



Cookit – An Intelligent Recipe Content Sharing Platform

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Chapter 1 : INTRODUCTION TO THE STUDY

1.1. Background to The Project

Concept of learn to cook through mobile phone is no bizarre than before compared to years back. In these days, digital education is generally available in the market where people can learn beyond in physical classes, making learning a process that is much enjoyable yet flexible, so that everyone can always continue learning at anytime and anywhere unboundedly. Indeed, especially after the pandemic period where people are locked up in home, lots of activities are restricted and hence digital learning has been greatly endorsed and recognized to be the future of how learning new knowledge should be carried out.

Cooking being one of the most satisfying activities that allows ourselves to present our artistic skills have also been heavily influenced by the digital trend. To perform every task, we often need several guidance around us to assist and ensure that we are on the right track, in fact the same lies with cooking (Taneja, 2020). Undeniably, smartphone has become so essential that its existence has changed our lives including the way how we cook. Through the convenience that smartphone provides, we can now attain useful resources that can be used as a reference to instruct us on what to prepare and how to cook as according to the written steps. With this easy reference, hence it makes digital devices like such so much handy as we can always learn at any places without many concerns.

Though learning was made easier to be accessed through the convenience of mobile devices, however the effort of improving the eLearning experience has always been lacking behind, resulting in low efficiency and engagement rate (ELM Learning, 2021). When learning becomes a boring process, this can cause many people to feel less unenthusiastic, making it a though yet torturing course. Hence, edutainment is introduced to improve the above mentioned, helping in making a clear shift to bring education and learning to an amusing ecosystem. The key to edutainment is to mix education and entertainment with the aim to make people to stay more engaged and excited when acquiring new knowledge. While despite having fun, edutainment is considered to be more serious and professional to elevate the atmosphere while learning, with the

main goal still being to deliver knowledge to the endpoint. Just because it is more enjoyable but the impact of drawing the focus off the people are still exceptionally low. One of the best examples that shows how edutainment can be successful can be indicated from the concept of documentaries. Documentary shows has been successful enough in bringing entertaining media to the people while the same time educate the general public, effectively capturing one's attention to learn and recognize (ELM Learning, 2021). As one of the main goals in this project is to help inducing people's interest to learn cooking, thus by combining the new technologies from mobile devices to make a fun edutainment application can very help in improving the enthusiasm of general public into learn to cook while having fun the same time.

1.2. Problem Context

Food is something that everyone has to deal with every day and mostly people generally can never escape from the process of preparing food themselves in life. It is common that people do plan for their next meals, with thought like what do I eat for lunch or tomorrow but never has people ever actually execute it with reasons being they don't know where to get the food. Naturally, when one does not know where to get it, we always proceed to the second option which is to "do it your own". In this days, concept of preparing own food is widely common as prices of buying well prepared cooked dishes are quite high. However, most of the newer generations these days are not equipped with the skill to cook well, come to worse some may not know how to actually prepare some simple dishes.

As social media being one of our daily life necessity, people do source for online cooking recipes from there and try to replicate their method to prepare their wanted dishes. Yet, one of the drawbacks doing so is that social medias can't provide well guided cooking information given that they were not meant to be a platform for culinary guidance. This may cause confusion for many people as they could not get a clear step by step guide to learn how to cook.

As for that, many businesses have seen this opportunity and made an online version of cooking recipe e-book. Though they are much more convenient than old days bulky printed recipe books, but the fact that they are still not the best choices for many. This is mainly due to that they have

much **less flexibility** option as not all ingredients are made commonly available in different regional countries. The recipe book may be suitable for certain regions as they have better access to source them but indefinitely, it may be different for other places. Asides, as each region have been heavily influenced by their cultural dish taste, hence what may seem a perfect recipe might not fit the taste bud of the people from other regions. Taking an example, chili padi may be a common ingredients to be sourced in the Southern Asia countries for making chili paste, however, to make chili paste in the western regions are completely different and we cannot expect people from the western world to source chili padi as according to the recipe menu that suits our taste preference, chili paste with chili padi will be deemed too spicy for them as well. Hence, a need for Cookit is definitely necessary in order to tackle all the problems as mentioned above to allow users to share cooking recipe together as a community.

1.3. Rationale

With this mobile cooking toolkit, it can provide so much convenience for the new mothers especially the younger generations by learning how to cook through step-by-step guidance that covers a vast varieties of cuisine options that are shared. Not only it benefits the ladies in kitchen, but users regardless of their genders and age groups can as well be benefited from this application to learn culinary arts pleasurable and cook any of their wanted dishes at their own comfort. Asides, this application does also have a grocery list that users can use to add in the ingredients that they do not have for making the food and be used as a grocery checklist so that users can always refer on what to buy without the need to write them down on other places. This certainly would ease further on the whole culinary experience as it could offer an extent of expediency for many house cooks. Apart, users could as well post their recipe to help in building the recipe app as a part of sharing their recipe creations, helping the others to learn and innovate better quality food together as a community.

1.4. Potential Benefits

1.4.1. Tangible Benefits

- As the application has extensive coverage of cuisines, looking for recipes for other cultural cookeries will be much easier and effortless
- Time saving as users can know beforehand on what they have to prepare for their cooking the meal
- Efficiency for users is greatly advanced as it offers multiple functionalities that could help the users in find, learn and improve the cooking recipe as a hamlet group

1.4.2. Intangible Benefits

- Hassle-free experience as the required ingredients for specific dish are clearly listed out so that users can know what to prepare beforehand
- Could potentially attract interest from more people trying out culinary and improve their cooking skills
- Make cooking experience more enjoyable for families, hence foster better family relationships

1.5. Target Users

As this application is designed for people in learning and sharing knowledge on their cooking recipes, therefore the targeted users of this application will be the house cooks who will be using this application for sharing their cooking experience and exchange for reviews and feedback from other users who are trying out the recipes shared as well. The targeted age group of this application is developed for younger generations as it aims to help the users in learning and most importantly have pleasure experience with cooking in kitchen.

1.6. Scope and Objectives

1.6.1. Aims

The aim of this project is to enhance the general experience of kitchen cooking at home by providing a comprehensive assistance for the users from planning, preparing and actual cooking of the meals. This application is aimed to improve the culinary skills of many house cooks

especially for the first timers or new people who wish to learn on how to cook for themselves and their family.

1.6.2. Objectives

1. To offer convenience for house cooks in planning and preparing dishes
2. To provide better hands-on experience for young people first time trying on learning to cook
3. To enable younger generations in enhancing their culinary skills by learning more about cuisines from other cultures
4. To entice interests from the public to get more people involved into cooking by making cooking experience more enjoyable
5. To allow users to make and keep their own exclusive recipes together in the application so that kitchen and recipe access can be made available from their fingertips

1.6.3. Deliverables - Functionality of The Proposed System

Cookit is an intelligent recipe content sharing platform that helps its users especially for the house cooks who cook regularly in the kitchen to handle their kitchen matters from the initial process of planning to actually making the food. Ideally, it acts as a toolkit that people can use to learn how to cook as well as other cultural cuisines that they wish to try on. However, being an intelligent recipe content sharing platform, it also tends to offer convenience such as automated content writing feature where users do not have to worry about writing a lengthy word of description. With following is the list of the expected functions that the system has to deliver to achieve the ultimate goal.

Cookit allows House Cooks:

- Search for recipes and follow the guide step-by-step
- Automated content generating feature where texts description can be written automatically
- Save their own exclusive recipes into the application
- Share recipes with others on public to help others better in improving culinary skills together

- Ability to view on what they have cooked and kept as a cooking diary

1.6.4. Nature of Challenges

As this application tends to achieve multiple functionalities within a system, hence the difficulty to develop of the application is also exponentially high. With its goal to deliver conveniences to house cooks and provide a better daily meal preparation experience, multiple considerations have to be drawn to attention while considering the product to assess how will the application actually benefits the primary targeted users. Asides, given that the time assigned for completing such a hefty project and limited manpower resources involved, it is also one huge challenge that has to be stridden to accomplish the final product. With that being said, system errors and bugs have to be captured and deterred once found throughout the lifecycle of this project as spending too much time on fixing bugs might affect the viability for system delivery.

1.7. Overview of This Investigation Report

This investigation report is segregated into 7 main chapters with each carries its purpose to discuss on the studies of the proposed project to support the ideation and viability of producing a mobile cooking toolkit application. As such, the function of every chapter that serves in this report are briefly described and listed down as follows.

1.7.1. Chapter 1: Introduction to The Study

In the very beginning of this investigation report utters the general concept of the proposed project with initially describing on the project background as well as the problem contexts to give a brief understanding on the value of the project. Following after comes the rationale and potential benefits that discuss on what significance can the project draws as a spark to show its prominence over in facilitating the problems mentioned earlier. Scope of this project is also indicated by the aims and objectives which later to be used for ascertaining the expected deliverable outcome from the proposed solution. To ground down further the root, possible challenges that might be faced by the developer throughout the project lifecycle and who the target users that will use the application is as well included as part of the chapter here. At last, a project plan that drafts the

timeline of the project is also to be attached to show the plan on how this project is to be completed within the allocated timeframe.

1.7.2. Chapter 2: Literature Review

A dissertation on the research that has been carried out from journals and reputable sources related to the subject topic is included in the second chapter of the investigation report to make a clear review on the previous studies that was done by other scholars and researchers. On top of that, investigation on identical systems that perform similar tasks and serving purposes are assessed in ensuring that the proposed system will deliver a huge contrast that distinct itself from the other competing alternatives in market.

1.7.3. Chapter 3: Technical Research

A technical research is conducted in this chapter to assist on cherry-picking the most appropriate technical elements to build this project. With subjects being explored like the selection of programming language, interactive development environment (IDE), database system, operating system as well as the necessary equipment to support the development of the project are as well to be justified in this segment.

1.7.4. Chapter 4: System Development Methodology

Moving on, an evaluation between two software methodologies that are deemed more likely suitable for this project is being made to ensure that one best developmental approach is used in the project to drive the whole lifecycle process. With that, the chosen methodology also being further elaborated to demonstrate why and how does it fit best for this project.

1.7.5. Chapter 5: Research Methods

In this chapter, it mainly discusses about data gathering method that was picked for helping the collection of useful information from the respondents to retrieve their most honest perspectives in regard to support the project. Design of questions that will be used to assess the public opinions are to be provided and further justified to ensure the fitness of the research approach matches well with the principle of this project.

1.7.6. Chapter 6: Requirements Validation

In requirements validation, it is tightly related to the previous chapter that was mentioned whereby data that are gathered from the research approach is extracted to make good analytical study in determining how the suggested solution needs to be developed in order to fit the requirements of the targeted public users. As a result, the outcome of this chapter will be highly important as it helps shaping the success of the project.

1.7.7. Chapter 7: Conclusion and Reflections

Finally, the last chapter here will summarize the entire investigation report and the overall knowledge acquired throughout the process of generating this report. Experience attained will also be taken in for making a self-reflection as a measure to make better improvement that might be useful for future projects.

1.8. Project Plan

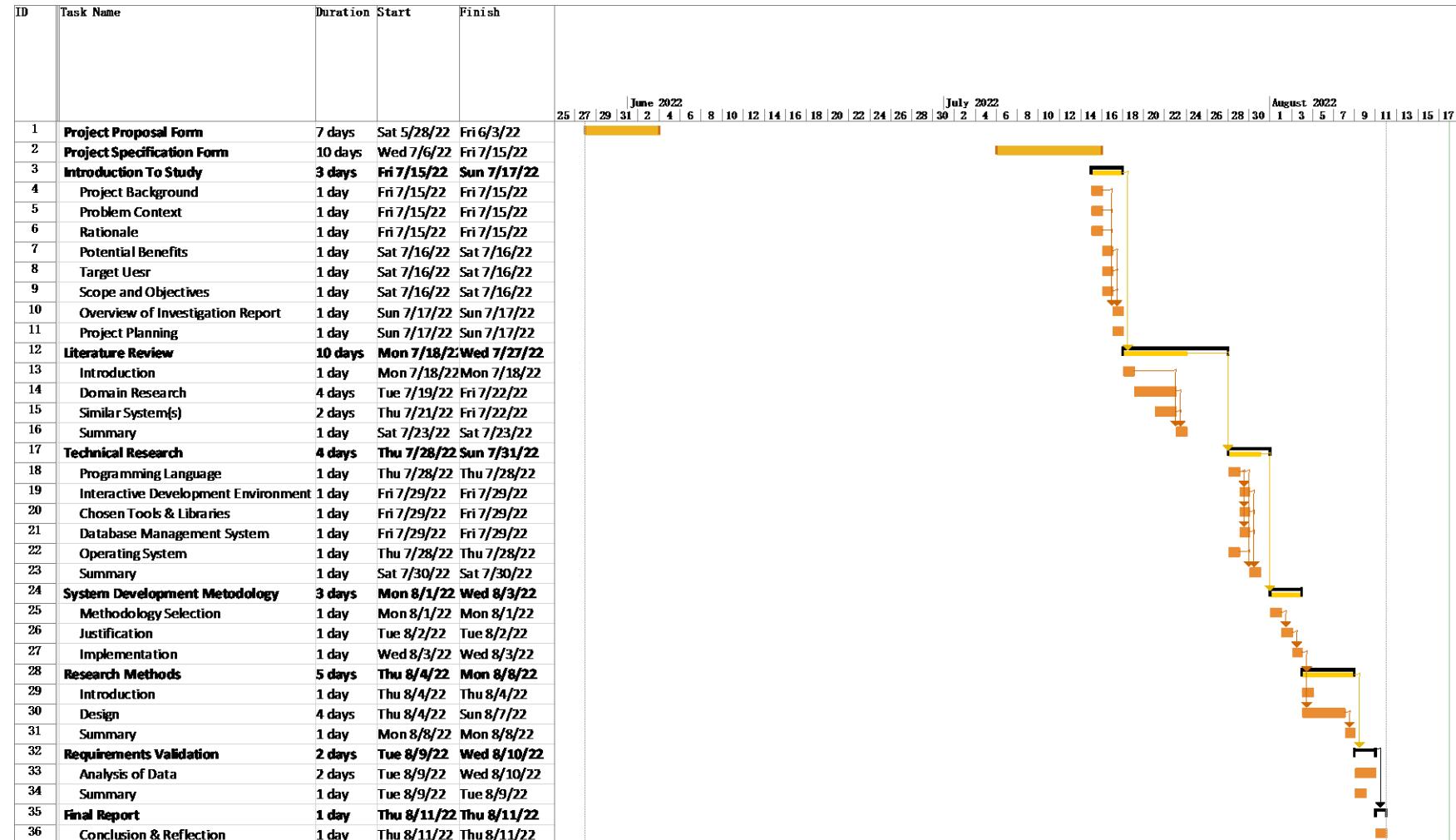


Figure 1-1: Project Plan Gantt Chart

Chapter 2 : LITERATURE REVIEW

2.1. Introduction

A literature review is a piece of academical review that exemplifies insight and understanding of the empirical papers on a particular topic in setting. In literature review, it provides a multidimensional analysis, which is why it is termed as a review rather than a report (The University of Edinburgh, 2021). In this chapter, synthesis of the valuable information found from the analysis of other literature papers are gathered and formulated into a summary of subtopic areas where similar results and ideas identified are put together for further review. Apart from performing a detailed research into the domain of related topics in regard, similar systems that are found available are picked and put into comparison to make further analysis of the available features and technologies that are being used in the market currently so that it can help in better targeting on what more this proposed application can work on in order to combat in the competition and how can we make it better. Therefore in this chapter, it contributes lots in determining the success factor of the proposed application in helping the development team in understanding better in the domain as well as the market competitors available.

2.2. Domain research

In this domain research, a total number of seven topic areas are classified and evaluated for assisting in making better conception on the domain in relevant.

Decrease In Domestics Cooking

Though home cooking may offer plenty of benefits, however the number of families preparing home cooked meals are gradually decreasing over the years. As a research conducted by Kim (2021) to assess the eating patterns of adults in Korea, it is found that home meals ratio has declined by a stack, from 45.8% to 38.1% within the time period of 12 years. Frequency of how often people cook house meals has as well sunk from on average of 2.1 meals per day to 1.7 meals. Hence, provided from the statistical data here, we understood that there is a crucial decrease in domestics cooking over the years and mostly people are getting less exposure and time allocated to prepare meals in home. Also from Kim (2021) that in Korea, average time spent on preparing meals per week is reported to be at 3.7 hours. By taking into account that there are 168 hours in a week, we

can witness that in a total one week time, people are spending less than 3% of their time to be committed in even preparing foods in home for own or family consumption. That is making it out that on average, families only willing to fork out around 30 minutes daily in food preparation for the entire day.

As found from a studies in UK completed by Caraher (1999), numbers of people eating outside has been growing at a skyrocketing pace. Even if they were to eat in house, food that are consumed by the people in the home are also found to be more towards ready-to-eat meals where no additional complicated cooking procedures are required. This has contributed to people getting less motivated to cook in home as convenience foods are getting more approachable in the market. As written in Caraher (1999), it has identified that social trend has changed how the modern society works especially in meal preparation. These days, as women are more committed in waged labor than before, this has indirectly created markets for convenience foods in blooming drastically, making consumer society to be more reliant living on consuming ready-prepared foods outside.

