

The presentation layer is responsible for the user interface and how the system interacts with the user. It focuses on providing a visually appealing and user-friendly experience. The two key components of the presentation layer are the user interface (UI) and the input controller. UI is where the users interact with the system. It is composed of many different graphical user interface elements such as: icons, forms, menus and others. The input controller manages the communication between the UI and the logic layer. It processes user inputs such as finger gestures and keyboard events by forwarding them to the appropriate logical layer components for processing.

The logic layer contains the core functionality of the system and the application logic, such as processing user input, executing the underlying logic of the functionality and managing the data flow within the system. The logic layer consists of 3 components which are app logic, application interface, and data access components. App logic specifies the rules and operations required to complete a particular task or achieve a desired result. It implements algorithms,
processes data and controls the overall behavior of the system. Application programming interfaces (APIs) mediate between software components, it enables them to communicate and exchange data. APIs allow the integration with external systems and services, thus extending the functionality of the application. In addition, the data access component is responsible for retrieving and manipulating stored data. It communicates with databases and other data sources in order to read, write, update and delete data as required by the system.

The database layer is responsible to store and manage the system's data. It provides a structured and organized way to store, retrieve, and manipulate data. There are 2 components in the database layer which are database and firebase. The database is the central repository for structured data storage. It ensures data integrity, enforces data constraints, and facilitates effective information query and retrieval. FireStore allows for real-time data syncing and can be directly interacted with through Firebase's SDK.

3.2.2 Use Case Diagram

The use case diagram is shown below (Figure 3.3). The use case diagram for the restaurant recommendation application will outline all of the functionality provided to the user. The user can log in or create an account to use the functionality provided by the mobile application. The user can then select the actions to be performed in the mobile application. The use case diagram contains all the actions that can be performed.

Chapter 3



Figure 3.2.2: Use Case Diagram

3.2.3 Activity Diagram

Use Case: Login

When the user launches the application, the user will be prompted to log in or create an account using an email and password. After logging in, the user will be directed to the home page. New users can register to create an account. The application will send a confirmation link. The user can reset the password by clicking on the "Forgot Password" button. The application will send a link to reset the password to the user's email. During the login process, the system uses Firebase authentication to verify the user's email and password and displays an associated error message if the user cannot pass the authentication.



Figure 3.2.3: Activity Diagram (Login)

Use Case: Search Restaurants

When the user uses the search function, the user will be asked to enter the text for searching the name of the restaurant. Once the input is complete, the system will check it and give the result. If the input is available, the application displays a restaurant card or list of restaurants matching the input. If the input is not available, a result of 0 is displayed. The user can press the restaurant card to navigate to the detail screen for that restaurant to view more details such as reviews, timings, phone number, and location.



Figure 3.2.4: Activity Diagram (Search Restaurant)

Use Case: Top Rating Restaurants

When a user uses a top-rated restaurant, the system will display the top 10 rated restaurants based on the database.

🗏 User		E System
C Top R Resta	ating urant	Find currently top 10 rating restaurants from database
Display R	lesult	
Č)	

Figure 3.2.5: Activity Diagram (Top Rating Restaurant)

Use Case: Questionnaire

When a user uses a questionnaire function, the system will request the user to answer the question. After this, the answer will be stored as the user preferences to FireStore.



Figure 3.2.6: Activity Diagram (Questionnaire)

Use Case: Favorite Restaurant

When the user presses the favorites button in the detail screen, the restaurant will be stored in the favorites list for that account. If the favorites button is pressed again, the restaurant will be removed from the favorites list. The user can view the favorites list via the pop-up menu "Favorites" button.

Chapter 3



Figure 3.2.7: Activity Diagram (Favorite Restaurant)

Use Case: Review and Rate

When user want to review and rate a restaurant, user can rate first in the detail screen by press the star. After rate, the user will navigate to the review screen and been requested to write the review. After writing the review, user can press submit to submit the review. If the user has done before, the new review will replace the previous review. If not, the new review will display on the detail screen of the restaurant.

Chapter 3



Figure 3.2.8: Activity Diagram (Rate and Review)

Use Case: Delete Review and Rate

User can delete own review and rate by press the delete icon beside his/her review post.



Figure 3.2.9: Activity Diagram (Delete Review and Rate)

Use Case: Surprise Wheel

When the user presses the pop-up menu "Wheel of Restaurant" button, a border containing a wheel is displayed. The user presses the wheel to rotate it and the system will randomly display restaurant results based on user preferences and the database. A higher percentage of restaurants matching user preferences are displayed.



Figure 3.2.10: Activity Diagram (Wheel Of Restaurant)

Use case: Provide Feedback

When a user wants to send the feedback, user can press the feedback button from the setting page. The user will input the feedback. After that, the feedback will be uploaded to the system.



Figure 3.2.11: Activity Diagram (Provide Feedback)

Use Case: Sign Out

When a user press on the sign-out button, the system will then proceed to sign out and returns to the welcome page.



Figure 3.2.12: Activity Diagram (Sign Out)

Chapter 4 System Design

4.1 System Block Diagram

The system of this project consists of 4 modules with different functions to form one, which are the list module, the top-rated restaurant module, the surprise roulette module, and the settings module (Figure 4.1). Firstly, before using the application, the user needs a login module to authenticate the user. After logging in, the system will check whether the user has filled in the questionnaire, if not, he/she has to answer the questionnaire first, and after answering the questionnaire, he/she can board the Mainframe module to use the other modules. Firstly, the list module will randomly display a variety of restaurant cards to recommend Kampar restaurants to the audience, the user can click on the card to go to the detail's module or through the filter module to select the preferences, the list module will filter the restaurant cards that match the preferences selected by the user. Secondly, the user can also search for the name of the restaurant through the search function to find the favorite restaurant faster. In addition, the user has the surprise wheel function, which is based on the principle that through the database and the user's previous preferences after answering the questionnaire, as long as it meets the preferences will have a higher chance to be displayed; this means that the restaurant that meets the user's preferences is more likely to be found by the user at the same time, the other restaurants also have the opportunity to let the user know about it, which achieves the purpose of promoting the economy. Next, users can click on a restaurant through these modules to go to the restaurant's details page. The main purpose of this page is to allow the user to learn more about the restaurant through its details such as: opening hours, phone number, address and reviews and ratings. Users can also click on the phone number to go directly to the phone call page and the address to go to Google Map for directions. In addition, users can also leave reviews and comments in the details module to promote communication between users and for more references. If users like the restaurant, they can bookmark the restaurant through the Bookmark module, so that next time they want to see the restaurant, they can go to the Bookmark page directly. Last but not least, the Settings module contains an exit function, a feedback form and an about us page.



Figure 4.1: System Block Diagram

4.2 System Components Specifications

This section will cover and discuss the 4 most important pages in the system, which are the list pages, Surprise Wheel pages, top-rated pages and detail pages. The methodologies used and the general system flow in those pages will be discussed.

4.2.1 List Page

The list page contains a list of many restaurant cards. This restaurant card information is retrieved from the Google Map Api service, which retrieves it from nearbysearch/json and details/json. Google Map Api is an API that allows developers to access Google Maps data and features for their own projects [6]. I was able to get the Place_ID of the restaurant inside Kampar by using the Nearbysearch's library inside one of the Place APIs, after setting the coordinates and filtering some unwanted conditions. Since NearbySearch/Json only has some one-sided data, so the next system is to get more detailed information from details/json through

the obtained Place_ID, such as: each user's evaluation in Google Map, its hours of operation and so on. After getting all the data collated, the listing page gets this data to display the various restaurant cards, Figure 4.2.1 shows the whole process.