Impact of Processed Foods

As one of the reasons being that led to a drastic fall in home cooking is as well due to the impact coming from the processed foods in the market. As highlighted by Caraher (1999), one of the mistakes ever done causing people to cook less in home is a result from the industrialized society that affects the food systems within us. Consumers mainly rely upon pre-processed and cooked foods and this has never stopped down. As quoted in (PF2), ‘if prepared food is easily available, why even bother to learn cooking? If you have no cooking skills, then fast foods are the most efficient answer’. Though this quote may be seen inappropriate as we know that knowing how to cook is a basic skills that most should acquire in order to survive. However as the world is undergoing a transition, what seems to be basic skills are slowly becoming obsolete in the community. The skills required to prepare food is shifting Engler-Stringer (2010), as convenience foods are mostly available everywhere, people have started to buy what they can get quick on hand rather than cooking it themselves. Convenience is what these processed foods have been offering and that has unquestionably taken a big success in the society (Kolodinsky & Goldstein, 2011).

The impact that these processed foods, regardless pre-processed or completely processed, has even turned the sight on how we define and use kitchen utensils. Statement from Caraher (1999) has

judged that there appears to be a trend in how equipment is increasingly used by the people over preparing meals. However it is sad to note that how meal preparation with these kitchen equipment has been used to serve pre-processed ingredients and meals. When one starts consuming these processed foods, it is for sure that nutritional control over what we eat will become one concern that we cannot avoid from.

Backing from the argument as argued by Engler-Stringer (2010), heavy reliance on such ready prepared foods could as well mean that people are unconditionally allowing unhealthy ingredients to taken into their body. By consuming these processed foods, they are found to be opening gates for our forms in absorbing unnecessary unhealthy nutrients such as fats with insufficient intake of fruits and vegetables. Acknowledging how processed foods may be unhealthy for us, however the growth of processed and prepared food has increased especially in takeout meals. This is mainly from the effect in response to social pressure of how processed foods are slowly conquering and becoming part of most people's life. Almost half of the respondents from a research conducted have shown that they are devouring convenience or ready-to-eat foods in Britain and whereas respondents coming from the same research done in France has shown that people are using pre-prepared items for quick meal preparation (Kolodinsky & Goldstein, 2011). While in the USA food market, a split between food prepared at home and take out food is also obviously noticeable. With the existence of processed food, it is sure that cooking skills are no longer as good as they were with ladies in years back then. As technology advances, cooking skills that may seem required are not even that important anymore considering has as well changed its standard constraints. We found that from Caraher (1999), that because of the processed food, only cooking skills with minimal levels are required to prepare food for self-consumption at home. To justify further on why the statement is made, it has also found that with current technological advancement, it has influenced how food preparation is done with minimal effort as simple as reheating and assembly.

Time Limitation Making People Unwilling to Cook

Up till to date, it is estimated that up to thousands of available food products are mostly processed and usually require only little or no transformation before they are made ready to be eaten (Engler-Stringer, 2010). However, it is believed that the numbers are well beyond than what was identified

from the uncovered. In evidence to that, several academic and journalistic sources have debated that these convenience foods were developed as a market reaction to the need of spending less time cooking at home (Engler-Stringer, 2010). As such, we could see that time is also a main contributor to the result of high number of pre-processed foods. To further proving on this standpoint, as taken from Mills (2017), people with restrictions on time or working hours cooked less compared with those with greater leisure time availability. From this point, we can further look into the problem that as society pressure are becoming more concern over the period, it has also impacted on how people want to cook. It is understandable that in fact when one has too much time resources that needs to be heavily invested in, the motivation of doing secondary tasks are no longer matters to them anymore, even when coming to fact where provided that home cooking can help in giving many beneficial effects, such as high nutrients and so on.

Due to the lack of time to cook, a research is as well conducted to help identifying on the effects of time lacking in current modern society. It is found that participants are becoming more dependent on the use of pre-prepared foods to cook at home. Definitely, lack of time is one major barriers to cooking, work commitments have significantly influenced the decision to (not) cook as well (Kolodinsky & Goldstein, 2011). By taking this as the evidence, hence it can very well be used to demonstrate the statement validity as discussed on the paragraph above.

In subject to those time limitations, a study is also done to explore further on the attitudes that people have towards cooking behaviors, where some negative attitudes were found to be in regard to taking too much time in food preparation, getting physically tired of preparing meals and making clean ups after that. With that, they justified that homemakers think it is tiresome and time-consuming to cook while at home (TL1). Relatively, cooking often requires lots of after cleaning especially when cooking something oily. These messes are often difficult and tiring as cooking alone has taken up quite some time to get the food done prepared and served. As a result, most people opt for the quicker way which is of re-heating processed and well-prepared food that can be immediately served on the table to save efforts and time needed. Not only that, among one of the factors that led to this negative attitude is as well due to the time needed on purely just to pick what menu to prepare each time (TL1). As there are thousands or more of dishes that are available across globally, planning on what to prepare on table to serve the family may be one big concern to the house cooks as well. Often, some kids are picky eaters that may have their favorite

preference over what food they eat. Mothers and house cooks have to always brainstorm what other possible ways they can cook just to fit the palate of the families.

In all, to provide a contrast to the problem due to time limitation, a good example can be taken from the recent virus outbreak during the Covid-19 pandemic where most places are enduring phases of lockdowns to curb the spread chain. During the lockdown, it has led to increased time availability in home environment and which presented lot of opportunity to see if cooking habits can be changed given that there is more time available. As we agreed that before the pandemic, the declination of domestic food preparation has been at a steady downtrend (Sarda, 2021). However a research is made by Sarda (2021) to find out if the assertions made earlier were valid.

By looking from the algorithmic results provided by Google, it has exemplified that searches using the word “recipe” has almost tripled during the lockdown compared to early quarter in 2019 just in France alone Sarda (2021). From here, an assumption based on time availability affecting the cooking attitude of people at home has been very well found to be highly correlated in between. By collecting responses from the respondents in Sarda (2021), some explanations to that reaction were found out that people have more time to prepare meals than before and this response was backed by the majority of up to 54.8% of the respondents, while 45.9% of the respondents were also declaring that this was a result of people actually still prefer to eat more homemade meals and less ultra-processed foods if possible. As seen, results have told us that though processed foods can be convenient, however homemade meals are still strongly preferred by many in actual when both put in contrast without being affected by the time constraint in our busy daily life.

Table 3

Perceived evolution of cooking frequency and culinary practices reported most frequently during the lockdown.

	Total		Men		Women		p-value ^a
	N	%	N	%	N	%	
Evolution of cooking frequency							
More frequent during lockdown	2422	100%	1153	100%	1269	100%	
More frequent during lockdown	1017	42.0%	440	38.2%	577	45.4%	
Less frequent during lockdown	171	7.0%	82	7.1%	89	7.0%	0.001
No change	1234	51.0%	631	54.7%	603	47.5%	
Culinary practices reported as more frequent during lockdown	1017	100%	440	100%	577	100%	
Spending more time preparing meals	793	78.0%	344	78.2%	449	77.8%	0.95
Trying new recipes and/or cooking unusual meals	749	73.6%	295	67.0%	454	78.7%	0.03
Spending time baking	682	67.1%	267	60.7%	415	71.9%	0.03
Cooking fresh products	613	60.3%	273	62.0%	340	58.9%	0.53
Preparing a greater number of meals	583	57.3%	260	59.1%	323	56.0%	0.52
Preparing food in larger quantities	498	49.0%	208	47.3%	290	50.3%	0.50

Figure 2-1: Screenshot of Table 3 (Sarda, 2021)

From the table shown above, it is found that 42.0% of the respondents have acted in favor towards cooking more frequently during the lockdown compared to the past. While those who reported to be cooking more frequently in pandemic period has shown that more time are put into preparing meals (78%), while 73.6% reacted with trying out new recipes during the time spent and 67.1% responded with spending more time commitment in baking as well. From this table is has made it clear to excuse that people tend to cook more frequent during the pandemic time and linking this back to our subject, when time is made up more freely available to the general public, they tend to try out cooking and improve their cooking skills as well.

Post-lockdown continuation of the increased cooking practices.									
	Total		Took pleasure in cooking more frequently				Did not take pleasure in cooking more frequently		p-value ^a
	N	%	N	%	N	%	N	%	
Continue to cook more frequently after lockdown	1017	100%	861	100%	156	100%			
Yes	609	59.9%	540	62.7%	69	44.2%			
No	408	40.1%	321	37.3%	87	55.8%			<0.001

Figure 2-2: Screenshot of Table 4 (Sarda, 2021)

Asides, as judging from the table extracted from Sarda (2021), we could find out that the growth in cooking frequency after the lift of home lockdown policy has remained consistent for six out of ten respondents assessed. This point further strengthened the fact that people in current society has been heavily affected by the working pressure that resulted to timeless working conditions, making people to feel unmotivated to cook. Hence, time limitations have been proven to be one of the big impact towards discouraging people from cooking at home.

Expensive Raw Materials Resulting Processed Food to be Preference by Many

Going on, aside from the time limitation that affects us from doing home cooking activities, cost is also one big matter that mark on making people to stick more towards processed foods. As recognized from the proclamation in Kolodinsky & Goldstein (2011), high costs of raw foods such as fruits, vegetables and meat are a hurdle to self-preparing meals at home. In responses gathered from Irish and American individuals from Kolodinsky & Goldstein (2011), the respondents have showed strong preference in buying cheaper processed foods as opposed to raw foods. This shows that how much the influence of high cost of raw foods can affect people from cooking at home. As reported in Sarda (2021), with wide availability of ultra-processed food products at lower cost, this has bluntly cause to the decline in cooking and food skills as well. To understand what is up to the

high cost in raw food, some has stated out that as the food resources are limited, hence raw ingredients are priced at higher cost. Controls over the raw food prices are one interest that people have always looked on, however the domino effect of such price increase cannot be simply solved by the people and hence processed foods are made available as an attempt to offer people who may need access to cheaper food options.

Not only so, the same research that were referred in assessing the negative attitude toward cooking behavior has also pointed out that one negative impact from cooking at home is also led by the cost of preparing the ingredients for cooking at home (Kim, 2021). However, with higher cost for raw food materials do not always act in oppose to dissuading people from cooking at home. Home cooking can also be used as one strategy by many as an effort to reduce food costs even with scarce financial resources (Kolodinsky & Goldstein, 2011). As eating from the restaurants outside may actually cost more than what is needed to actually prepare the food in our own kitchen, hence cooking at home can actually help in allowing greater control of the domestic budget, making people to cook what they crave at lower cost. Though it is indisputable that cost for buying fruits and raw food materials may take up higher cost when compared side by side with the processed foods, however considering the nutrients that one may offer, processed foods have definitely no stand on that as they are unhealthy with many artificial additives contained when they are produced in the factory.

Effects of Lacking in Cooking Confidence

As revealed by Kolodinsky & Goldstein (2011), knowing how to cook and having the confidence in cooking is described to be one important factor for home cooking. Consequently, absence of confidence in cooking could be a hindrance to cooking. In a statement from Engler-Stringer (2010), cooks generally do not use convenience foods because they do not equip with the culinary knowledge, but other reasons behind it may include lack of interest and confidence for cooking. Asides, many younger generations have also found to be not well equipped with good culinary skills. Such issue may be coming from an effect of declination in cooking skills, however it does not necessarily always to be from the skills that are refraining people from cooking, a lack of confidence in using the basic skills is also one big factor that causes from the issue happening (EF3).

Therefore from points as elaborated above, we can see that the confidence in cooking skills was found to be one key element leading to cooking at home. With this finding, it has also known to be similar as the study by Kim (2021), which strengthened that perception of cooking skills is an important significance that is affecting cooking behavior at home. To overcome the issue, it is needed that more time allocation needs to be put into cooking and trying out unknown cooking techniques that are yet to be explored. With such approach on getting the skills practiced, it may positively help people in gaining the knowledge and confidence in cooking, which are part of the essential aspects of food skills (Sarda, 2021).

Benefits of Home Cooking

After the discussions on the factors that led to a fall in home cooking and their impacts, it is necessary to as well evaluate the potential benefits that home cooking can bring in and understand why home cooking is still necessary these days even when the convenience of processed foods is made handy and time saving for most people. Firstly, it is known that home-cooked meals have opened up many beneficial advantages such as reduction of excess energy, sugar and fat intakes. Not only reducing the intake of unhealthy food sources, it also helps in elevating the ingestion of nutritional food sources such as vegetable and fruits compared to dining outside and processed meals (Kim, 2021). With increased intake of healthy and fresh foods, it also can effectively help in preventing obesity issue, lowering the probability of unbalanced dietary meals. Asides, as home cooking also mainly utilizing fresh ingredients that are bought from credible and safe places such as hypermarket and others, therefore health protection may also be guaranteed better by lowering the chance of having any allergic reactions or food poisoning. One thing that was discussed earlier was about the cost of meals and we have fixed that cost is one important factor that affects people's behavior in eating. Therefore in terms of economic benefits, studies have determined that eating at home can help saving lots of monies when compared to dining out as well (Kim, 2021).

With endorsement from the Department of Health and Health, they have promoted that the cooking skills is indeed necessary even in today's world in order to live a healthy life (Caraher, 1999). A relationship between the food skills and nutritional intake is built as according to their studies. Thus, with the ability to cook for yourself can be highly useful as it can help to control ourselves in what to cook and what nutrients we need. Several investigations have been taken to experiment

on this issue and has identified by Kolodinsky & Goldstein (2011) that cooking allows people to have greater control over what they and their families eat, including affecting the eating habits as well. In fact, children are mostly dependent on how they were raised in a family according to what their parents cook and serve at home. Parents are usually the direct factor in helping their children to determine what to eat, making parents the role as the “gatekeepers” of family nutrition. Hence, only when parents are cooking more frequently at home, it can help in controlling the health levels of their children based on what foods they cook and serve to their children.

In terms of health outcomes, only when home cooking frequency is improved, subsequently only we can assure of our body health condition. As remarked by Mills (2017), people who cook more frequently at home are associated with longer lifespan in Taiwan. This has emphasized on how home cooking can enhance our body health when compared to eating processed foods or dining out. To explain on the mystery of this reference behind, it is also called that eating at home with healthier cooking practices implied can link with reduced risk of overweight, particularly in adolescents.

While social scientists have suggested that relationship of cooking and health is complex but in truth, they are circular and connected in between. In the paper Caraher (1999) have indicated that availability of foods defines the range of cooking to be applied, likewise cooking skills and techniques outlines how the people consume food as well. Therefore the knowledge of knowing how to cook is definitely critical as to provide healthy meals to the family while cooking at home as inadequate knowledge about food preparation may result in nutrients deficiencies in severe circumstances (Caraher, 1999). In nutshell, only when healthier dietary patterns are exercised by cooking at home, health concerns associated to obesity, BMI and others may get to be reduced in return (Sarda, 2021).

Apart from improving better health for home cooking, relationships are also believed to be one interest that can be developed from cooking and eating at home. In a report compiled by Kolodinsky & Goldstein (2011), people often feel delight when cooking as a social aspect in the activity. Cooking is one frivolous leisure activity that involves friends and family especially during the weekends. Evidence has suggested that home food preparation can also allow individuals to open up to connect with others and toughen relationships to express their love and care. Not only

to make better connections with other individuals, but parents are also found to bring closer with their children meanwhile increasing the independence amongst the adolescents in learning how to cook on their own (Mills, 2017). In a meal sharing occasion between parents and children, it has been proposed by Glanz K. et al. (2021) that this can help to promote relational closeness as a family meanwhile promoting health and wellbeing as well. The mechanisms that work behind this is believed to follow from the occurrence of social interactions whereby good parenting is demonstrated while family members are eating together. A recent report from Glanz K. et al. (2021) has also suggests that dining together may actually foster and build better communication channels between parents and children as an opportunity for them to understand each other better through conversations and listening to what their opinions are, making it relatively low for conflicts occurring between parents and children as misunderstanding can be well reduced.

In families who started out with more frequent mealtime occurrences, it is found out that the adolescents in these families have been reported less decline in parent-child communication (Glanz K. et al., 2021). This is one remarkable point to be pinned out as adolescents are always found to be rebellious and communication are poorly conducted in between, resulting poor relationship between parents and their child. Hence, in emotional benefits, higher mealtime frequencies can prove to highly associated with fewer problematical manners in adolescence, and thereby meal preparation at home should be greatly promoted to parents and practice to cook and eat at home to greatly help in setting a good example for children, reducing the hassle of kids going over for bad drills such as drinking and smoking (Kim, 2021). In an observational study performed in Malaysia, it has also realized that cooking with family members especially with the mother can assist in family bonding, consolidating the family relationships at home (Kolodinsky & Goldstein, 2011). Therefore, home cooking is proven to say with confidence that it can help in so much, not only where it can improve our body health by allowing us to control what we consume, but it also helps in improving connections between families and friends, bringing love to everyone in house.

Motivational Factors on Why People Should Learn Cooking

As discussions above mainly are surrounded with disadvantages, benefits and factors why people tend to cook less at home, hereby comes to explain the motivational dynamics of why more people should be enticed to learn cooking. Often, cooking skills are perceived as obsolete and no longer

a necessary in such modern hi-tech society (Caraher, 1999). However, without the skills equipped, choices and control over what we can pick to eat could be taken away from us as younger generation these days have high dependency over what is offered to them. Hence, by knowing on how to cook can make us to be prepared to making choices on what we want to eat even if the food options and restaurants are limited at the place where they live.

One motivator that why cooking should be promoted to the public is that cooking is not just about a necessity skill in order to stay surviving, but it is also a form of creativity expression where people can get their ideas to be utilized in making the best taste by combining a certain food ingredients (Kolodinsky & Goldstein, 2011). A survey found from Caraher (1999) has signified that a strong support is garnered from the general public in demonstrating that the need of teaching cooking skills. From the results shown, 98.5% and 99.2% of participants think that it is very important to teach boys and girls to cook and this is unneglectable. As experimenting further into interpretation of this result, it is shown that not only cooking can act as a good medium for the younger generations to spur the creativity, but cooking is also a skill that can support in self-sufficiency (Kolodinsky & Goldstein, 2011). This statement remains true that in most situation, cooking can help in assuring that children are not put in starvation even when there is no food served readily on the table when parents are away. Henceforth, with motivational factors as such, it helps in emphasizing that cooking is no doubt important in our life, especially to be taught as a skill for the children.

2.3 Similar System(s)

A proper evaluation into the identical systems that are currently readily deployed in market is significant upon the constructional process of the actual system. In this section, a discussion will be held to look into the features that each similar systems are providing to their users and the strength that they possess in securing their user base from jumping over to other alternatives. Any weaknesses that they may open to can as well be taken down into note here so that the proposed application system can make an effort in working on the issues and create the proposed system in becoming a better option when compared by the users with these alternatives in market. A total of three identical systems are spotted and taken for comparison in completing the goal of discovering their qualities and variation gaps to study the current market trend in how they provide a solution for the current users and allowing the development team in achieving more than what they offer.

2.3.1. Plan to Eat: Meal Planner

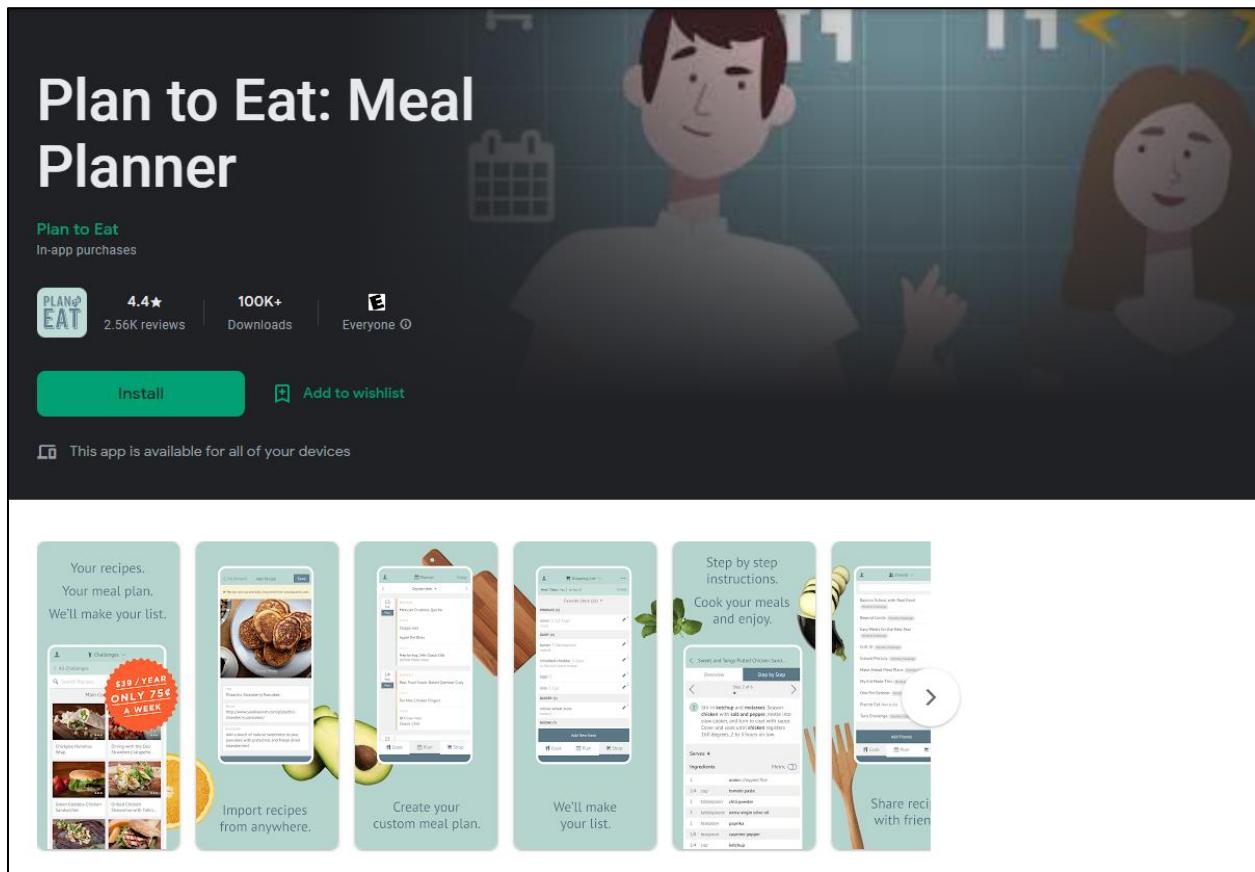


Figure 2-3: Plan to Eat: Meal Planner (Plan to Eat, 2018)

With proper meal prepping, it can help users in spending less on food, while in the interim optimizing user's eating behaviors and encourage families to eat more frequently together. From using the Plan to Eat application, it is deemed as ideal approach for making meal planning a seamless element of user's daily routine. In Plan to Eat, it makes meal planning easier and helping families in eating better by saving cost at the grocery store. This has made cooking a kitchen more like a less stressful cooking nature.

As the application runs no advertisement to allow greater user using experience for the application, the app is making it free for new users to try out using for as long as 14 days. Credit card and obligation are not required in beforehand and once the trial using period has ended; the users may be required to decide in between paying a month occurring fee to unlock Pro features or terminate the usage of the application.

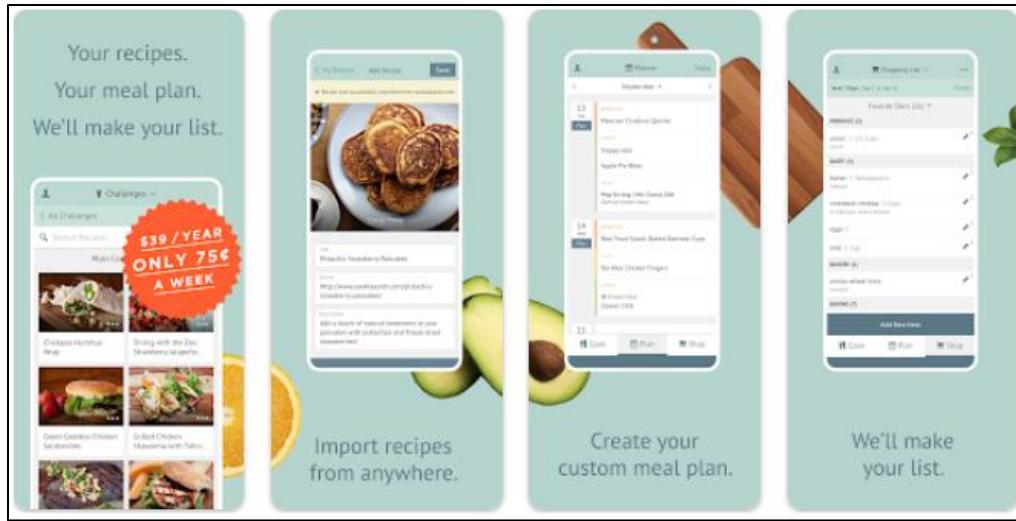


Figure 2-4: Plan to Eat: Meal Planner (Plan to Eat, 2018)

In Plan to Eat, it makes it easier for users in keeping the recipes when they found it from online websites. Not only so, custom meal planning activity and shopping list can also be stored in the application and referred to when necessary.

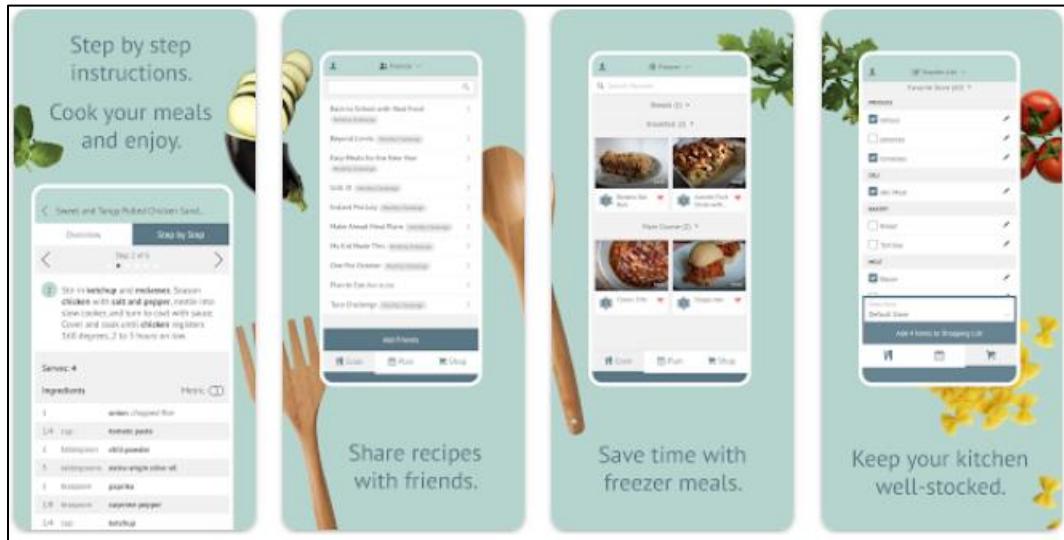


Figure 2-5: Plan to Eat: Meal Planner (Plan to Eat, 2018)

Detailed instruction steps for making the dish may as well be customized and written in the application acting as a place to store all the self-made recipes. Nonetheless, shareability is also one highlight over the application in allowing users to share the recipes with their friends or families. Kitchen stock inventory can as well be monitored by recording down what item its available in kitchen and how many of the quantities is left before running out.

2.3.2. Paprika Recipe Manager 3

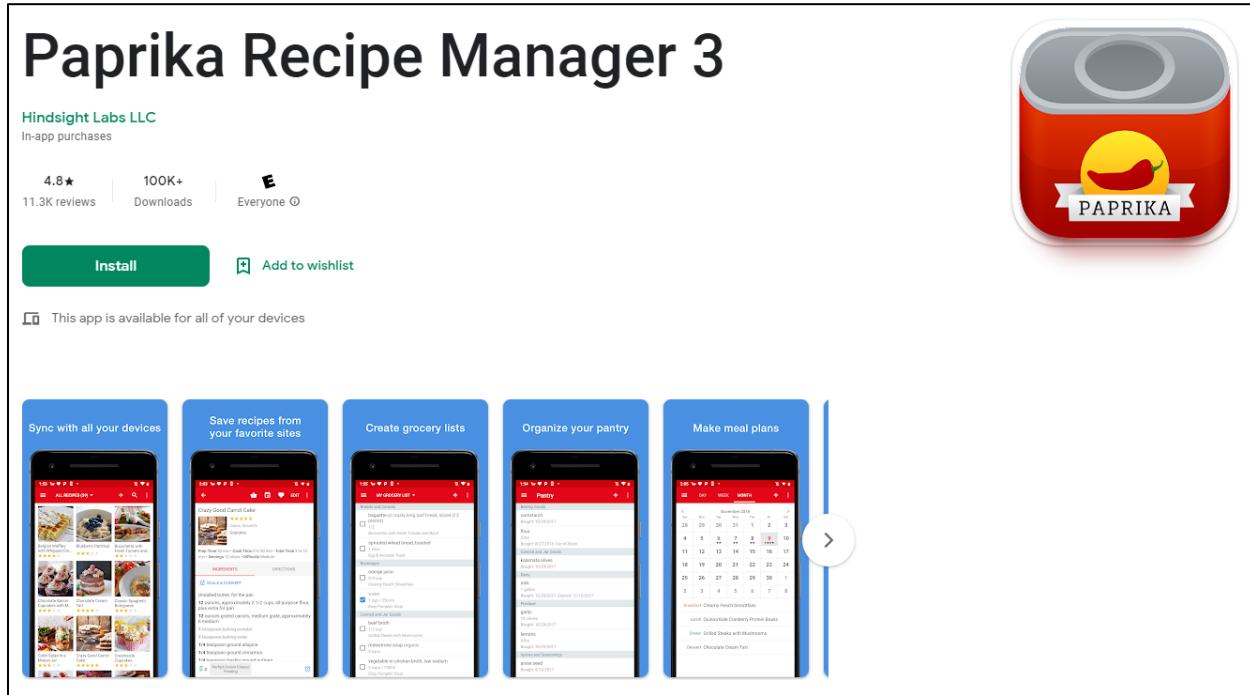


Figure 2-6: Paprika Recipe Manager 3 (Hindsight Labs LLC, 2018)

With the aid of the Paprika Recipe Manager application, users can organize their recipes, make meal plans and generate shopping lists for buying what they need. The built-in browser provided within Paprika application allows users to save recipes that are scratched down from any cooking websites online and sync them across all of the user's personal devices.

Difference between its free version and paid version is made that in free version of the Paprika application, users are limited to save only at most 50 recipes in the app and cloud syncing function that is mentioned previously which allows users to share their recipes across multiple devices are not accessible for free users. By upgrading to full version with a one-time payment of \$4.99 USD, users in return gets to unlock all the mentioned functions including cloud syncing feature.

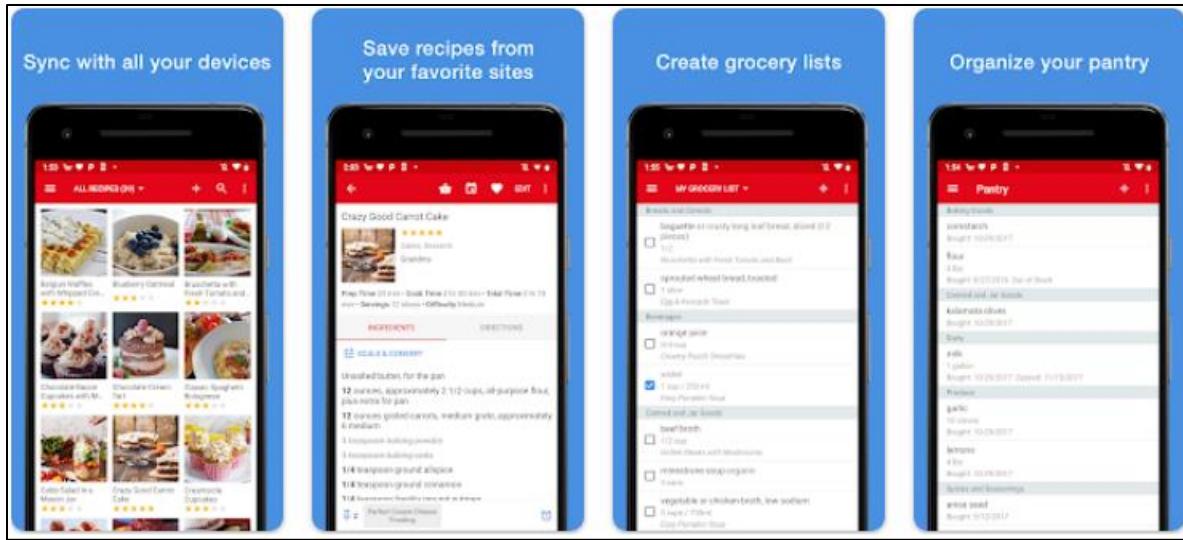


Figure 2-7: Paprika Recipe Manager 3 (Hindsight Labs LLC, 2018)

Paprika offers features such as saving recipe from third party websites into the application so that user can find back the recipe from the list of recorded recipes. They also have grocery lists and a pantry organizing list included to help the users in tracking on what ingredients to buy and manage the ingredients that are available in the kitchen.