Figure 4.2.1: The process to retrieve restaurant data

List Page also contain the filter modules and searching modules. Searching modules is based on the user input the restaurant name, it will compare to the name of restaurant in database to display the result (Figure 4.2.2). And the filter modules are based on the categories of restaurant in the FireStore, it compares the user selection of preferences and the categories from database. Examples, user select vegetarian, the system will be finding the restaurant with the category "Vegetarian" from FireStore and display them out. (Figure 4.2.3)



Figure 4.2.2: The progress of Searching Modules



Figure 4.2.3: The progress of filter modules

4.2.2 Top Rating Restaurant Page

The Top Rating Restaurant Page is retrieved the data from FireStore. After this, calculate the rating score from the Google Map API and current user rate in app. The formula will be add both of them together and divide the number of person who had rate. The formula is given below:



Figure 4.2.4: Block Diagram of Top Rating Restaurant

4.2.3 Detail Page

Detail page has retrieved a lot of detail information from the detail/json. The detail page has implemented some functions like rate and review feature, favorite feature and direct to phone call and google map routes feature. When the user press on the restaurant card from list page, Top Rating Restaurant Page or favorite page, the system will based on the pressed restaurant's place_id and retrieve it data from database and display its detail information in detail page like photo, weekly schedule, "Open Now/Closed", address, rate and review and phone number. (Figure 4.2.5)



Figure 4.2.5: Block Diagram of Getting detailed information

For the Rate and Review function, before user use the app the rate and review in detail page are all retrieve from the detail/json. Following the Figure 4.2.6 below, it show the what we can get indetail/json like the account name, profile url, rate, time and text.



Figure 4.2.6: Example of detail/json (Rate & Review)

After we retrieve this data to FireStore, the user can see these review in detail page and also they can make a rate and review post too in the detail page. The post will also store in the FireStore and combine together as Figure 4.2.7.



Figure 4.2.7: Block Diagram of Rate and Review modules

Otherwise, user can also press the phone number and address navigate to phone call and Google Map Route. For these 2 modules, the detail page had implemented the flutter package called url_launcher. For phone url launcher, we need to get the phone number first and use the code canLaunchUrl and launchUrl as shown in Figure 4.2.8 below. These 2 codes allow user navigate to phone call. For the route url, we need to get the coordinates of destination from the detail/json first, then we are using the code that we mentioned just now with the specific URL. Then user will be allowed navigate to google map to check the route.



Figure 4.2.8: Example of canLaunchUrl and launchUrl

The next modules will be favorite modules, this module allow user to save the favorite restaurant by pressing the favorite icon. After press the favorite button, the restaurant's place_id will be store in FireStore. If user want to check back the favorite restaurants, there is a favorite page which retrieve the favorite place_id from FireStore and based on the place_id to retrieve those restaurant card in favorite page. (Figure 4.2.9)



Figure 4.2.9: Block Diagram of favorite modules

Chapter 5 System Implementation

5.1 Hardware Setup

The hardware in this project is a MSI GP63 8RE-820MY Laptop and a RMO-NX1 mobile phone. The laptop will be used for coding to create the application and run the algorithms for the computing system. The mobile phone is used to try the new application.

Description	Specifications
Model	MSI GP63 8RE-820MY
Processor	Intel® Core [™] i7-8750H CPU @ 2.20GHz
Operating System	Windows 10 Home
Graphic	GeForce® GTX 1060 with 6GB GDDR5
Memory	16GB PC4-19200 DDR4 SDRAM
Storage	Samsung PM871b MZNLN128HAHQ, 128 GB

Table 5.1.1 Specifications of laptop

Description	Specifications	
Model	RMO-NX1	
Chipset	Qualcomm SM6375 Snapdragon 695 5G	
Operating System	MagicOS 7.1.0.176	
Memory	256 GB	
Storage	8GB RAM	
Battery	Li-Po 5100 mAh, non-removable	

Table 5.1.2 Specifications of smartphone

5.2 Software Setup

The table below shows the list of software used (Table 3.2.3) in this project:

Software	Description		
Flutter	The Cross-platform SDKs and frameworks for developing mobile		
	application front-ends		
Android Studio	Built-in Android emulator to help deploy and test developed mobile		
	applications		

Visual Studio Code	The main source code editor for the project's mobile application
Firebase	A cloud-hosted database that acts as a backend database for mobile
	applications.
FireStore	It acts as NoSQL cloud database. It allows for real-time data syncing
	and can be directly interacted with through Firebase's SDK.
Google Map API	The Google Maps API provides API calls for fetch the restaurants
	data.

Table 5.2.1: List of software used

5.3 User Requirements

Hardware Requirements

This project deliverable currently only supports Android devices.

App Permissions

The following list shows the app permissions that the user must approve:

- Location

Connectivity Requirements

The following table shows the connectivity requirements for a user:

Connectivity	Requirements(Y-yes/N-no)
Wi-Fi/Cellular connection	Y
GPS Service	Y

Table 5.3: The Connectivity Requirement

5.4 Setting and Configuration

This project requires preliminary setting and configuration to runs the application.

Setting up developer mode on android device

- 1. Open device settings and turn on the developer option.
- In the developer option, under debugging, turn on USB debugging and also install via USB (as shown in Figure 5.4.1).
- 3. After that, the user will be able to build and run the application in the mobile device via a USB connection for implementation and testing purpose.



Figure 5.4.1: Developer Options of Mobile Device

Declaring required permissions in AndroidManifest.xml

The permission used in the mobile application must be declared in the AndroidManifest.xml in order for the mobile application to work as intended. Below shows the permissions declared in the AndroidManifest.xml.



Figure 5.4.2: Declaring permissions in the AndroidManifest.xml

Installing related flutter dependencies

There are several Flutter packages that are being used in this project. The packages should be installed using 'pub get' in Visual Studio Code

dependencies: dio: ^4.0.0 flutter_polyline_points: ^1.0.0 google_maps_flutter: ^2.4.0 google_maps_flutter_android: ^2.4.16 google_maps_flutter_platform_interface: ^2.4.0 args: ^2.4.2 flutter_rating_bar: ^4.0.1 flutter_svg: ^2.0.4 firebase_auth: ^4.8.0 firebase_auth_web: ^5.7.0 google_fonts: ^4.0.4 sqflite: ^2.3.0 cloud_firestore: ^4.9.0 cloud_firestore_platform_interface: ^5.16.0 cloud_firestore_web: ^3.7.0 provider: ^6.0.5 rxdart: ^0.27.7 intl: ^0.18.1 email validator: ^2.1.17 lottie: ^2.6.0 cached_network_image: ^3.2.3 animate_do: ^3.0.2 flutter_spinkit: ^5.2.0 shared_preferences: ^2.2.0 flutter_fortune_wheel: ^1.3.0 js: ^0.6.7 petitparser: ^5.4.0 plugin_platform_interface: ^2.1.5 typed_data: ^1.3.2 vector graphics: ^1.1.7 xml: ^6.3.0 location: ^5.0.3 geolocator: ^10.0.1 url launcher: ^6.1.14 flutter_lints: ^2.0.2