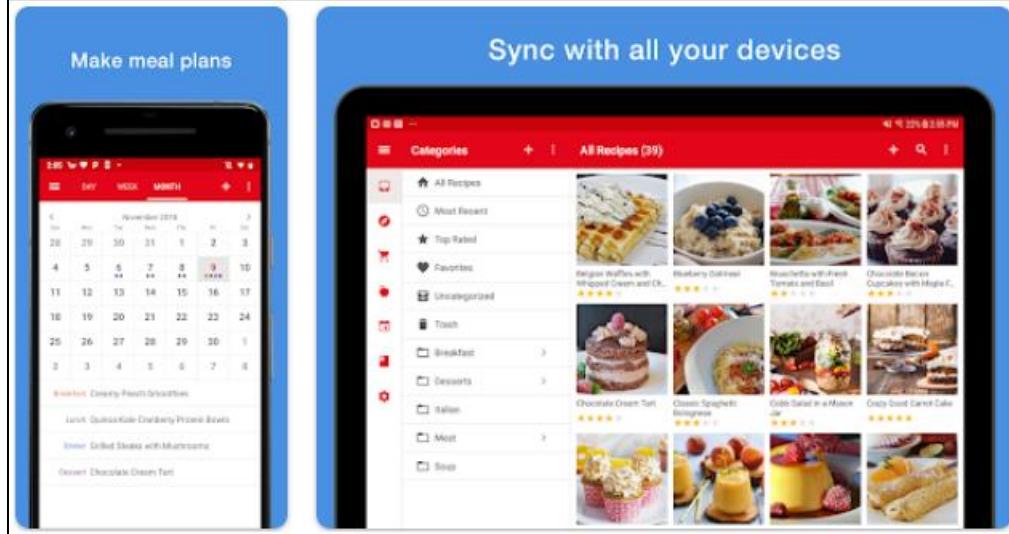


Figure 2-8: Paprika Recipe Manager 3 (Hindsight Labs LLC, 2018)

Paprika also have a meal planning functionality where users can make meal plans ahead of time on adding what dishes to cook for the coming time. In Paprika, the recipes saved by the users can as well be synchronized across any devices that belong to the same user.

2.3.3. Mealime Meal Plans & Recipes

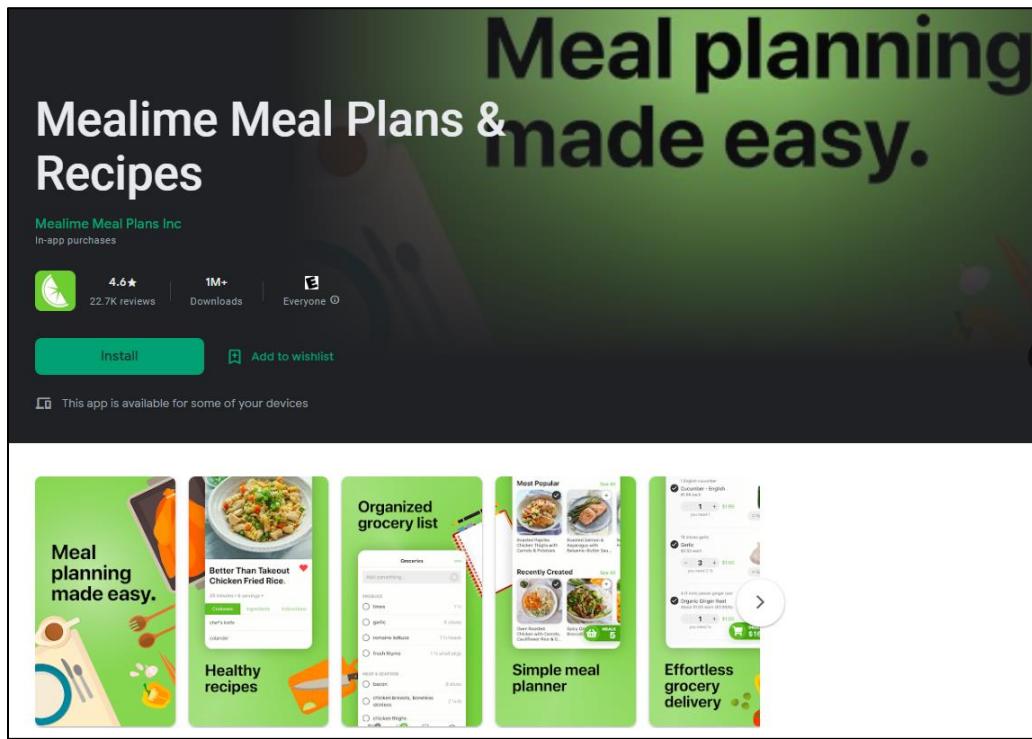


Figure 2-9: Mealime Meal Plans & Recipes (Mealime Meal Plans Inc, 2016)

Mealime is a quick and easy way for individuals, adults and even young families to prepare their meals and eat a healthier lifestyle. With fully customizable diet plans and recipes provided, it allows users to easily tailor a plan according to their likings and taste preferences. Mealime has made an offering to recommending better way to shop by automatically generate a grocery list, which users can even make the groceries to be delivered, bringing convenience to the user's hands at grocery prices.

By providing a meal plan to help the users in getting to eat healthier, save more money and live more productive life, Mealime has reached to a total number of over 5 million user downloads of the application itself. To use the application, it is free for everyone to download it, however users may also opt for paying a monthly fee of \$2.99 USD per month as a member subscription to access the Pro service. The advertised Pro service come in a package as to provide certain more additional features in the app such as exclusive pro-only recipes that are added every week, viewing of nutritional information like calories, calorie customization filters, notes to recipes viewing back on the previous meal planning histories and lastly best email support service for the customer users.

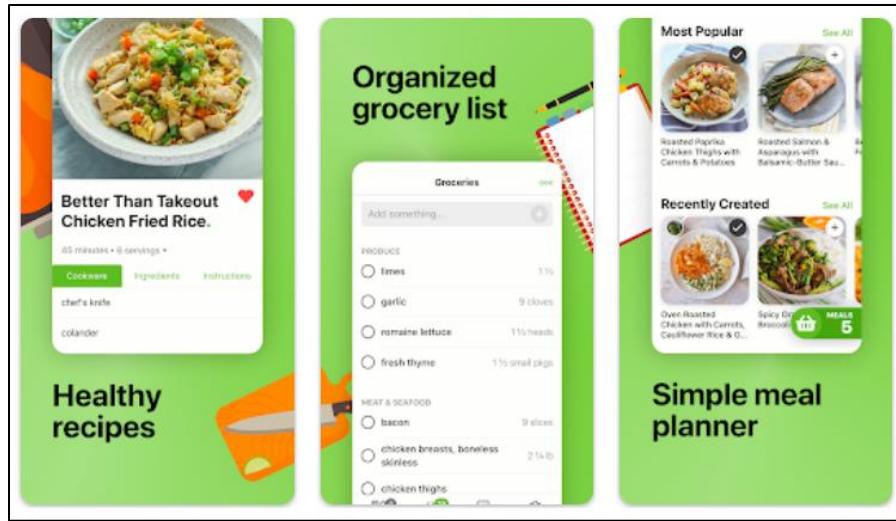


Figure 2-10: Mealime Meal Plans & Recipes (Mealime Meal Plans Inc, 2016)

Mealime provides functionalities that include providing access to healthy recipes, organize structured grocery list and a meal planner that allows users to plan on what to eat next or in upcoming schedule.

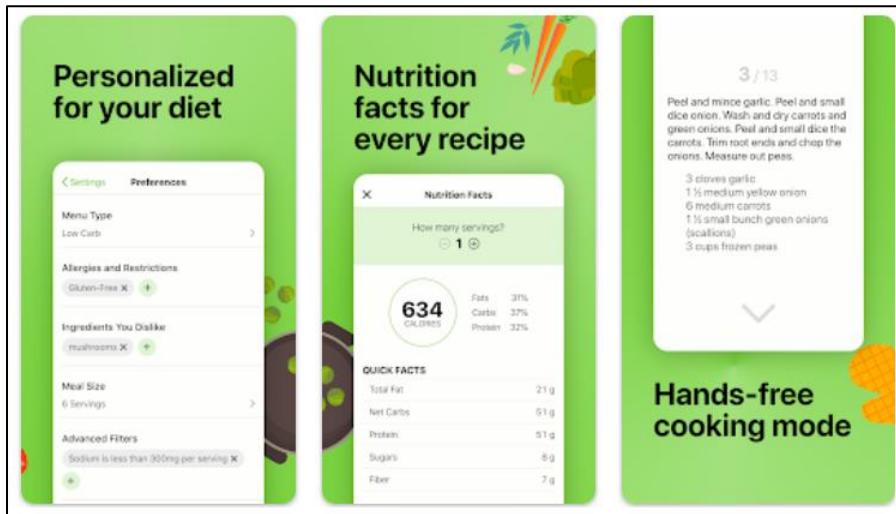


Figure 2-11: Mealime Meal Plans & Recipes (Mealime Meal Plans Inc, 2016)

Some premium features such as customization ability that allows users to adjust meal suggestions that are filtered based on the predefined personalized settings is as well included as part of the application. Other than that, nutrition facts are as well built in in the application that shows users the detailed nutritional data is also presented. One mode which is called to be the hands-free cooking mode is also found included in the app for allow better navigation when users are preparing their food.

2.3.4. Analysis of Similar System(s)

Table 2-1

Comparative Analysis of Similar Systems

Criterion	Plan to Eat: Meal Planner	Paprika Recipe Manager 3	Mealime Meal Plans & Recipes
Download Recipes for Offline Viewing	Yes	Yes	No, recipes are extracted from online database server
Create Grocery Lists	Yes, but manual and does not integrate with any stores	Yes, but manual and does not integrate with any stores	Yes, ingredients can also be added to cart via its grocery fulfillment partners online
Meal Planning	Meal scheduling ability in planning what to eat	Meals can be planned ahead for any days using a calendar view	Personalized meal scheduling in weekly manner
Search Function in Finding for Recipes	Yes	Yes	Yes
Share Recipes Over with Friends via Third Party Application	Yes, but only internally in app	Yes, but sharing over e-mail only	Yes, links will be generated to access the shared recipe through web
Bookmarking of Recipes	Yes, recipes are saved into “liked” section	Yes, recipes will be saved into the account	Yes, recipes are saved as favorites
Import Recipes from Third Party Sources	Yes, but only to save links of other cooking websites	Yes, but recipes are extracted from the supported search results from the browser	No

Step-by-step Cooking Instructions	Yes	Yes	Yes
Sources Where Recipes are Sourced From	User own provided recipes only	User own provided recipes and external web sources	From internal database, has limited recipe coverage
Supported Platform	iOS & Android	Windows, Mac, iOS & Android	iOS & Android

As according to the analysis table shown on top, it is found that Plan to Eat and Paprika are both quite similar in terms of their characteristics where they both offer functionalities that are work like peas in a pod on theoretical. The characteristics include the offline access to recipes, grocery list where they do not have the ability to integrate with any stores and items are needed to be added manually and ability to import recipes from third party sources. What is interesting to note that is the fact all three applications do offer the feature for meal planning that allows user to plan their meals in advance. However, for Mealime, they are more focused on personalized weekly meal scheduling where users are encouraged to plan meals for the whole week. As for Plan to Eat and Paprika, they are quite flexible that users can switch on to any days on the calendar view and plan specifically only for that day if required. Asides, bookmarking feature in the application works almost similar in the three compared apps as they all achieve the same goal of keeping the one highlighted recipes that the user likes into another destination for users to refer back on their next log ins.

Interestingly, Mealime offers some additional features that both the Plan to Eat and Paprika do not come equipped with, such as the ability to get ingredients to automatically sent to its fulfillment partners so that users get to purchase the ingredients required on the spot with and waits for them to get delivered at their doorstep, this is one great convenience for the user they offer. Asides, the sharing ability of the recipes are also handier for the users to share just the links to their family and friends instead of using emails or in-app sharing only like the other two apps compared in the table. Though it may have some more advanced features provided for the users, however Mealime still has a certain extent of drawbacks such as inability to get recipes downloaded for offline viewing

and limited recipes choices on the app as it only offers what recipes they have in their own server database.

As speaking from the recipe sources of each application wise, Plan to Eat is more of recipe collector application that helps user to store any recipes that they found online to get it added to the list of their own recipe list. Whereas for Paprika, the user can find for recipes that are supported by the web browser in the application, make it more coverage extensive as it can source the recipe of a single dish from multiple cooking websites. While for Mealime, it was mentioned earlier that their recipes are only limited to what their server have and therefore recipes found in the app may not be complete covering various cuisines types. Lastly, in terms of the supporting platforms, Plan to Eat and Mealime are both found to be more mobile oriented where the application is only made accessible via mobile devices such as Android and iOS devices only. Yet, for Paprika it supports wider user accessibility where it can not only the mobile devices can access to it, but desktops such as Windows and Mac devices are also made compatible to use the application as well, making it to have the best cross-platform supportability.

2.4. Summary

In a nutshell, conducting a literature review on the related studies has found to be very useful for the project team in determining the direction of how the team should aim in achieving better quality deliverable at the final. With deep exploration down on the related domain topics, it has helped the team in identifying how the domestic cooking has been affected due to various social issues and also the benefits and importance of why learning cooking is indeed necessary for younger generations. This study has helped the team in shaping a better scope and understanding on the problems that were faced by the people and also their attitudes towards home cooking in overall grasp. Multiple sources and research papers have been taken to compare and contrast by the team to study on the domain and ensure the diversification of perspectives from various sources.

As for the research on the similar systems that are found available in the market, through the comparative analysis and assessment table, it has made a clearer depict of the competitors in understanding where their strengths, opportunities and weaknesses are. From the analysis, it can help the project team to know what features need to be included and how the proposed application can work better on top of their drawbacks.

Chapter 3 : TECHNICAL RESEARCH

In this chapter, the project team will be in role of performing a comparison of the available technical products on the market that can be chosen from to develop the mobile cooking toolkit application. A discussion on the chosen tools and technical products will also be justified in this section based on the best benefits and value the technical tools can provide for the development team. A total of five sections are divided to make a complete review on the technical aspects of the tools that are to be used in the application development.

3.1. Programming Language Chosen

Table 3-1

Comparison Table of Native & Hybrid Application

Criterion	Native	Hybrid
Description	Native applications are created to run on a single operating system only	Designed to run on several platforms that works on top of several combination of programming languages
Operating System (OS)	Supports on singular platform only (either Android or iOS)	Provides multiple OS supports that runs on different device types
Cross Application Compatibility	Richer compatibility with other native apps	Lower support with other applications
Technology Stack	Runs on programming languages that are supported by the platform natively (e.g. Kotlin, Java, Objective-C, Swift)	Relies on web architecture that programs based on technologies such as: HTML, CSS, JavaScript
Development Speed	Slower, more time is needed to repeat the development if an app is needed to be built to support multiple platforms	Faster to complete as only one time development is needed

System Maintenance	Require more effort in system maintenance	Easier maintenance procedure as maintenance can be completed once
Testing	More bugs need to be deterred as an app is developed separately on different target OS	Bugs can be fixed in one go as testing is done with a single set of test cases only
Performance	Higher performance as the app build has direct support on the OS platform	Lower performance and slower response time due to the graphical rendering time needed for user interface
Development Cost	Higher cost, more resources are needed	Cheaper than native app development as resources can be reused
Time To Market	Time consuming to develop an app	Time saver as code is reusable

For the proposed application, it is decided that the application will be developed on a Hybrid architecture. From the comparison table demonstrated above, it is identifiable that though there are several drawbacks such as lower performance and lower integration support with other applications, however as considered that the benefits that the project team can acquire as discussed in the table above, with Hybrid architecture, work tasks can be facilitated with less work required and faster development pace. This is due to that in Hybrid, it supports cross platform support where a single application developed can be applied and used in multiple devices that runs on different operating systems. Moreover, as the proposed application does not require real-time intensive user operation, it is sufficing that Hybrid architecture can handle the processes and usage of the application itself. Though being said that for current situation, the project team is considering on developing for application that supports on Android devices for now, however Hybrid architecture can further allow the application to be more extensive in ensuring the compatibility of multi-platform usage without the need for rewriting another application that runs on iOS or other platforms in the future.

Table 3-2

Comparison Table Between Flutter, React Native & Ionic

Criterion	Flutter	React Native	Ionic
<i>Parent Company</i>	Google	Facebook	Drifty Co.
<i>Programming Language</i>	<ul style="list-style-type: none"> ▪ Dart 	<ul style="list-style-type: none"> ▪ JavaScript 	<ul style="list-style-type: none"> ▪ HTML ▪ CSS ▪ JavaScript
<i>Performance</i>	Full-scale performance, slightly better than React and Ionic	Provides close-to-native performance	Mediocre performance
<i>GUI</i>	Provides ready-to-use plugins and wide range of widgets with own rendering engine	Use Native UI Controllers	Standard-based Web Components
<i>Community Support</i>	Comparatively new, however tutorial videos and guidance are available online	Rich community and online support from sources like JavaScript professionals	Strong support and guidance available
<i>Pricing</i>	Open source (Free-for-all)	Open source (Free-for-all)	Open source + Paid version
<i>Learning Curve</i>	Easy	Difficult	Easy
<i>Hot Reload</i>	Yes	Yes	No
<i>Use Cases</i>	Suitable for developing any application types	Suitable for developing any application types	Hybrid cross-platform simple apps
<i>Code Reusability</i>	Allows written code to be used	User can re-use the code but only basic	Extensive library of adaptive components that helps users to re-

	repetitively and re-styled	components can be re-styled	use their code for re-styling
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Among the most popular programming languages for building Hybrid based application, the top three preferred are Flutter, React Native and Ionic respectively. Referring to the analysis results from the table above, it is found that Flutter is the most efficient compared with the rest as it promises a full-scale performance where applications can run perfectly without obvious delay or slow UI responsiveness. Among the three, Ionic is identified as having the least performance capability. This relates to its GUI components where it is seen that Ionic is utilizing standard web components that are not the most perfect option when coming to graphical rendering on the native devices. React Native on the other side is using native UI controllers where each different components are rendered based on what the platform supports, this makes the graphical UI on the application running on React Native look and feel more like a natively build application. Coming to Flutter, it offers broad range of plug-ins and widgets where each widgets are rendered with its own engine; hence Flutter can offer a good customizability on the UI graphical view.

From the points discussed above, it has been fixed that the team will be deciding to pick Flutter as the pertinent programming language to build the mobile application in this project. As the proposed application mainly deals with giving users interesting and pleasant using experience through attractive User Interface, therefore with no doubt that Flutter is the best choice among the others. Moreover, it is highly notable that Flutter is open source with free usage for developers, hence by picking Flutter for developing the proposed application, it can allow developers to utilize the available features that are provided by Flutter. Last but not least, as seen from the table that the learning curve for Flutter is lower compared to React Native, therefore it also can further allow the developers to get a good grasp and master using Flutter in shorter period of time.

3.2. IDE (Integrated Development Environment) Chosen

Software for creating applications known as an integrated development environment (IDE) combines standard developer tools into a single graphical user interface toolkit. An integrated development environment (IDE) typically consists of a source code editor and a debugger (Red Hat, 2019). A source code editor is a text editor that can help with writing software code by offering features like syntax highlighting with visual cues, auto-completion for programming syntaxes, and

inspection for errors in the lines of code. Whereas a debugger is a program that is used for testing other programs in turn of graphically displaying the position of where the bug exists in the script of code.

With that, the Integrated Development Environment that was picked to be utilized in this project is Visual Studio Code. Visual Studio Code is created by Microsoft as being the source code editor that works on Windows, Linux, and macOS. It is a lightning-quick and compact source code editor that may be used to view, modify, execute, and debug application source code. The majority of its users are front-end developers. When compared to Visual Studio, Visual Studio Code is an entirely distinct software. It is cross-platform and operates on Windows, Linux, and Mac, whereas Visual Studio only supports Windows and Mac (Thakur, 2018).

In the subsequent comments, several advantages and features of the chosen IDE will be covered in order to promote the decision of choosing Visual Studio Code as the most applicable IDE for handling the development of this project. In a statistical result extracted from a survey, Visual Studio Code has been found to be the top most preferred by the public, with 14 thousands respondents out of 20 thousands participants voted for Visual Studio Code as being their favorite, this has shown the strength that Visual Studio Code is undoubtedly the best option for IDE to go for (Yusov, n.d.). Apart from that, Visual Studio Code also has an integrated feature called IntelliSense which can greatly help the developers in completing the unfinished written syntaxes, helping developers in increasing the efficiency and productivity while coding. Additionally, Visual Studio Code has built-in Git support that enables actions like commit, push, pull, and publish. This makes it possible to monitor for modifications in the project and keep developers updated constantly about the changes with versioning control. Furthermore, language service features like Peek Definition, Go to Definition, Find All References, and Rename Symbol are offered by Visual Studio Code as well. With the integration of this feature, developers can be greatly benefited from these functionalities to make quick transition between multiple coding files when debugging for bugs in the code (Thakur, 2018).

With the discussion above about the chosen IDE, Visual Studio Code has demonstrated that it has robust and powerful practical capabilities in making it most compatible with the project development. The project developer's familiarity with the control of this particular IDE can also

allow the team to fully utilize functionalities in Visual Studio Code during the system development with the goal of producing a quality mobile cooking toolkit application. Therefore, this brings the entire team in coming to the final decision for choosing Visual Studio Code as the IDE for the development.

3.3.Libraries Chosen / Tools Chosen

Android Studio is Google's official integrated development environment (IDE) that is built based on JetBrains' IntelliJ IDEA software and developed exclusively for Android programming (Ducrohet et al., 2013). Android Studio is supported on platforms like Windows, macOS, and Linux-based operating systems. It is the major IDE for native Android application development, replacing the Eclipse Android Development Tools. Android Studio, however, will only be used in this project as a tool for simulating the environment needed to test out the application during the development. To perform the app simulation on Android Studio, the Android Emulator that is provided in this tool will be used for running and testing the application as it provides a virtual environment that supports features which a physical smartphone can provide. Through testing the application on the emulator, it makes the development and testing of the application faster without the need of physically install it on a physical device.

3.4.Database Management System Chosen

A database management system or known as DBMS, is simply a computerized data storage system where users of the system are given the ability to execute a variety of actions on the system, such as manipulating the data in the database or managing the schema and structure of the database itself (IBM, n.d.). In general, the goal of a database management system is to manage and turn data into useful information that can be used for making choices and operations in the system. A DBMS can append, search, update, and delete information in a database, as well as viewing all of the accessible information. A suitable database management system (DBMS) for the proposed mobile cooking toolkit application should be selected in this section, with Firebase and SQFLite being considered.

Table 3-3

Database Comparison Table between Firebase & SQFLite

Criterion	Firebase	SQFLite
Description	Mobile Backend as a Service via JSON (MBaaS)	A plugin from SQLite specifically for Flutter
Location of Data	Google Cloud	Local
Programming Language	Dart	SQL
Primary Data Model	NoSQL	Relational Database
Platform Compatibility	iOS and Android apps	More suitable for Android apps
Cost	<ul style="list-style-type: none"> ▪ Free tier available ▪ Paid tier for premium features 	<ul style="list-style-type: none"> ▪ Free-for-all with no license needed

By comparing from the table above, it is able to justify that both DBMS are quite completely different judging that from the primary data model alone for both DBMS, Firebase is rather a non-SQL model whereas for SQFLite, it is a database that runs on rational data model. When looking into the differences between where these two DMBS store their data, it is identified that Firebase is caching the data on Cloud offered by Google and SQFLite on the other hand is using the local storage on the mobile phone device only. One thing that distinct between both of the data storing location is that with Cloud storage, data can always be stored without the risk of worrying data being destroyed in the event when the device is damaged (Akervik, 2020). Though the fact that this mobile cooking toolkit application is only developed for Android devices only at current level, however, as to make the application future-proof, Firebase is a better option to go with as it has great compatibility on iOS and Android platforms. SQFLite will not be considered in this case as seen from the table above, it demonstrates that it is more adaptable for Android operated devices only.

3.5.Operating System Chosen

In this project, the operating system that will be used by the developers to build the entire application will be Microsoft Windows 11 which is a product company that also develops for Visual Studio Code that will be used for this development. Windows 11 is the latest operating system that has high compatibility and great usability in executing any programming languages.

3.6.Summary

In brief, analysis between the available technical products and services are done in this chapter to allow the team to identify each pros and cons of the tools, programming languages and the database system that will be needed for developing the application. Analysis of the comparison in between the selected tools and services are also summarized and displayed in table format to allow easier viewing when making comparison so that characteristics of the selected can be put to do good comparison in parallel. After making good analysis of the tools and technical related products, the team has come to make a final decision over what they prefer based on the relevant criteria that matters the most for the team in ensuring that the technological tools that will be used can give good support to the development of this project to deliver a quality product at final. To recap of the selections made by the team, Hybrid architecture is chosen as a result that it offers future-proof ready framework that can make the application to support on multiple platforms whenever the team is ready to expand the app compatibility support. As for building a hybrid app, Flutter is chosen to be used for developing the application due to its great performance assurance and GUI components that are highly reusable and re-styling enabled. Coming to final, DMBS system that is picked for storing the data of the application is found to be Firebase due to among one of the most important aspects that it allows data to be stored on the Cloud server provided by Google, this can help in assuring that the risk occurrence of data loss can be minimized.

Chapter 4 : SYSTEM DEVELOPMENT METHODOLOGY

4.1. Introduction

A software development plan describes all of the necessary periods and processes for bringing a project to life, beginning with project initiation, planning, designing, development and testing and eventually actual implementation (IVASHYNA, 2022). Though the concept of software development plans is identical, however not all are made exactly the same with each has their own attributes that makes it suitable for certain types of project. It also helps in defining on the process that we have to go through in producing a set of system artifacts, making the entire development procedure to be more effective, maintainable and predictable through the right application of system methodology (DS&AI, 2021).

In this segment of report will include further discussion of methodologies by comparing two candidates which are waterfall methodology and Rapid Application Development (RAD) methodology to explore further on the benefits and drawbacks as well as suitability of the methodology for this project. Furthermore, justification on why the one chosen methodology from the 2 suggested here is picked will as well be discussed to provide better concept of how the picked methodology will suit this current project.

4.2. Methodology Selection

4.2.1. Waterfall Methodology

The waterfall model, which first appeared in the early 1970s, has become a prominent proponent and is widely used in the development of many software projects. The waterfall approach advances a project in a linear manner, with processes consisting of sequential stages, each of which must be officially validated before proceeding to the next stage. Ideally, this was set to assist in reducing the complexity of a system implementation process in order to avoid issues discovered during the development process being delayed, thereby affecting product quality. The waterfall model inspired and evolved some modern project management methodologies such as PMBOK and PRINCE2 (Ruël et al. , 2010). It was so successful that these two project management approaches, which were built on the architecture of the Waterfall model, were chosen as the most widely used methodology in Europe and North America. The waterfall model's main strength is the

management of each of its stages: planning, executing, testing, and closing. Though the author's labels for the stages may differ, the fundamentals remain consistent with Royce's original approach.

System projects based on the waterfall approach typically proceed through six stages, each of which is explained below. All of these stages are connected in such a way that progress is seen to flow steadily downwards like a waterfall through the stages. The next stage begins only after the previous phase's defined set of goals has been met and signed off, hence the name "Waterfall Model" (tutorialspoint, n.d.).

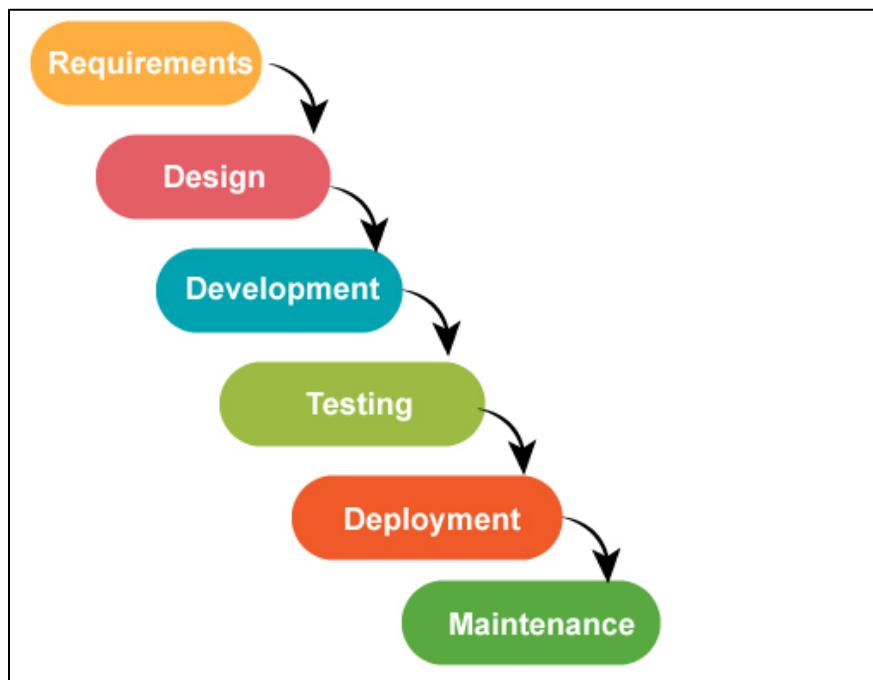


Figure 4-1: Phases of Waterfall Methodology (Instagantt, n.d.)

The six main stages of the waterfall methodology are discussed as follows:

Requirements

As the name implies, this phase will primarily deal with the project's requirements by analyzing and documenting the requirements in a paper known as the specification document. Following the collection and recording of all requirements from stakeholders, a feasibility analysis is performed to determine whether the requirements are appropriate and genuine. In the feasibility analysis, it is critical to consider the project's limitations and constraints in order to determine how viable it is

to complete the requirements and how they will affect the development process if they are realized (Zulqadar, 2019).

Design

In system design, it is prepared with detailed specifications of the hardware and system requirements. These requirements may include aspects of the system's technical design, such as data layers, programming language frameworks, network infrastructure, user interface design, and so on (Zulqadar, 2019). This phase is required to depict how the system should look from two perspectives, the high-level and low-level design, in order to better define the overall system architecture as well as to act as a reference for developers later in the actual implementation of concept to a workable product.

In the high-level design, which typically includes a list of modules, a brief description of each module's functionality, interface relationships, dependencies, database tables, architecture diagrams, and technology details (Satish, 2015). This phase will eventually conclude with the creation of a High-level design document as an output.

The previous phase's High-level Design is then disintegrated into smaller parts, units, or modules in the Low-level Design phase, and each of them is explained so that the programmer can begin coding directly from the document's reference. A detailed description of the module's functional logic in pseudo code, as well as interface details, error-message listings, dependency issues, inputs and outputs for each module, will be included in the low-level design document (Satish, 2015).

Development

As we get to this stage, the programmer will start coding based on the requirements that the stakeholders previously defined and validated. The physical design specification completed in the previous phase is also referred to in order to convert the model into a workable solution. Initially, the system is developed in small segments called units, which are later tested and integrated as one working component of the system.

Testing

When the system is done coded and developed by the developers, these codes are then handed over to the testing team to allow testers to check the program for any possible defects by executing test cases. The test cases can be done in either manual manner or automatically. Stakeholders are also involved in the testing phase to ensure that the requirements are met and tested against in the system (Zulqadar, 2019). Any error bugs or system defects discovered during this phase are required to be fixed immediately to ensure the system's quality assurance.

Deployment

Eventually, once the system has been validated and successfully passed all the test cases, the system shall be ready for actual deployment. In the deployment phase, the system is deployed into a live environment where it makes the system to be accessible to end-users and server performance can as well be tested (Zulqadar, 2019). In order to make the system to be deployed in accordance, plans on how the system is packaged and scheduled for release will be made as well.

Maintenance

Once after the system has been deployed, maintenance of the system is still required to make sure that the system runs smoothly without causing any issues affecting the system's operational functions (Sharma & Singh, 2021). Any errors and defects found in this phase will need to be deterred by the system support and technicians in this phase.

4.2.2. Rapid Application Development (RAD) Methodology

As many projects failed during the 1980s and 1990s, businesses and project managers became concerned that traditional structured methodologies had a higher tendency to deliver systems later than planned, causing a significant impact on the original requirements set (Hardcastle, 2011). As a result, numerous people have decided to experiment with agile methodologies such as Rapid Application Development (RAD). Despite its short and simple nature, RAD is regarded as a comprehensive approach to system development because it can effectively cover the entire life cycle from inception to delivery. The use of RAD is frequently classified into two types: phased RAD projects and intensive RAD projects (Davies et al., 1999). In a phased RAD, the project team must divide a project into multiple timeboxes in order to maintain a constantly refined prototype

and construct a workable deliverable that meets the time-changing requirements at the end of the timebox. In terms of intensive projects, these projects typically use RAD as a result to achieve a working product under time constraints that are tight and limited.

Nonetheless, RAD are not always appropriate for all project types; in particular, RAD projects can only collaborate with a team that is relatively small in size and has a shorter duration. As a result, while RAD is beneficial for many use cases, its adaptability is still heavily dependent on project characteristics.

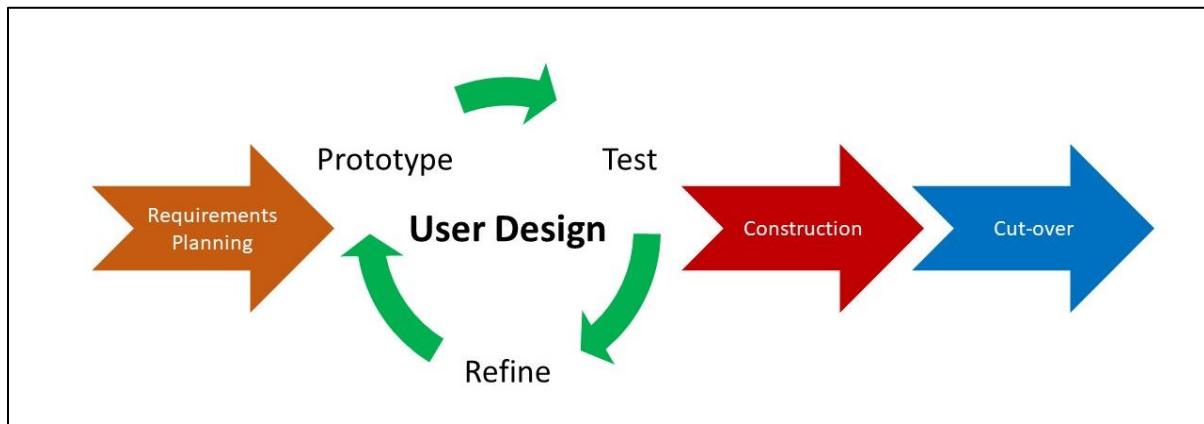


Figure 4-2: Phases of Rapid Application Development Model (Konjin Design Studio, 2019)

The four constructive phases of RAD model are discussed below:

Requirements Planning

The RAD cycle begins at where stakeholders define a loose set of project requirements that states what would need to be accomplished, similar to project scoping in traditional development cycles. In this stage, clients will have to provide a goal for the product and a research is in need to be conducted for finalizing the requirements with each stakeholder. With that being said, as an agile methodology, one of the main principle that RAD upholds is the ability to accept changing requirements at any point of time, nonetheless approval from stakeholders is still crucial. This is one approach to ensure that every stakeholder is working on the same page in the early stage of development so that miscommunication can as well be avoided, therefore reducing the chance of making costly mistakes (Lucid Content Team, n.d.).