Figure 5.4.3: List of the flutter dependencies used

Setting up Firebase Cloud Firestore and Authentication

The following are the preliminary setup for Firebase Database and Authentication

- 1. Open the pubspec.yaml file in your project directory and add the 'firebase_core', 'firebase auth', and 'cloud firestore' dependencies under the dependencies section.
- 2. Save the pubspec.yaml file and run flutter pub get in the terminal to fetch the dependencies.
- 3. Set up a Firebase project:
 - a. Go to the Firebase Console.
 - b. Click on "Add project" or select an existing project.
 - c. Follow the instructions to create a project in the Firebase Console.
- 4. Set up Firebase Authentication:
 - a. In the Firebase Console, go to the "Authentication" section.
 - b. Click on the "Set up sign-in method" button.
 - c. Enable the sign-in methods (e.g., email/password, etc.).
- 5. Set up Firebase Cloud Firestore:
 - a. In the Firebase Console, go to the "Database" section.
 - b. Choose "Cloud Firestore"
 - c. Set up the database
- 6. Connect the Flutter app to Firebase by registering the app and download the 'googleservices.json' file. After that, place the file in the 'android/app/src' directory
- 7. Finally, initialize the Firebase in the app by adding the relevant codes to start using the firebase services:



Figure 5.4.4: Initialization of Firebase

Setting up Google Maps API

The following are the preliminary setup for Google Maps API:

- 1. Open the 'pubspec.yaml' file in the project directory and add the 'google_maps_flutter' dependency under the dependencies section
- 2. Save the pubspec.yaml file and run flutter pub get in the terminal to fetch the dependency.
- 3. Obtain an API key from the Google Cloud Platform Console
 - Go to the Google Cloud Platform Console.
 - Create a new project or select an existing project.
 - Enable the "Maps SDK for Android" and "Maps SDK for iOS" APIs for your project.
 - Create an API key for your project.
- 4. After that, open the AndroidManifest.xml file and add the API key in the file with the tag.



Figure 5.4.5: Setting up Google Maps API with API key

5.5 System Operation

In this project, the app is named "GFood". The application emphasises with the users who possess the difficulty in choosing to provide the information of the restaurants that can be referred and help the users to make the choices. The logo of the application is shown in Figure 5.5.1 below.



Figure 5.5.1: Logo of "GFood" application

5.5.1 Login Functionality

As shown in Figure 5.5.2 below, the user is presented with a welcome screen when launching the application which, in addition to the welcome, allows the user to choose whether they want to sign up for an account or log in.



Figure 5.5.2: Welcome Screen

Before the end of the welcome page, the user needs to choose to press the Sign Up button to go to the Registration page and the Login button will be directed to the Login page, which is shown in Figure 5.5.3 below. On the login page, the user is required to enter login credentials, which are a combination of email and password. The application uses Firebase Authentication to validate the login credentials, ensuring that the credentials entered are correct and match an existing account. When the user enters incorrect login credentials, the application displays an error message notifying the user that the wrong login credentials have been entered. Additionally, if the user forgets his/her password, he/she can access the Login Password page by clicking the Forgot Password button on the login page, as shown in Figure 5.5.4. On this page, the user is required to enter an email address and press the Send Reset Password button.

Chapter 5

Login	
GOOD FOOD	← Forgot Password
Your Email	We will send a reset password link to your email Email
Password	Reset Password
Forgot Password	
LOGIN	
Don't have An Account ? Sign Up	

Figure 5.5.3: Login Page



After the user press Reset Password button, user's email will receive a password reset link and the user can reset their password (Figure 5.5.5).

Reset your password for project-553429828021 (External) Inbox ×	
noreply@gfoood-dfc63.firebaseapp.com to me ▼	2:21PM (1 minute ago)
Hello,	
Follow this link to reset your project-553429828021 password for your hngivan0808@1utar.my account.	
https://gfoood-dfc63.firebaseapp.com//auth/action?mode=resetPassword&oobCode=KD1v8VMpL4eMdElgdtya526wtKVhGP9orclGHtFdxr0AAA AlzaSyAAWPLOSAkNuwOvMt7jGwdbQupkJFuAflo⟨=en	<u>GKjTPWBQ&apiKey=</u>
If you didn't ask to reset your password, you can ignore this email.	
Thanks,	
Your project-553429828021 team	
← Reply → Forward	

Figure 5.5.5: Email with Reset Password Link

Alternatively, if a user does not have an account, they can click the "Sign Up" button on the welcome page or the "Don't have An Account? Sign Up" button on the login page to register a new account. During the Sign-up process, the user is required to enter an email address and

password. The system will then check to see if there is an existing account associated with that email address. (Figure 5.5.6)



Figure 5.5.6: Sign Up Page

If there is no matching record, the user will receive a confirmation email to verify the email(Figure 5.5.7). Once the user confirms via email, he/she can login to the application.

Verify your email for project-553429828021 🔉 Intex x
noreply@gfoood-dfc63.firebaseapp.com to me ▼
Hello,
Follow this link to verify your email address.
https://gfoood-dfc63.firebaseapp.com//auth/action?mode=verifyEmail&oobCode=ewULffYptt2Ql8lguxcaVY0hrTIANuh9jg50TOJvTfAAAAGKJgqV_Q&apiKey=AlzaSyAAWPLOSAkNuwOvMt7jGwdbQupkJFuAflo⟨=en
If you didn't ask to verify this address, you can ignore this email.
Thanks,
Your project-553429828021 team
(Reply

Figure 5.5.7: Verify Email by link

All of the authentication data will then be stored in the Firebase Authentication as shown in Figure 5.5.8 below.

Q Search by email address,	phone number, or u	ser UID			Add user	C	•
Identifier	Providers	Created 🔸	Signed In	User UID			
hngivan0808@1utar.my		Aug 24, 2023	Sep 12, 2023	nBOIGu5BA3b7U2BSrIIiR	yf5mSp1		
hngivan0808@gmail.com		Aug 24, 2023	Sep 11, 2023	PoxZFvSa2cV6nqf3fw7V	ndwL1nN2		
			Rows per pag	je: 50 ▼ 1 - 2	of 2	<	>

Figure 5.5.8: Example of stored user login credentials

After logging into the app, if the user are new registered, they will be navigate to Questionnaire Page and requested to answer the questionnaire. If they already submit before, they will direct to Main Page.



Figure 5.5.9: Questionnaire Page

After user fill in their user preferences and submit will direct to login page. The data will store in the FireStore act as user preferences. (Figure 5.5.10)

★ vuser_preference > nBOIGu5BA3b7		🛆 More in Google Cloud 🗸 🗸
흊 gfoood-dfc63	🕒 user_preferences \Xi 🗄	■ nB0lGu5BA3b7U2BSrlliRyf5mSp1
+ Start collection	+ Add document	+ Start collection
feedbacks	nB0lGu5BA3b7U2BSrlIiRyf5mSp1 >	+ Add field
restaurants	o2xeMQLvMVWu0Y9DmaT405GRLbz1	budget: "1-10"
user_preferences >		isVegetarian: false (boolean) 🧪 🧻
		▼ selectedCuisines
		0 "Chinese"
		1 "Thai"
		2 "Italian"
		- In I

Figure 5..5.10: User preferences store in FireStore

After this, if user press the Surprise Wheel button in popup Menu, the border with a wheel will display as shown in Figure 5.5.11 below. User can press on the wheel and the wheel will spin and based on the database and user preferences, randomly display one of the restaurant. The restaurants which matching the user preferences have higher percentages to display. User can press the result to Detail Screen.