User Design

Once the project is done scoping out, development of the project shall as well begin at this point by firstly building out the user design through multiple prototype iterations. In this phase, stakeholders and developers are required to work hand in hand to ensure that stakeholder's needs are being fulfilled at every design process (Chien, 2020). Through this method, it gives developers a good opportunity to tweak the model till it reaches a satisfactory design according to the expectations from the stakeholders.

Construction

In the third phase, also known as the rapid construction phase, is where it takes the prototypes and beta systems from the previous phase converting them to a working model (Lucid Content Team, n.d.). One of the strength that RAD possess is that majority changes and issues were well addressed earlier in the iterate design process, therefore developers can construct a final workable model quicker as compared to traditional approaches. In this phase, software development team with members from different roles like developers and testers working together to make sure that the system is working smoothly as expected by the objectives described. Similar to the design phase, stakeholders are as well welcomed to give inputs and suggestions for alterations.

Cutover

It is in the final phase of the RAD methodology that developers address the technical debt accumulated during early prototyping in order to optimize system implementation by improving system stability and maintainability upon product launch (Chien, 2020). During the implementation phase, development teams move components to a live production environment, kicking off the transition to the new system and allowing for full-scale testing.

4.2.3. Comparison of Methodologies

Table below provides a brief comparison overview between the two selected system development methodologies which are the waterfall model and Rapid Application Development (RAD) Methodology. The criterion is crucial for comparison in deciding which methodology provides the best suitability to the proposed mobile cooking application.

Table 4-1

Comparison Table of System Methodology for the Proposed Project

Criterion	System Development Methodology	
	Waterfall Model	Rapid Application Development Methodology
Model Type	A classical traditional model	Agile Approach
Requirement Change	Only at the beginning of the project life cycle, otherwise will be costly to change	Accepting changes in any phases
Product Delivery	Final product is only delivered at the end of the product lifecycle	Gives earlier deliveries to ensure project is right on track with its requirements
Project Ideal Type	On-premise software and desktop applications	Web-based applications and mobile applications
Waiting Time	Has long waiting time to get the software running only at the end of the lifecycle	Less waiting time for running software as the working prototype can already be presented at its first design iteration
Team Size	Require large number of human resources working in a team	Can start with just a team that has smaller size scale
Reworking of Product	Each phase is separated and completed within its given timeframe, hence less need for reworking	Stakeholders may change requirements at any point, resulting possible sudden request for reworking
Feedback Process	Requirements are well defined at initial phase. Feedbacks are not entertained in the mid of development	Stakeholders may give their feedbacks to the system at any point

4.2.4. Justification on Selected Methodology

Upon going through some thoughtful consideration, it was determined that the most appropriate software development methodology for this project would be Rapid Application Development. This final decision is made after reviewing the comparison table, which clearly shows that RAD is the definite winner, with several significant factors contributing to this outcome. The first aspect that motivates RAD from being chosen is that it accepts changes of requirements at any period, and in fact, the proposed project is expected to receive constant requests for change as the application must be perfected over time to meet the stakeholder's expectations periodically. Aside from meeting the changing needs of stakeholders, frequent product deliveries are absolutely pivotal because software developers need to receive the most recent feedback updates from stakeholders in order to understand how the system is judged and what else needs to be improved to assure that the project always sticks well with its goal. Furthermore, as stated in the RAD team size criterion, it demonstrates that RAD is in fact highly suitable for developing this cooking toolkit mobile application based on the project team size. It should be noted that the human resources for this project are limited, and there is no large team contributing to its development; thus, RAD is one of the best choices for the project because it does not require a large team as the waterfall model does.

4.3. Selected Methodology - Rapid Application Development (RAD) Methodology

4.3.1. Implementation of Rapid Application Development (RAD) Methodology in Current Project

As RAD has been chosen as the one approach to be used for managing the project in the development of the cooking toolkit mobile application, therefore the paragraphs below will explain in further on how RAD is implemented with all of its phases.

Requirements Planning

To depict on what needs to be done and outlines the required expectations that the stakeholders are demanding for, this phase will be vital in helping the project team in understanding what is needed to be included in the mobile cooking toolkit application based on priorities so that the project team can prioritize on building the topmost wanted requirements first for the system to achieve a most desirable result in the project. Once going through the filtering process of gathering the requirements and rank them accordingly, the requirements are also needed to be validated to understand how viable the requirements are if to be realized given that the current resources are available and how the requirements can be realized as well. Apart from it, the scope of the project is also defined in this phase to discuss on what needs to be resolved from the problems that were identified earlier as well as covered by the supervisor who has given good advices on how to keep the project achievable to its goal and objectives.

User Design

In this phase, developers and stakeholders of the proposed system will have to work closely in developing functional prototypes that is built as according to what was described in the requirements discovered earlier. With each iterations in this phase, the developer will keep refine the prototype based on the feedbacks that were received from the stakeholders after being reviewed in each cycle. This is to ensure that the cooking toolkit application can be built to fit exactly the expectations and satisfy the stakeholder's needs. The cycle will keep continue till the best prototype has been designed that fixes all the issues identified and the changing requirements that arise in the middle of the project development.

Construction

Once the best prototype outcome has been produced for the mobile cooking application, the construction of the actual mobile application will begin rapidly, turning the prototype to be realized as one actual fully functional product. With discussions made in Chapter 3, the tools and programming language that are needed for implementing the code to develop an actual application system are indicated with justification on why they were chosen for completing this project. Asides, testing are necessary to be done with test cases developed to ensure that the entire mobile application is working as intended. Among, testing that can be done to ensure the functionality and usability of the application are unit testing, which helps in assessing every single part of the system, integration testing and system testing. All the tests are needed to be completed and verified that no defects or bugs are found in the mobile application that may affect the quality of the product, causing system instability.

Cutover

In the final stage of the developmental process for this project, it is where the mobile application is ready to be launched for public access. Before it is made to be publicly available, a full-scale testing is needed to be performed for the mobile cooking toolkit application and some finishing touch-ups are done on maintaining the best quality of the product upon the final deployment is made.

Chapter 5 : RESEARCH METHODS

5.1. Introduction

A number of literature evaluations were conducted in the previous chapter to define the project's scope and explore multiple perspectives on the mobile cooking toolkit application that is being suggested. The suggested project shouldn't, however, be entirely based on the findings of the earlier studies because different studies would produce different results depending on many factors and the sample that was chosen. In actuality, the research's findings just serve as the basis for establishing the fundamental requirements for the proposed project's existence. As a result, research methodologies must be used in this section to create the research questions, analyze, and validate the data gathered about the project topic using various data gathering approaches. Additionally, acquiring data and understanding about the cooking experience will be a part of the research. There are numerous research methods that can be used, including questionnaires, interviews, observations, and many more. However, to avoid the accuracy of the data and information gathered to be impacted due to improper application of research methods. Therefore, both quantitative and qualitative research methods have been chosen as the best data collection techniques to be used in this research in order to obtain more credible and accurate information and make a broad assumption of the proposed system. The following research techniques were selected as follows:

5.2. Questionnaire

A questionnaire is a research instrument that consists of a series of questions designed to elicit information from respondents about their attitudes, experiences and views on a domain topic (Bhandari, 2022). Questionnaire questions may be qualitative or quantitative, and they can be delivered through online, on paper, or in person. Questionnaires may include open or closed ended questions, or sometimes a combination of the two and these questions usually do not have to be assessed in the presence of a researcher (Cint, 2022). Respondents may react in their own terms in as much or as little detail as they like with open-ended questions, while closed questions provide responders with a set of prepared replies from which they can pick in response.

5.2.1. Questionnaire Design

There are a total of 4 sections in this questionnaire, which are as shown in the figures below. Out of 20 questions assessed, 19 of the questions are prepared as closed-ended while only 1 question is designed as an open-ended question.

- **Questionnaire Section 1 – Introduction of The Questionnaire**



Cookit – An All-In-One Mobile Cooking Toolkit

Dear participants,

Hello, my name is Tang Ming Ze, a final year degree Software Engineering Student at Asia Pacific University of Technology and Innovation, and is currently working on his **Final Year Project (FYP)**.

💡 About The Project
The project is a mobile application named '**Cookit**', inspired by the word **toolkit** to :

- Share recipes with others in the form as contribution to the community
- Search for recipes and follow the guide step-by-step
- Add the required ingredients to grocery list and purchase from partnering ecommerce platforms
- Save own exclusive recipes
- View cooking history just like a cooking diary
- Build fun and interactive platform to inspire younger generations to learn and improve culinary skills

⌚ About The Questionnaire
Approx. completion time: 5-10 mins
The purposes of the questionnaire are to obtain your :

- Consent of voluntarily-based participation
- Experiences of planning and preparing dishes
- Suggestions for the project
- Feedback on existing features

🔒 Private & Confidential
1. The information gathered from the questionnaire will be used **ONLY** for academic purposes and will be kept strictly **CONFIDENTIAL**.
2. All the responses are recorded **ANONYMOUSLY**.
3. You have the rights to **WITHDRAW** from the questionnaire anytime for any reasons.

✉️ Contact Me
If there are any inquiries or concerns regarding the project, feel free to contact me at tp054682@mail.apu.edu.my.

Thank you for your participation!!

Sincerely,
Ming Ze

Figure 5-1: Introduction of the Questionnaire

Diagram above is the first section of the questionnaire where it explains the intention of this questionnaire as well as outlining the project to the respondents. Below it also informs the participants that their participation is voluntary and information will be kept confidential for academic purpose only.

By selecting the option below, you agree to the terms listed and provide consent * to provide information for academic & research purposes.

I hereby acknowledge that I have read, understand and agree with all the terms of the questionnaire

Figure 5-2: Consent Checkbox

On top shows the checkbox that the respondents have to check on before they enroll themselves into answering the questionnaire. Respondents are required to agree on the acknowledgement as a form of giving consent and agreeing to the terms explained as shown in Figure 5.1.

- **Questionnaire Section 2 – Demographics**

There are a total number of five questions in this section which is aimed to understand more on the participants from the demographic data gathered. Identification details such as complete name will not be collected to safeguard the personal privacy of the respondents.

Gender *

Male

Female

Prefer Not to Say

Figure 5-3: Section 2 - Question 1

Objective: To help identifying the gender of the respondents which later can be used as an indicator for identifying the number of male and female respondents participated in this research.

Age Group *

- Under 18
- 18-24
- 25-30
- 31-35
- Above 35

Figure 5-4: Section 2 - Question 2

Objective: To identify the age group of which the respondents belong to for better understanding the perspectives of different age groups on the same domain topic. This can help ensuring that the research is done fairly with assessment from diversified demographical viewpoints.

Nationality *

- Local (Malaysian)
- Foreign

Figure 5-5: Section 2 - Question 3

Objective: To distinguish the nationality of the participants of the research and gather insights on how the foreigners and local Malaysian view in the same problem matter.

Current Employment Status *

- Student
- Employed
- Unemployed
- Retired

Figure 5-6: Section 2 - Question 4

Objective: To identify the employment status of the respondents presently in an effort to trying to capture opinions from different employment categories section towards their agreement and voices on the matter of the cooking attitude and meal preparation.

Highest Education Level *

Certificate

Pre-University (Foundation / Diploma)

Bachelor's Degree

Master's Degree

PhD

Figure 5-7: Section 2 - Question 5

Objective: To classify the highest education level that the respondents have acquired in understanding the opinions from different education level categories.

- **Questionnaire Section 3 – Experiences on Meal Preparation**

In this section, it will be served for evaluating participant's thoughts and feelings towards planning and preparing dishes with a total of 8 questions.

Have you ever tried cooking on your own? *

Yes

No

Figure 5-8: Section 3 - Question 1

Objective: To validate on the perspectives that whether the respondent have any past cooking experience.

How often do you cook in regular days (including working & non-working days)? *

Never

1 - 5 times a month

6 - 10 times a month

10 and above a month

Figure 5-9: Section 3 - Question 2

Objective: To understand how often the respondents cook by using one month as the measurement for assessing the frequency that they cook. This can be crucial as it can help identifying the fact if it is true that people these days do not cook as regular anymore.

Given that if you are free from work at the moment, how will you prefer to prepare your meal? *
(May pick more than 1 answer)

Cook by myself

Order Food Delivery

Eat Outside

Take-Away

Figure 5-10: Section 3 - Question 3

Objective: To look for how the general public will react to when they are preparing meal for themselves during their leisure or free time. This helps determining if the public is too reliant on outside foods rather than cooking on their own.

Do you think that cooking is a troublesome yet time-consuming work? *

Yes

No

Figure 5-11: Section 3 - Question 4

Objective: To experiment into assessing if the respondents agree on the statement that cooking is a complicated and time-consuming work.

Do you agree that younger generations these days are not equipped with good culinary skills? *

Strongly Disagr... Disagree Neutral Agree Strongly Agree

Response:

Figure 5-12: Section 3 - Question 5

Objective: To study on how much the public agrees on the problem that younger generations these days have poor or not equipped with decent culinary skills for preparing meals themselves.

Given from the scale of 1 to 5, how will you rate your cooking skill? *

1 2 3 4 5

Poor 😞 Excellent 😊

Figure 5-13: Section 3 - Question 6

Objective: To examine how the respondents think that their cooking skill is ranged at, with higher number being better cooking skill and lower number representing poorer skills that still needs room for improvement.

Do you know what exact grocers to pick if you were asked to buy according to the grocery list? *

Yes
 No

Figure 5-14: Section 3 - Question 7

Objective: To determine if the participants have good knowledge of what ingredients to look for in a grocery shopping. This can be useful in knowing how much the public knows about the food ingredients as listed on the recipe as buying the wrong item can be problematic later.

From where you prefer to source your groceries and cooking ingredients? *

- e-Commerce (Shopee, Lazada)
- Hypermarket (Giant, AEON, Lotus's)
- Convenience Store (99 speed-mart, KK, 7-eleven)
- Other...

Figure 5-15: Section 3 - Question 8

Objective: To help understanding what the most preferred source is where the general public will source for their groceries and cooking necessities, whether in-store or on online virtual shopping.

- **Questionnaire Section 4 – Opinions on Cooking Recipe**

This section consists of 7 numbers of questions which will be used to collect feedback on respondent's expectations for the cooking application app.

From where do you learn new culinary knowledge? (May pick more than 1 answer) *

- Television Cooking Show
- Social Media
- Recipe Book
- Online Cooking Website

Figure 5-16: Section 4 - Question 1

Objective: To get a concept on understanding how the people generally learn and acquire new culinary knowledge and what are their preferred source of information on exploring new cooking styles and recipes.

Would you refer to a cooking recipe application to learn cooking? *

Yes

No

Maybe

Figure 5-17: Section 4 - Question 2

Objective: To help identifying on the prospects of the respondents in how much they find recipe application useful in learning and following new methods of dishes cooking.

Do you think that digital learning is a good option to entice younger generations in learning? *

Yes

No

Maybe

Figure 5-18: Section 4 - Question 3

Objective: To assess on the degrees of how much the participants agree on digital learning, particularly for enticing younger generations into learning culinary arts and improve their cooking skills through digital mediums.

Do you support the idea of sharing recipe with others publicly through the concept like how social media works? *

Yes

No

Maybe

Figure 5-19: Section 4 - Question 4

Objective: To gather the number of supportive votes against the idea of sharing recipes with public users identically like how the social media works in sharing photos and opinions.

If you have found an interesting recipe that you would like to try out later, where and how will you keep it? (Pick 1 or more) *

- Write them Down on Notepad
- Capture Down a Picture of the Recipe Tutorial
- Share the Tutorial With Friends/Families
- Download the Recipe Tutorial onto Phone Local Storage
- Other...

Figure 5-20: Section 4 - Question 5

Objective: To know how the people are keeping the recipes that they found from other sources so that the recipes are well kept and collected and can be referred at later times when needed.

What other functionalities you hope to see included in this mobile cooking toolkit? (Pick your 3 favorites) *

- Grocery Ingredients Buying List
- Integration of Web Stores (Shopee) For Grocery Shopping
- Integration of Nearby Grocery Shop to Source the Particular Ingredients on Map
- Diary Keeping Feature
- Calories Limiter that Filters Out Dishes that Exceed the Maximum Intake Calories Set
- Other...

Figure 5-21: Section 4 - Question 6

Objective: To attempt on collecting for more opinions from the public participants in giving ideas on what other better features they think can be included into the mobile cooking toolkit to improve it better.