Figure 5.5.11: Surprise Wheel

5.5.2 Main Page

After logging into the app, the main page acts like a frame and contains 3 bottom navigation bars, the list page, the top 10 rated restaurants page, and settings. The main page contains some features, namely the search function on the app bar. Other features like favorites feature, surprise wheel feature and logout feature are in the popup menu. (Figure 5.5.12 & Figure 5.5.13). List Page is the home page. When navigating to List Page, it will retrieve the database and show all the restaurants in Kampar with restaurant card list.



Figure 5.5.12: Search feature in mainpage



Figure 5.5.13: Popup Menu

When the user press the search icon, user will navigate to search page (Figure 5.5.14). User can enter the name of the restaurant to search the restaurant.



Figure 5.5.14: Search Page

5.5.2 List Page

In the list page, it consists of 2 main actions, one is display all the restaurants in Kampar, and another one is filter function. User can press the "Sort" Icon on the List Page (Figure 5.5.15) and it will navigate to the Filter Page. (Figure 5.5.16). User will be requested to fill in the user preference.



Figure 5.5.15: Sort Icon in List Page

Chapter 5

← Filters	← Filters
Breakfast	
Lunch	Dietary Requirements
Brunch	
Dinner 🗌	Cuisines
	Chinese
Budget	Rice
O Low Budget (1-10)	Noodles
O Medium (11-20)	Pasta
O High (>20)	Malay
Reset Apply	Indo

Figure 5.5.16: Filter Page

User can press the reset button to reset the selection and press the apply button to filter the list. After that, the result will be shown is List Page. (Figure 5.5.17)



Figure 5.5.17: Example of the result (Cuisine: Chinese)

5.5.3 Detail Page

When a user press one of the restaurant card in Search Page, top 10 rating restaurants screen, favorite Page, or list Page, the user will be navigate to detail Page. The detail Page will display that restaurant information like photo, name, rating, location, phone number, "Open Now/Closed", Weekly Schedule and Review. (Figure 5.5.11)



Figure 5.5.14: Example of Detail Screen

User can press the star to rate for this restaurant(Figure 5.5.11 above). When user rate for the restaurant, User will navigate to Review Page and requested to write the review for the restaurant (Figure 5.5.12). After this, user can press submit button to submit and back to the detail screen. The rate and review will show in the Review section in Detail Page.

Rating: 5.	ivan0808@1u D/5	tar.my	
- Enter your	review		
Food ve	ry delicious!!!		

Figure 5.5.15: Review Screen

Post Review

After the user press the submit button, the review and rate by user will be upload to the Detail Page and user will be navigate to detail screen and see it. If user want to delete it, user can press the delete icon which is beside his/her post. Then, the system will ask user for the confirmation. (Figure 5.5.13: Delete Review and Rate)



Figure 5.5.16: Delete Review and Rate

Moreover, user can press the phone number to direct to the phone call and press the location to direct to the google map to show the routes. (Figure 5.5.13 & Figure 5.5.14)



Figure 5.5.17: Examples of show the routes



+60 5-468 4464

Furthermore, User can press the favorite icon on the app bar of detail screen to save it as favorite. (Figure 5.5.13). User can remove it but press again the favorite icon.



Figure 5.5.19: Favorite button in Detail screen

After this, user can check the favorite list by press the "Favorites" button on the popup menu in main page. The following Figure 5.5.14 below will show the example of Favorite list, user can press the restaurant card to navigate to the restaurant detail screen.



Figure 5.5.20: Example of Favorite list

If user want to remove all the favorite restaurant, user can press the delete icon on the app bar. After this, the system will ask for the confirmation to the user (Figure 5.5.15). Once the user confirms, it will remove all of the favorite restaurants from the list.



Figure 5.5.21: Confirmation for delete all favorite restaurants

5.5.4 Top 10 Rating Restaurant Page

User is allowed to press the bottom navigation bar to Top 10 Rating Restaurant Page. When navigating, the system will refers from the database and display out currently highest rating restaurants in Kampar in a restaurant card list. (Figure 5.5.22) User is allow to press the card to Detail Page.



Figure 5.5.22: Top 10 Rating Restaurants Page

5.5.5 Setting Page

User is allowed to press the bottom navigation bar "Settings" to the Setting Page. (Figure 5.5.23). In this page, it has shows the profile like email and it allow user to change password by press the edit password button.



Figure 5.5.23: Setting Page

After press the edit button, the system will notice user the edit link will send it to user (Figure 5.5.24). The user can use this link to edit the password. (Figure 5.5.25)



Figure 5.5.24: Notify user the password link sent

Chapter 5

noreply@gfoood-dfc63.firebaseapp.com to me ▼	4:58 PM (5 minutes ago)
Hello,	
Follow this link to reset your project-553429828021 password for your hngivan0808@1utar.my account.	
https://gfoood-dfc63.firebaseapp.com//auth/action?mode=resetPassword&oobCode=HfoIMUZxv_iH4AQEDs02udBH20BkqNLCw0gwWqGGVp AlzaSyAAWPLOSAkNuwOvMt7jGwdbQupkJFuAflo⟨=en	ooAAAGKjcMj5w&apiKey≞

Figure 5.5.25: The reset password link

After this, user can press the "About this app" button. It will show a border with the text that tell user about the apps to let user know more about this application. (Figure 5.5.26)



Figure 5.5.26: The dialog about the apps

Users can send their feedback by press the button report and feedback in Setting Page. The system will show a feedback border and ask the user to fill in the feedback. (Figure 5.5.27)


Figure 5.5.27: Feedback border

After the user submits the feedback, the feedback will store in the firebase as the following Figure 5.5.28 below.

♠ > feedbacks > W9kkq5oC244	⚠ More in Google Cloud 🗸			
흊 gfoood-dfc63		Feedbacks	÷:	U9kkq5oC24dGlc3ieD5i
+ Start collection		+ Add document		+ Start collection
feedbacks	>	W9kkq5oC24dGIc3ieD5i	>	+ Add field
restaurants user_preferences		vbmRbbPoJeGGSIoeuF3X		text: "Need add more features like delivery" timestamp: September 1, 2023 at 5:29:01 PM UTC+8

Figure 5.5.28: Feedback Firebase

Finally, when the user presses the sign out button, the system will ask the user for confirmation. If user confirm, user will be signed out and redirected back to the login page.

5.6 Implementation Issues and Challenges

The following implementations issues and challenges are faced during the development and implementation of the project:

1. Lack of knowledge and experience

The mobile application of this project uses Flutter as the framework for its front-end part. Due to the lack of knowledge and experience with the Flutter framework and the programming language Dart, a lot of time was spent learning these from scratch. In addition to this, Flutter offers a large number of libraries for developers. However, due to the lack of experience with the Flutter libraries, finding the best way to develop mobile applications was challenging. In addition, the tools used in this project included Firebase and Google Map APIs. Due to the lack of hands-on experience with the above mentioned programming languages and tools, the time consumed in developing the project increased considerably. Therefore, extra effort and research had to be put in and it was the technique of integrating all the components together that was the biggest challenge.

2. Lack of learning resources.

Another challenge encountered in developing the system was the lack of reliable learning resources. While API SERVICE has been widely adopted by the public, there are very limited resources available. I had wanted to use various different APIs to get the data, such as Zomato, Yelp, and so on. But in the end, I didn't use them because of the problem of crippled data, and finally I used Google Maps API to get the restaurant information from its Nearby Search and Detail json files respectively, but there aren't many such resources. Moreover, when I encountered some problems, the information I could find online was not enough to solve the problems I encountered, and I had to figure out the solutions step by step by myself, which took me more time. In addition, it took a lot of time to learn the technology from scratch due to the lack of resources to learn and implement this project. It also took more effort to ask for advice from seniors or mentors who have used similar techniques in this project.

3. Data quality and consistency

The quality and consistency of data collected from a variety of sources can present challenges. In particular, inaccurate, outdated, or inconsistent information can affect

Chapter 5

the effectiveness of an application in generating relevant recommendations. For example, I tried to get information from the Google Maps API, but I found that some closed restaurant information was also captured, and I had to spend time weeding out closed restaurants. More effort needs to be spent on pre-processing etc. in this project.

4. User privacy and data security

Ensuring user privacy and data security within the application is essential. Failure to ensure user privacy and data security can lead to data breaches, affecting user trust and the reputation of the application. So to protect user information, the project must follow best practices such as secure data storage, encrypted communications and strong authentication mechanisms.

5. Data synchronization issues.

Since the online information is always being updated, the system needs a stable Internet connection to ensure access to the latest information. Also, since some of the database information is obtained from the Google Map Api and some is obtained from the information entered by the user in the application, the system has to fetch the database used from the internet and then finally host it on Firebase after comparing and filtering it, therefore an internet connection is required to use this application. If the user loses internet connection, the restaurant data and information may not be available.

5.7 Concluding Remarks

In summary, Chapter 5 provides a comprehensive overview of the implementation phase of the system, including the development of the system, its operation and associated screenshots, and the challenges encountered. The chapter focuses on the integration, design and functionality of the numerous modules and components of the system.

Difficulties and problems encountered during the implementation phase are thoroughly analyzed, providing valuable insights into the complexities and nuances of the project. These experiences have shaped the methodology and contributed to the refinement of the system, ensuring that it meets the project's goals and specifications.

The next chapter tests and evaluates the implemented system in Chapter 6. By carefully evaluating the performance, functionality, and usability of the system, you can ensure that the system meets the expected requirements and has a significant impact in the intended environment.

Chapter 6 System Evaluation and Discussion

6.1 System Testing and Performance Metrics

System testing and performance is the process of verifying and validating the results of a developed system. The purpose of system testing is to ensure that the system meets the specified specifications and requirements and operates successfully. The focus of system testing is to ensure that the system operates as expected and meets user and business requirements. After all, defects and problems can occur when multiple system components interact with each other. At the end of the testing process, the results will be examined, and any issues will be communicated to the development team so that they can be fixed. This will ensure that the system is ready for distribution to end users.

The application was created to recommend a variety of different restaurants to users, helping to shorten the time it takes them to make a choice. In addition, Search Restaurant feature, View a Restaurant Detail feature, Favorite Restaurant feature, Ratings and Review feature, and Surprise Wheel feature have been integrated to make it easier for users to make their choices faster. However, during the development process, various problems such as unresponsive functions and errors may occur. Therefore, a variety of different system tests must be conducted to ensure that the application is running at its best.

The type of system testing that will be performed in this section is unit testing. In unit testing, a checklist will be prepared that contains a list of items and components in the application. In addition, the checklist usually includes a list of test cases or actions required to verify specific system functions or components.

6.2 Testing Setup and Result

In this section, a checklist will be used while executing unit tests. The checklist will ensure that all necessary items in the application are tested and that no important aspects are overlooked during testing. The test section will be divided into different parts, each representing a major module in the application.

Welcome Page Testing

After launch the apps, the system should display the Welcome Page to user and clicking each of the buttons must redirect to the respective to the respective page.

No.	Test Case	Expected Result	Status
1.	Launch the app	Show the logo of the app	Passed
2.	Welcome Page	Show logo, Welcome text and the 2 button.	Passed
		(LOGIN & SIGN UP)	
3.	Press "LOGIN"	Navigate to Login Page	Passed
	Button		
4.	Press "SIGN UP"	Navigate to Sign-Up Page	Passed
	Button		

Table 6.2.1: Test Results for Welcome Page

Login Page Testing

After select the Login option in the Welcome Page, the system should display Login page to the user and clicking each of the buttons must redirect to the respective to the respective page or function.

No.	Test Case	Expected Result	Status
1.	Login Page	Direct to login page after press the login button	Passed
2.	Input Email and	Able to input text into both text fields	Passed
	Password	Display error for wrong input	
3.	Press "Login"	Navigate to Main Page	Passed
	Button		
4.	Press "Forgot	Navigate to Reset Password Page	Passed
	Password?"		
	Button		
5.	Press "Don't have	Navigate to Sign-Up Page	Passed
	An Account ?		
	Sign Up" Button		
6.	Press "visibility"	The password become visible	Passed
	icon		

Table 6.2.1: Test Results for Login Page

Forgot Password Page Testing

After clicking the "Forgot Password?" Button in Login Page, the system will display the Forgot Password Page to the user, and each of the button must redirect to the respective function or page.

No.	Test Case	Expected Result	Status
1.	Input Email	Able to input text into text field.	Passed
2.	Press "Reset Password" Button	 Able to send reset password link to respective email Display error for wrong input Display "Email Sent" when correct input 	Passed
3.	Reset Password Link	Able to reset password with the link provided	Passed
4.	Press "Back" Button	Navigate to Login Page	Passed

Table 6.2.3: Test Result for Forget Password Page

Sign-Up Page Testing

After clicking the "SIGN UP" Button in Welcome Page or "Don't have An Account ? Sign Up" Button in Login Page, the system will display the Sign-Up Page to the user, and each of the button must redirect to the respective function or page.

No.	Test Case	Expected Result	Status
1.	Input Email and	Able to input text into both text field.	Passed
	Password		
2.	Press "SIGN UP"	- Able to send reset password link to	Passed
	Button	respective email and Redirect to Login Page	
		- Display message if tell user the email	
		already in-use	
		- Display "Email Sent" when correct input	
3.	Confirmation	User confirm from the link and the account can be	Passed
	Link	login in to the apps	
4.	Press "Back"	Navigate to Login Page or Welcome Page	Passed
	Button		

5.	Press "Already	Navigate to Login Page	Passed
	have An		
	Account ? Sign		
	In" Button		

Table 6.2.4: Test Result for Sign-Up Page

Questionnaire Page Testing

After successfully login to the application, if the user are new registered, the system will display the Questionnaire page to the user. Each of the buttons must respond to their respective functionality and page.