Any comments or suggestions for the mobile cooking toolkit? *
Long answer text

Figure 5-22: Section 4 - Question 7

Objective: To collect for other comments and suggestions that were not asked or collected in any of the given questions in the questionnaire in case if the respondents have more inputs to propose for the project.

5.3. Interview

An interview is a dialogue or conversation that takes place between a researcher and an interviewee in order to obtain useful information (Easwaramoorthy & Zarinpoush, 2006). An interviewer manages the progress of the discussion and asks questions during a research interview, while an interviewee is responsible for answering to those questions asked. Interview is a procedure that may be devised to assist the researcher in understanding the competencies, scrutinizing their attitude, and assessing their topic knowledge on the domain (Indeed Editorial Team, 2021). Usually interviews may be done in person or over the phone. Differentiated by two formats, formal interviews are well-planned interviews in which the questions are written in advance with the time, date, and location are determined prior to the interview. A casual interview, on the other hand, is not well-planned, and the questions are random and general. When contrast to formal interviews, communication between the interviewer and interviewee is also more relaxed and casual (Talent Services, 2021).

5.3.1. Interview Design

The list of interview questions is marked down as follows:

1. Do you think that there's a need for making an application where users can share of what they cook and the recipe to an app where other users can follow and learn?	
Objective	This question is constructed to understand the view of how the public thinks that a mobile cooking toolkit that offers a social media like platform for users to share recipes together in making it place for

	pleasure sharing with other people is necessary in helping the younger generations specially to learn and explore new ways in cooking.
--	--

2. How often do you cook at home?

Objective	This question is asked to identify how often the participants cook at home and not to buy foods from the outside. This can also be used to understand the reasons behind why the participant acts against to their responses in getting better knowledge on how they think on home cooking.
------------------	---

3. Do you eat processed foods regularly? As these foods do not need any complicated cooking methods.

Objective	This question is made to help investigating whether if the public prefers processed foods that may greatly pose a health risk to them even though they are convenient and fast to prepare.
------------------	--

4. Do you think that cooking skills is still relevant or needed to be mastered in today's world.

Objective	The question is put in place to gather on the thoughts from the participants on how much they think and agree that cooking skill is still relevant nowadays given that there are many convenience foods available for the public.
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5. Do you think that if an application can integrate with nearby stores/ecommerce stores online, will it be useful for users like you when purchasing the required food ingredients?

Objective	This question is applied to find the ground on how much the participants think that the feature of integrating a nearby stores/ecommerce stores online can be useful for the users to purchase the necessary ingredients.
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6. Do you agree that younger generation nowadays are less likely to be equipped with good culinary skills and do you think that by promoting an interesting cooking app can possibly help entice them to learn cooking (or some basic cooking skills)?

Objective	This question is raised for looking on how much the public agrees on the statement that younger generations do not come with good cooking skills that are highly important and how much do they think that the proposed application can help the younger generations in acquiring at least some basic cooking skills.
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7. What other suggestions and features would you like to see it integrated in the mobile cooking toolkit application?

Objective	The question is made to look for further suggestions or features that the participants would be expecting for in the proposed mobile application.
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5.4. Summary

In order to gather a more trustworthy and accurate data for this study, quantitative and qualitative data collection method has been used to draw the general conclusions regarding the proposed mobile cooking toolkit application. Both questionnaire and interviews have been chosen as the quantitative and qualitative data collection techniques with a total of 20 questionnaire questions created to elicit the perceptions and views of the general public and target users on the suggested system. As a result, it helps in depicting the requirements and expectations that the participants are looking for from this proposed application, which helps to keep the planned project on achieving an application that suits what the public needs the most. Additionally, a set of interview questions have been developed in this part along with the aim to obtain information that are relevant in the domain study.

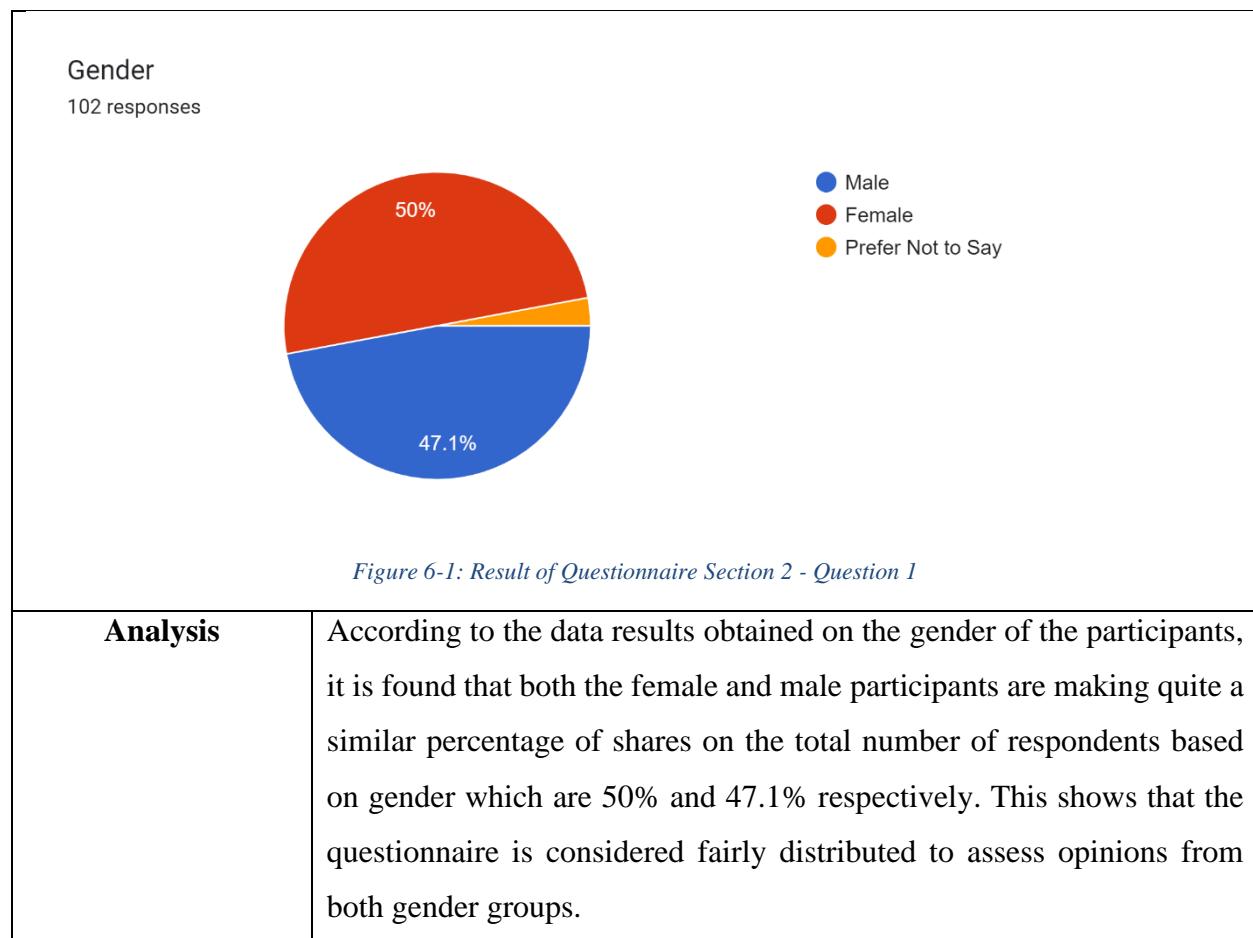
Chapter 6 : REQUIREMENTS VALIDATION

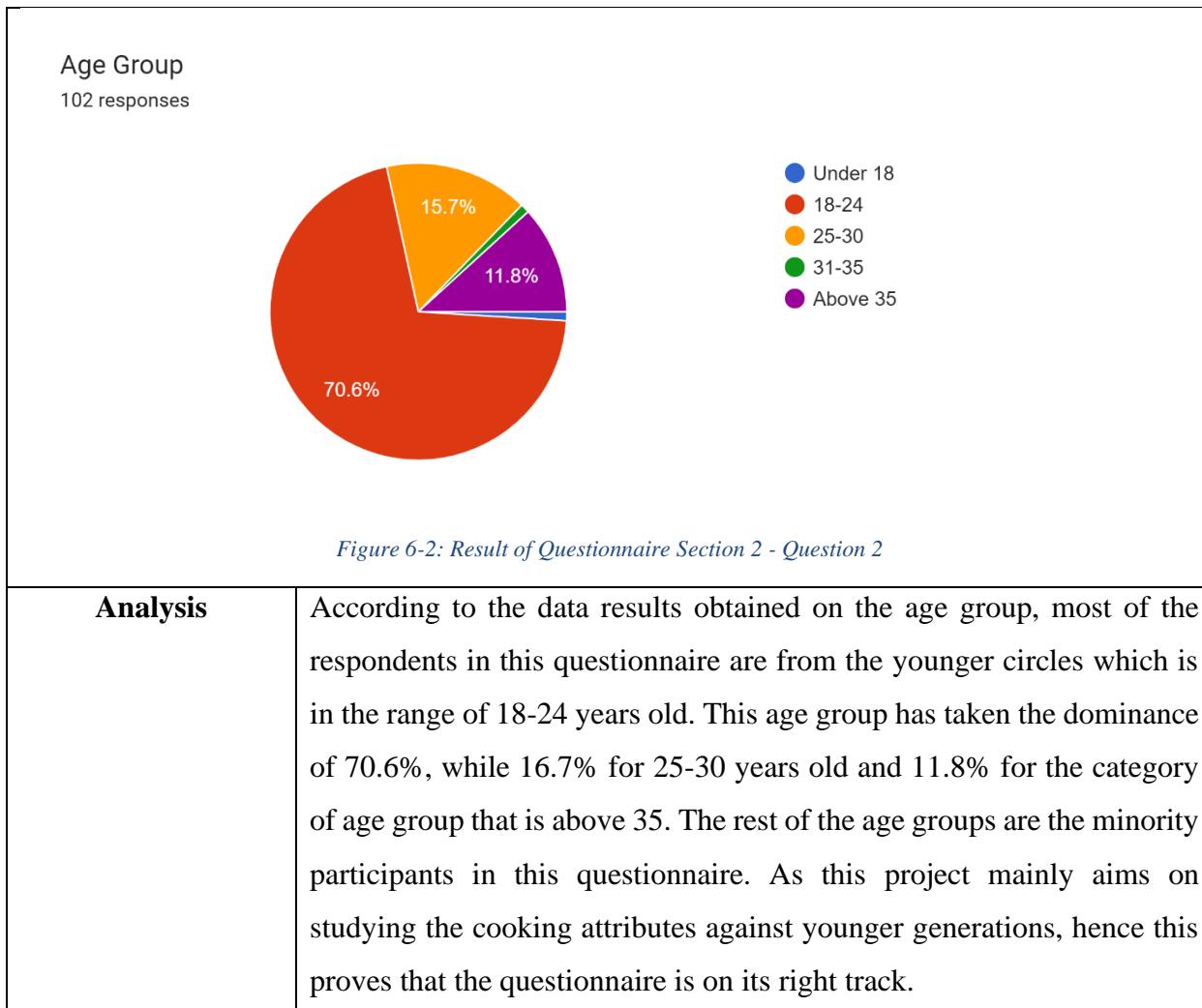
6.1. Introduction

In this chapter, the researcher will undertake a quick analysis and review of the data and findings obtained through questionnaire and interview. This is crucial for helping the team in drawing conclusions about the study's limitations and make recommendations for further research that are vital to the proposed project through the analysis of the data obtained from the aforementioned data gathering methods. The following is an analysis of all the information gleaned from the questionnaire and interview.

6.2. Analysis of Questionnaire Data

- **Questionnaire Section 2 – Demographics**





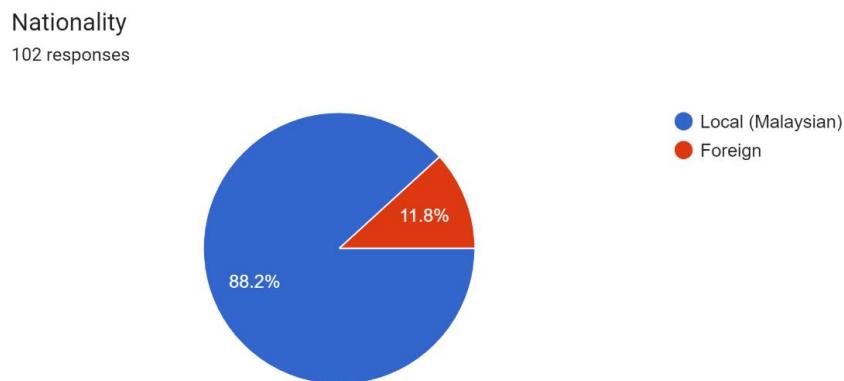


Figure 6-3: Result of Questionnaire Section 2 - Question 3

Analysis	According to the statistics findings obtained on the nationality of the respondents, majority were showed to be local Malaysian whereas 11.8% of them are foreign participants. Foreign participants are fewer in this questionnaire as there were limited numbers of foreigners at the place where the questionnaire is distributed and promoted.
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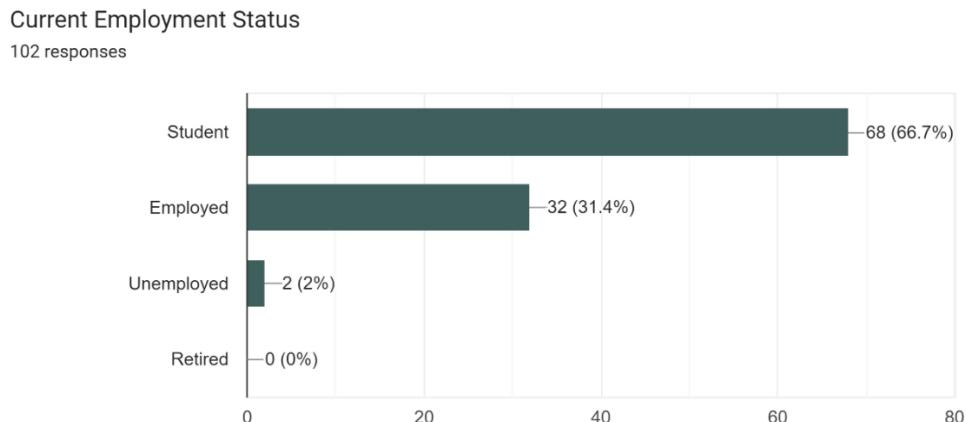
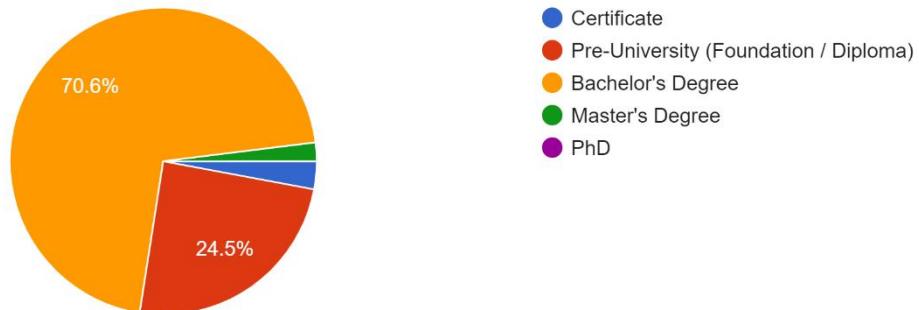


Figure 6-4: Result of Questionnaire Section 2 - Question 4

Analysis	According to the data results obtained on the employment status of the respondents, the results shows that most of the participants are currently still a student at the stake of 66.7%, 31.4% are employed staffs and 2% of the respondents remain as unemployed.
-----------------	--

Highest Education Level

102 responses

*Figure 6-5: Result of Questionnaire Section 2 - Question 5*

Analysis	According to the statistics results obtained on the highest education level that the participants are currently at, 70.6% of the respondents that partake in this questionnaire are bachelor's degree students and 24.5% are Pre-University students who are taking Foundation or Diploma. While the rest of the minorities are master's degree and certificate students respectively.
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- Questionnaire Section 3 – Experiences on Meal Preparation

Have you ever tried cooking on your own?

102 responses

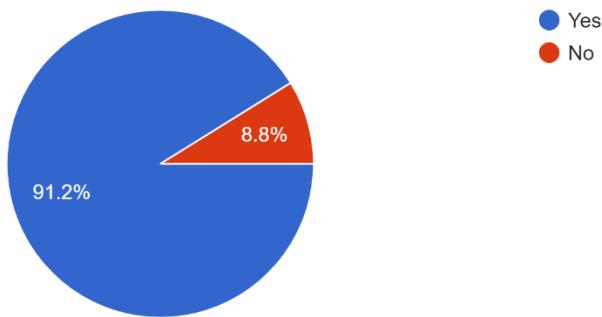


Figure 6-6: Result of Questionnaire Section 3 - Question 1

Analysis

Based on the results attained on the figure above, over 91% of the respondents have answered ‘Yes’ in an attitude to show that they have tried out and experienced cooking on their own. This shows that most of the people are familiar if cooking in kitchen and has at least some basic experience in cooking.