No.	Test Case	Expected Result	Status
1.	Press the	Able to choose the selection in RadioListTile and	Passed
	RadioListTile and	CheckBoxListTile into both text field.	
	CheckBoxListTile		
	Button		
2.	Press "Submit"	- Able to store the answer to database	Passed
	Button	- Redirect to Main Frame Page	

Table 6.2.5: Test Result for Questionnaire Page

Main/Main Frame Page Testing

After successfully login to the application, the system will display the main page to the user which contains the search button, pop-up Menu, and bottom navigation bar. The List page as the first page. Each of the buttons must respond to their respective functionality and page.

No.	Test Case	Expected Result	Status
1.	Display page after	Direct to the first page which is the list page	Passed
	Login or after		
	submit		
	questionnaire		
2.	Press Search Icon	Navigate to Search Page	Passed
3.	Press Pop-Up	Navigate to Favorite Page	Passed
	Menu Button		
	"Favorite"		

4.	Press Pop-Up	Display the border with the function surprise wheel	Passed
	"Surprise Wheel"		
5.	Press Pop-Up Menu Button "Log Out"	Display border to get confirmation from user	Passed
6.	Press "Home" Bottom Navigation Bar	Navigate to the List Page	Passed
7.	Press "Top 10" Bottom Navigation Bar	Navigate to Top Rating Restaurant Page	Passed
8.	Press "Settings" Bottom Navigation Bar	Navigate to Settings Page	Passed

Table 6.2.6: Test Result for Main Frame Page

List Page Testing

When the user is on List Page, each of the buttons must respond to their respective functionality and pages.

No.	Test Case	Expected Result	Status
1.	Display the	Display a list of Restaurant Card which in Kampar	Passed
	restaurant list	Area	
2.	Press Filter icon	Navigate to Filter Page	Passed
3.	After Select filter	Display a list of Restaurant Card with the sort of	Passed
		filter	
4.	Press Restaurant	Navigate to the pressed restaurant's detail page	Passed
	card		

Table 6.2.7: Test Result for List Page

Top 10 Rating Restaurant Page

When the user press on the Top 10 bottom navigation bar, the Top 10 Rating Restaurant Page will be redirected and displayed to user, each of the buttons must respond to their respective functionality and pages.

No.	Test Case	Expected Result	Status
1.	Display the Top	Display a list of Restaurant Card which is Top 10	Passed
	10 Rating	Rating in Kampar Area	
	restaurant list		
2.	Press Restaurant	Navigate to the pressed restaurant's detail page	Passed
	card		

Table 6.2.8: Test Result for Top 10 Rating Restaurant Page

Settings Page Testing

When the user press on the Settings bottom navigation bar, the Settings Page will be redirected and displayed to user, each of the buttons must respond to their respective functionality and pages.

No.	Test Case	Expected Result	Status
1.	Display the	Display all the profile information including picture	Passed
	Profile	and email address	
2.	Edit Password	A reset password link will be send to the respective	Passed
	Button	email and display a snack bar to notice user	
3.	About this app	- Display a border which display the texts	Passed
	Button	which about the apps	
		- Able to close the border after reading	
4.	Report and	- Display a border which request user to input	Passed
	Feedback Button	feedback	
		- Able to input in the text field	
		- Press cancel to redirect to Settings Page	
		- Press Submit button to submit feedback and	
		redirect to Settings Page	
5.	Sign Out Button	- Ask for confirmation before sign out	Passed
		- Press cancel to redirect Settings Page	

- Press OK to sign out and redirect to Login	
Page	

 Table 6.2.9: Test Result for Settings Page

Filter Page Testing

When the user press on the Filter Icon in List Page, the Filter Page will be redirected and displayed to user, each of the buttons must respond to their respective functionality and pages.

Test Case	Expected Result	Status
Display the	Display all the filter selection	Passed
Selection		
The Selection	- The RadioListTile work	Passed
Field	- The CheckBoxListTile work, can be ticked	
	or unticked	
Reset	Reset the previous selection	Passed
Apply	- Redirect to List Page	Passed
	- The filter function work in List Page	
	Test CaseDisplay theSelectionThe SelectionFieldResetApply	Test CaseExpected ResultDisplay theDisplay all the filter selectionSelection-The Selection-Field-Field-ResetReset the previous selectionApply-Redirect to List Page-The filter function work in List Page

Table 6.2.10: Test Result for Filter Page

Detail Page Testing

When the user press on the Restaurant card in List Page, Top 10 Rating Page and Favorite Page, that pressed Restaurant's Detail Page will be redirected and displayed to user, each of the buttons must respond to their respective functionality and pages.

No.	Test Case	Expected Result	Status
1.	Display the detail	Display all the detail or information including	Passed
	of the restaurant	picture, name, address, phone number, "Open	
		Now/Closed", Weekly Schedule, Rating and	
		Review	
2.	Press Phone	Redirect to the phone call with the number press	Passed
	number		
3.	Press the address	Redirect to the google map and show the route	Passed
4.	Rate and Review	Able to press the star to rate	Passed
5.	Delete Icon	Able to delete own review post.	Passed

		Only display on own review post.	
6.	Favorite Icon	Able to press the Favorite Icon to save and unsave	Passed
7.	Back Button	Redirect to List Page, Favorite Page or Top 10	Passed
		Rating Restaurant Page	

Table 6.2.11: Test Result for Detail Page

Review Page Testing

When the user press on the star bar in the Rate and Review section in Detail Page, the Review Screen will redirected and displayed to user, each of the buttons must respond to their respective functionality and pages.

No.	Test Case	Expected Result	Status
1.	Display the user	Display user information include the email /	Passed
	information	username and the previous rating score	
2.	Input the Review	Able to input the text into the text field	Passed
3.	Post Review	- Redirect to Detail Screen	Passed
		- Store the Review	
4.	Back Button	- Redirect to Detail Page	Passed

Table 6.2.12: Test Result for Review Page

Favorite Page Testing

When the user press on the "Favorites" in the Pop Up Menu in Main Frame Page, the Favorite Restaurant Screen will redirected and displayed to user, each of the buttons must respond to their respective functionality and pages.

No.	Test Case	Expected Result	Status
1.	Display the	Display the restaurant card which has been	Passed
	favorite restaurant	favorited before	
2.	Restaurant Card	Able to press the restaurant card to navigate to the	Passed
		pressed Restaurant's Detail Page	
3.	Delete Icon	- After press, a border display to ask for	Passed
		confirmation	
		- Press Ok to delete whole list	
		- Press Cancel to cancel delete	

4.	Back Button	- Redirect to Main Frame Page	Passed
	T 11		

 Table 6.2.13: Test Result for Favorite Restaurant Page

Surprise Wheel Function Testing

When the user press on the "Surprise Wheel" in the Pop Up Menu in Main Frame Page, the surprise wheel border will redirected and displayed to user, each of the buttons must respond to their respective functionality and pages.

No.	Test Case	Expected Result	Status
1.	Display the	Display the border with a wheel and text "Surprise	Passed
	surprise wheel	Wheel"	
	border		
2.	Press the wheel	Able to press the wheel and the wheel will having	Passed
		spin animation.	
3.	Display Result	Display a random restaurant card as a result after	Passed
		the wheel rotate.	
4.	Close Button	Redirect to Main Frame Page	Passed

Table 6.2.14: Test Result for Surprise Wheel Function

6.3 **Project Challenges**

The following list below are the challenges that are being encountered during the development and implementation process of this project.

1. Restrictions on access to API services.

During application development, certain assets must be implemented to enable certain specific features, such as making all restaurant data available in the application. However, since there is only a maximum of 60 different restaurant data available in the Google Map API Service, and all other Services are the same only need to pay money to get that information, thus limiting the ability of the mobile application to provide more data and functionality to the user.

2. Project Schedule Management

One of the challenges faced by projects is the difficulty of following the project timeline every step of the way. Effectively managing project timelines is a challenge. This is because the development process can take longer than expected, leading to delays in delivering the final product, as well as reducing the amount of time spent on writing documentation to bridge the gap between the actual time it takes to complete the code and the planned time.

3. Some Flutter tools/features have versioning issues

Using the tools given by Flutter well was also one of the challenges of this project. Because some of the flutter tools may be fine on their own, but when multiple tools or features are run together they may have versioning issues, e.g. Flutter Local Notification is affected by the IOS version. In this project, I've spent a lot of time debugging because of versioning.

6.4 Objectives Evaluation

The main objective of this project was to develop a mobile application that recommends restaurants and provides a platform for people to make choices using Flutter. This project has achieved this objective. With the application developed in this project, users can find information about various restaurants in Kampar.

The project has also been done by getting information from the internet with the assistance of using Google Map Api Service and through the information obtained it has provided the information about the restaurants in Kampar in order to make it easier for the users to find their favorite restaurants.

The objective of helping the locals to improve their decision-making skills has been equally accomplished in this project. For the users who are not sure about what to eat, they can find their favorite restaurants by using the Search function, Filter function and Top 10 Rating restaurant function. For users who have trouble choosing, they can use the Surprise Wheel feature to get random results based on their preferences. Meanwhile, those users who want to try new food can also use the Surprise Wheel to learn about the restaurants they haven't been to before. On the other hand, if users want more in-depth information, such as weekly schedules, prices and reviews, these features can help them learn more about their favorite restaurants in a short period of time. They can use the detail page feature, which also includes the ability to make a phone call and display a map, which will help them save more time. This

also improves the decision-making ability of locals in choosing a restaurant If they save time in choosing a restaurant, they will have more time to do their work or hobbies.

Chapter 7 Conclusion

7.1 Conclusion

In summary, the proposed development of a restaurant recommendation mobile application for the Kampar region has been successfully realized. The system is capable of improving the dining experience of residents and tourists in Kampar. The developed application not only has a recommendation function, a search function, but also a detailed restaurant information and a rating function to provide the user with more information to make a quicker decision, which is convenient for the user. In addition, the application also uses a surprise roulette function, the user can get an unexpected restaurant recommendation through this function, which helps users to make a choice and improve the user's ability to choose. Overall, the system achieved the goals set at the beginning of the project and was considered a success.

In terms of the project's contribution, the Restaurant Recommendations Share mobile application provides a list of local restaurant recommendations and their details page, which allows people to learn about the local cuisine. There is also a surprise wheel feature that allows people to learn more about restaurants other than the popular ones, boosting the local economy. And the app also uses a questionnaire to get the user's profile before using the app. And this information will become user preferences to help users filter out unsuitable restaurants.

In conclusion, this project has successfully developed a user-friendly mobile restaurant recommendation and assisted selection sharing application using Google Map Api Service, Flutter etc. All the predefined objectives and scope of the project have been achieved. The final outcome of the project successfully demonstrates the ability to share Kampar's local restaurant list, restaurant details, user reviews, wheel of fortune and other features to increase the user's ability to make a choice.

7.2 Recommendation

This section provides recommendations for further research and improvement of the current system, based on the conclusions and experiences of the previous chapters. Based on the conclusions and experiences of the previous chapters, recommendations are made for further research and improvement of the current system. Objectives of these recommendations The objectives of these recommendations are to improve system performance and functionality for development and expansion.

1. Add more API Service to increase the database

The information provided by the Google Map API alone is still insufficient for this app; thus, this app need leverage additional APIs, such as Yelp, to obtain more information about restaurants and their offerings.

2. Add ordering and table reservation function

This allows users to book table or order food from the restaurant directly when using the app, which can save more time for users.

3. Improving security

Another recommendation is to improve the security of the hotspot by implementing stronger encryption protocols or using more authentication methods. This will ensure that only authorized users can connect to the hotspot, minimizing the risk of unauthorized access or data leakage.

4. Integration with popular social media platforms

The application can be integrated with popular social media platforms such as Facebook or Twitter, allowing users to share the experience of tasting food from various restaurants with friends and followers in just a few clicks.

REFERENCES

[1] F. Bellisle. "The factors That Influence Our Food Choices" eufig.org. https://www.eufic.org/en/healthy-living/article/the-determinants-of-food-choice (accessed June. 6, 2006)

[2] C. Segura-Garcia., P. D. Fazio, F. Sinopoli., R. D. Masi. and F. Brambilla. "Food choice in disorders of eating behavior: correlations with the psychopathological aspects of the diseases". pubmed.ncbi.nlm.nih.gov. https://pubmed.ncbi.nlm.nih.gov/24703769/ (Accessed Mar. 1, 2014)

[3] Zomato "Who We Are". Retrieve from https://www.zomato.com/who-we-are

[4] Foodpanda. "WHAT IS FOODPANDA?" foodpanda.my.

https://www.foodpanda.my/contents/about.htm (Accessed 2022).

[5] A. Anitha, B. Jitendra, V. Krunal, "Software Process Models for Mobile Application Development: A Review," International Journal of Computer Science & Communication, 7(1), 150-153, 2016.

(Project II)

Trimester, Year: Y4S1

Study Week no.: 2

Student Name & ID: Ivan H'ng Zheng Quan 19ACB04815

Supervisor: Dr Aun Yichiet

sor: Dr Aun Yichiet

Project Title: What To Eat Today?

1. WORK DONE

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

Revise the work done in FYP1.

2. WORK TO BE DONE

Design UI, Searching for How to Get Restaurant Database and try to implement flutter local notification

3. PROBLEMS ENCOUNTERED

No problem encountered.

4. SELF EVALUATION OF THE PROGRESS

Discuss and get advice from supervisor

Supervisor's signature



(Project II)

Trimester, Year: Y4S1

Study week no.: 4

Student Name & ID: Ivan H'ng Zheng Quan 19ACB04815

Supervisor: Dr Aun Yichiet

Project Title: What To Eat Today?

1. WORK DONE

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

Searching available restaurant database

2. WORK TO BE DONE

Design UI, Learn on Google Map Api

3. PROBLEMS ENCOUNTERED

Lack of relevant resources. Flutter Local Notification contain problems because of the version of flutter and unfamiliar

4. SELF EVALUATION OF THE PROGRESS

Discuss and get advice from supervisor. Spent more time to study the implementation of flutter local notifications.

Supervisor's signature



(Project II)

Trimester, Year: Y4S1

Study week no.: 6

Student Name & ID: Ivan H'ng Zheng Quan 19ACB04815

Supervisor: Dr Aun Yichiet

Project Title: What To Eat Today?

1. WORK DONE

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

Design UI in Flutter, explore the available Api Service to be used.

2. WORK TO BE DONE

Start to implement Google Map Api methods in Flutter App.

3. PROBLEMS ENCOUNTERED

Unfamiliar with the writing of custom platform-specific code in Flutter and Google Map Api.

4. SELF EVALUATION OF THE PROGRESS

Spent more time to study the implementation of Google Maps in Flutter App.

Supervisor's signature



(Project II)

Trimester, Year: Y4S1

Study week no.: 8

Student Name & ID: Ivan H'ng Zheng Quan 19ACB04815

Supervisor: Dr Aun Yichiet

Project Title: What To Eat Today?

1. WORK DONE

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

Completed to retrieve restaurant information from Google Map Api (Nearbysearch/json)

2. WORK TO BE DONE

Start to retrieve more restaurant details from Google Map Api Service (details/json)

Learn to store the data in FireStore

Find resources about the filter function and user preferences

3. PROBLEMS ENCOUNTERED

Unfamiliar with Google Map Api My mother sudden burst of blood vessels in the brain. I need spent time to go back hometown to take care of her, and cause lack of time to do the project.

4. SELF EVALUATION OF THE PROGRESS

Spent more time to study the implementation of Google Maps in Flutter App.

Supervisor's signature



(Project II)

Trimester, Year: Y4S1

Study week no.: 10

Student Name & ID: Ivan H'ng Zheng Quan 19ACB04815

Supervisor: Dr Aun Yichiet

Project Title: What To Eat Today?

1. WORK DONE

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

Completed to retrieve restaurant detail from Google Map Api Service to FireStore Completed to display restaurant list and detail page function. Completed filter function.

2. WORK TO BE DONE

Start working on the surprise wheel function, restaurant card function.

3. PROBLEMS ENCOUNTERED

Limited Resource Online about the restaurant information in Kampar Not Familiar with How to work with Surprise Wheel Function

4. SELF EVALUATION OF THE PROGRESS

Get advice from supervisor. Spend more time to research

Supervisor's signature



(Project II)

Trimester, Year: Y4S1

Study week no.: 12

Student Name & ID: Ivan H'ng Zheng Quan 19ACB04815

Supervisor: Dr Aun Yichiet

Project Title: What To Eat Today?

1. WORK DONE

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

Done all the function in Flutter App.

2. WORK TO BE DONE

Improve the UI design Testing the function and components in the project Start Writing FYP2 report

3. PROBLEMS ENCOUNTERED

Keep facing some bugs and error with database SQLite and FireStore rules. Grandfather has a serious illness, there are not enough hands in the family. I need to go back hometown to take care of him, this call me lack of time to do the project.

4. SELF EVALUATION OF THE PROGRESS

Need to be more discipline on doing the project. Spent more time to research

Supervisor's signature



Student's signature

POSTER

WHAT TO EAT TODAY

By: Ivan H'ng Zheng Quan

INTRODUCTION

This project proposes a mobile app for restaurant recommendations and assists choices. This app recommends various restaurants in the Kampar area and the functions of the app could guide users to make the choice in a short time.

OBJECTIVES

- Improve people's decision making skills for restaurant choices in Kampar
- Develop restaurant recommendation mobile app using Flutter with a assisted choice platform.

METHODOLOGY



CONTRIBUTION

This app aims to assist the people who having decisionmaking difficulties and to improve the efficiency of their meals. This app is available to everyone in Kampar:

1. Personalized Restaurant Recommendation

- 2. Surprise Recommendation
- 3. An assisted choice system

A high quality dining experience for everyone during normal meal times

CONCLUSION

This app provides a system to assist users in selecting restaurant with features such as rated recommendations and random recommendations. It will improve the lifestyle of residents and the dining experience of visitors.

PLAGIARISM CHECK RESULT

FYP2_ ORIGINALIT	Turnitin ^{y report}	File_Ivan H'ng Zl	neng Quan		
8% SIMILARIT	'Y INDEX	6% INTERNET SOURCES	1 % PUBLICATIONS	4% STUDENT	PAPERS
PRIMARY SC	OURCES				
1 E	eprints.	utar.edu.my			2%
2 5	Submitt tudent Pape	ed to Universiti	Tunku Abdul F	Rahman	1 %
3 2 P	Marco L 2019	Napoli. "Begin	ning Flutter®'	', Wiley,	<1%
4 V	www.tva	assignmenthelp	.com		<1%
5	ibraetd	lib.virginia.edu.			<1 %

Universiti Tunku Abdul Rahman

Form Title : Supervisor's Comments on Originality Report Generated by Turnitin for Submission of Final Year Project Report (for Undergraduate Programmes)

Form Number: FM-IAD-005Rev No.: 0Effective Date: 01/10/2013Page No.: 1of 1



FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY

Full Name(s) of Candidate(s)	Ivan H'ng Zheng Quan
ID Number(s)	19ACB04815
Programme / Course	Bachelor Of Computer Science
Title of Final Year Project	What to Eat Today

Similarity	Supervisor's Comments (Compulsory if parameters of originality exceeds the limits approved by UTAR)
Overall similarity index: <u>8</u> %	
Similarity by sourceInternet Sources:6Publications:1Student Papers:4	
Number of individual sources listed of more than 3% similarity: <u>0</u>	
Parameters of originality required and lin (i) Overall similarity index is 20% and (ii) Matching of individual sources liste (iii) Matching texts in continuous block	nits approved by UTAR are as Follows: below, and d must be less than 3% each, and must not exceed 8 words

Note: Parameters (i) – (ii) shall exclude quotes, bibliography and text matches which are less than 8 words.

<u>Note</u> Supervisor/Candidate(s) is/are required to provide softcopy of full set of the originality report to Faculty/Institute

Based on the above results, I hereby declare that I am satisfied with the originality of the Final Year Project Report submitted by my student(s) as named above.

Signature of Supervisor

Signature of Co-Supervisor

Name: <u>Dr Aun Yichiet</u>

Name: _____

Date: ____15/09/2023_____

Date: _____



UNIVERSITI TUNKU ABDUL RAHMAN

FACULTY OF INFORMATION & COMMUNICATION TECHNOLOGY (KAMPAR CAMPUS)

CHECKLIST FOR FYP2 THESIS SUBMISSION

Student Id	19ACB04815
Student Name	Ivan H'ng Zheng Quan
Supervisor Name	Dr Aun Yichiet

Your report must include all the items below. Put a tick on the left column after you h	nave
checked your report with respect to the corresponding item.	
√ Title Page	
√ Signed Report Status Declaration Form	
√ Signed FYP Thesis Submission Form	
Signed form of the Declaration of Originality	
√ Acknowledgement	
√ Abstract	
Table of Contents	
List of Figures (if applicable)	
List of Tables (if applicable)	
List of Symbols (if applicable)	
List of Abbreviations (if applicable)	
√ Chapters / Content	
Bibliography (or References)	
All references in bibliography are cited in the thesis, especially in the cha	pter
of literature review	
Appendices (if applicable)	
√ Weekly Log	
√ Poster	
Signed Turnitin Report (Plagiarism Check Result - Form Number: FM-IAD	9-005)
$\sqrt{1}$ I agree 5 marks will be deducted due to incorrect format, declare wrongly	y the
ticked of these items, and/or any dispute happening for these items in th	is
report.	

*Include this form (checklist) in the thesis (Bind together as the last page)

I, the author, have checked and confirmed all the items listed in the table are included in my report.



(Signature of Student) Date:14/09/2023