How often do you cook in regular days (including working & non-working days) ?

102 responses

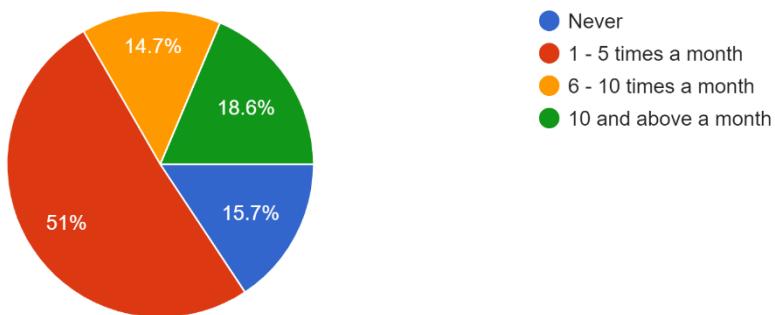


Figure 6-7: Result of Questionnaire Section 3 - Question 2

Analysis

Corresponding to the data results gained from the figure above, majority of the participants only cook at very minimal rate at between 1 to 5 times

	<p>a month on average. Surprisingly, the percentage of people who cook more often with frequency range of 6-10 times a month and 10 times or more a month are found to be almost at equal stake with the result of 14.7% and 18.6% respectively. However still, the number of people who are not actively cooking are taking up a share of 15.7% in this questionnaire which shows that most people (51% of the respondents) rarely cook on their own and almost a quarter-less of people on average never thought to cook for meals.</p>
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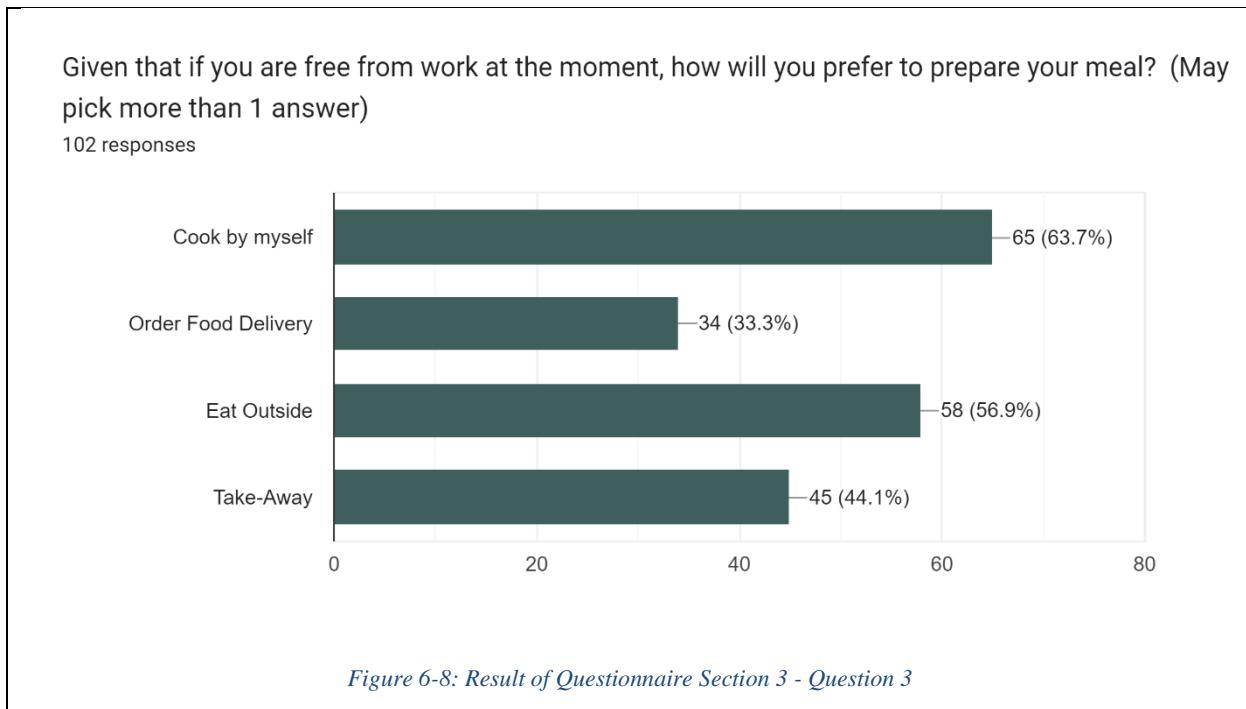


Figure 6-8: Result of Questionnaire Section 3 - Question 3

Analysis	From the graphical result of the assessed question, it is found that over 63.7% of the respondents prefer to cook by their own when they have free and available time. 56.9% on the other side still prefer to eat outside even though they are not bound with any work. 44.1% and 33.3% of the respondents have voted for take-away and food delivery respectively as their meal preparation option during free time. This shows strong support from the participants that they will still try out cooking in free time and in times, they might still go over with eating at outside restaurants, while occasionally ordering food delivery or take-away.
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Therefore, it shows that the potential of attracting people in cooking at home is still huge which is crucial in estimating how actively the users will use the proposed cooking application.

Do you think that cooking is a troublesome yet time-consuming work?

102 responses

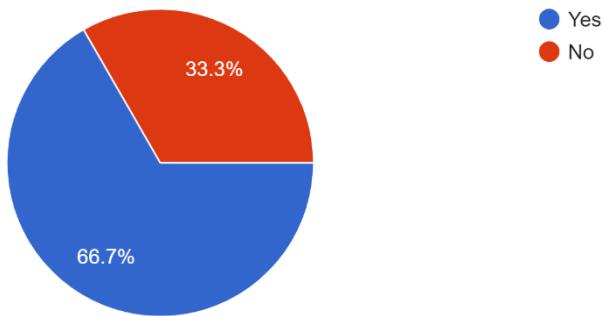


Figure 6-9: Result of Questionnaire Section 3 - Question 4

Analysis

According to the questionnaire results, most participants agree on the statement that cooking is indeed time-consuming and troublesome work, while 33.3% think otherwise. This shows that most of the participants think that time-consuming is one important negative attribute that hold them back from cooking on their own.

Do you agree that younger generations these days are not equipped with good culinary skills?

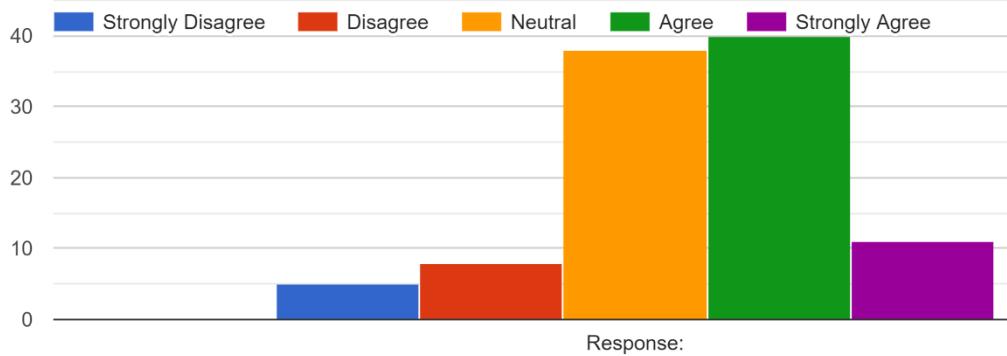


Figure 6-10: Result of Questionnaire Section 3 - Question 5

Analysis

As shown from the chart from figure above, the results have clearly shown that most of the participants agree on the fact that younger generation people these days are lacking good cooking skills. Where most people (40 responses) stand on agreeing the statement, 11 responses for strongly agree, 38 responses voted for neutral where they do not disagree nor show strong support to the statement. The rest of the participants were 8 and 5 of them voted for disagree and strongly disagree, making it up as the least and second least group of responses. This shows that most of the people are agreeing that younger generations these days are lack in cooking skills and the other quarter of people do not vote in favor but not denying the statement at the same time.

Given from the scale of 1 to 5, how will you rate your cooking skill?

102 responses

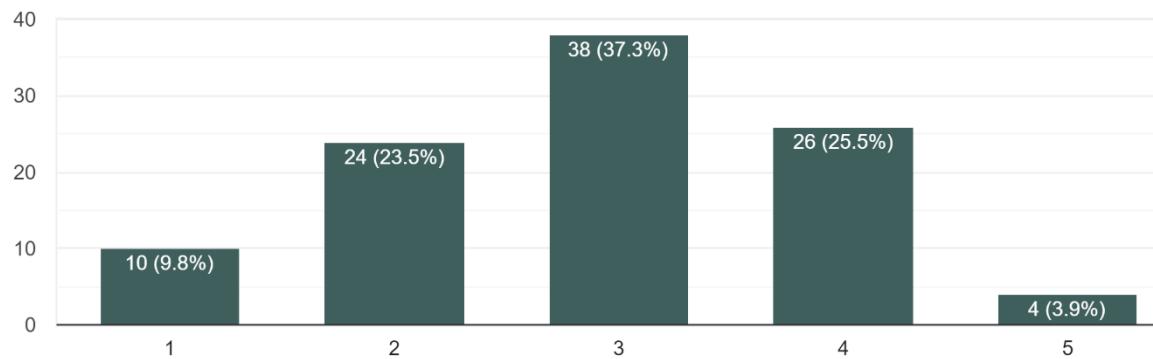


Figure 6-11: Result of Questionnaire Section 3 - Question 6

Analysis

Based on the graphical data shown above in diagram, the result is quite equally distributed with most participants rate their cooking skill at average, 24 participants and 26 participants respectively vote at below average and above average respectively. With 10 people think that their cooking skill is poor and 4 think that they have excellent cooking skill. This shows that overall the general respondents have close to average cooking skill that are suffice for general cooking.

Do you know what exact grocers to pick if you were asked to buy according to the grocery list?
102 responses

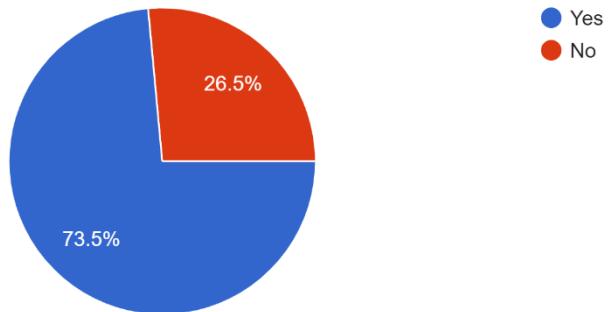


Figure 6-12: Result of Questionnaire Section 3 - Question 7

Analysis	According to the responses to the question as shown from the figure above, while most people at 73.5% of them think that they have good understanding of the grocery items and are able to buy the correct ingredients. However still, almost more than a quarter of participants are not sure of the food ingredients and know what to buy when the food from just watching the grocery list alone.
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From where you prefer to source your groceries and cooking ingredients?

102 responses

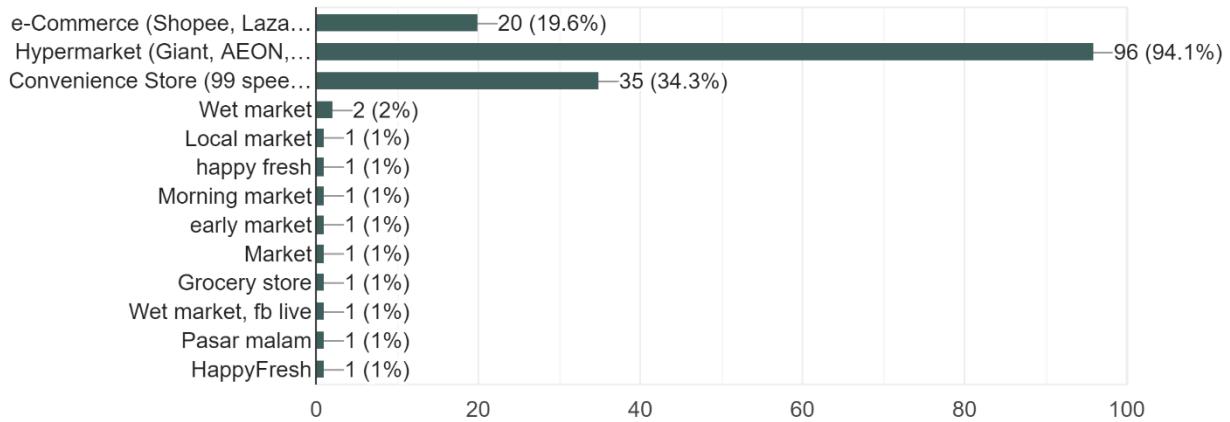


Figure 6-13: Result of Questionnaire Section 3 - Question 8

Analysis	From the shown results in diagram above, most respondents have picked hypermarket as the place of where they buy groceries from, while the second highest nominated selection is convenience stores and 20 respondents choosing e-Commerce as the place where they source their grocery needs. Others answer may mainly be grouped as market and Happy Fresh (a grocery helper platform). This shows that most of the people are still preferring over physical purchases rather than online purchase for buying groceries and food ingredients. With this analysis result, it is clear to know that the application should prioritize on integration with nearby hypermarkets and convenience stores to tell the users where they can buy their groceries, if similar feature is to be included.
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- **Questionnaire Section 4 – Opinions on Cooking Recipe**

From where do you learn new culinary knowledge? (May pick more than 1 answer)

102 responses

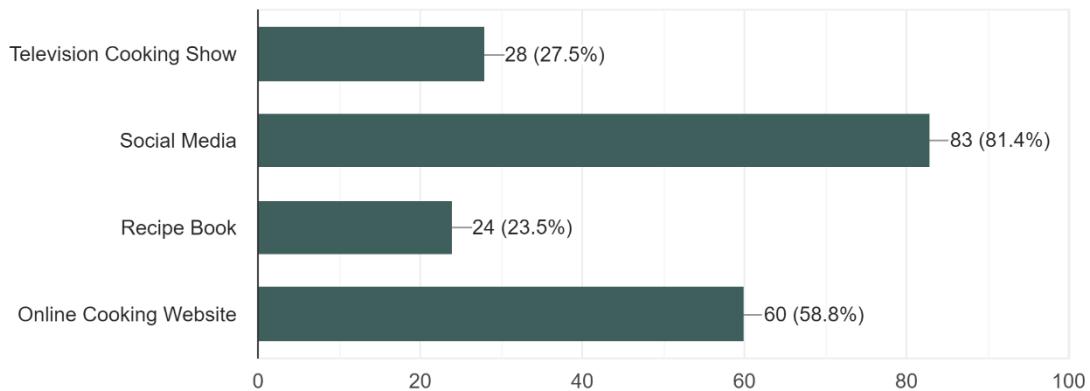


Figure 6-14: Result of Questionnaire Section 4 - Question 1

Analysis	Out of the four options, the diagram has depicted that most of the people learn from social media about cooking related knowledge, while coming close to it is online cooking website with 58.8% voting rate. Meanwhile, television cooking show and recipe book though old fashioned, however are still preferred by 27.5% and 23.5% respectively from the respondents. From this analysis we identified that social media and online cooking website has shown a highly positive potential in digital learning for culinary.
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Would you refer to a cooking recipe application to learn cooking?

102 responses

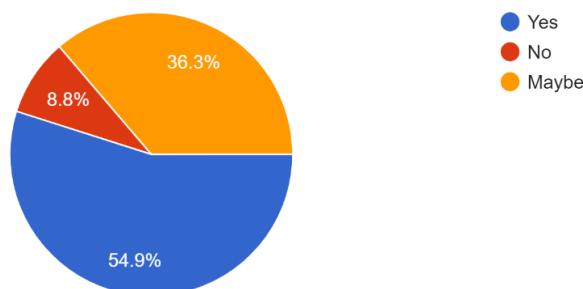


Figure 6-15: Result of Questionnaire Section 4 - Question 2

Analysis

While over 54.9% of the respondents have given support for a cooking recipe application, quite notably 36.3% of the respondents are uncertain with their action on whether a cooking recipe application can help them in learning to cook. Nonetheless, there is still a majority support that shows that cooking recipe application can help in culinary learning.

Do you think that digital learning is a good option to entice younger generations in learning?

102 responses

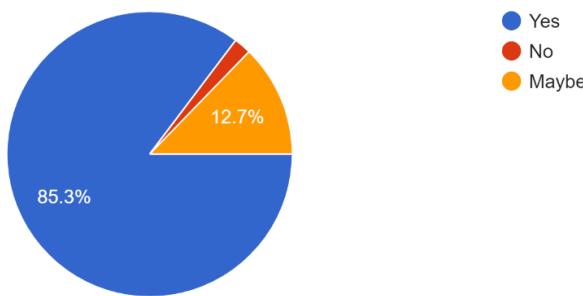


Figure 6-16: Result of Questionnaire Section 4 - Question 3

Analysis

From the pie chart shown on top, it demonstrates that digital learning is indeed a good option to entice younger generations in learning. Hence, in this analysis it is understood that an edutainment app for this proposed project have good chance of succeed in attracting its primary targeted user base.

Do you support the idea of sharing recipe with others publicly through the concept like how social media works?

102 responses

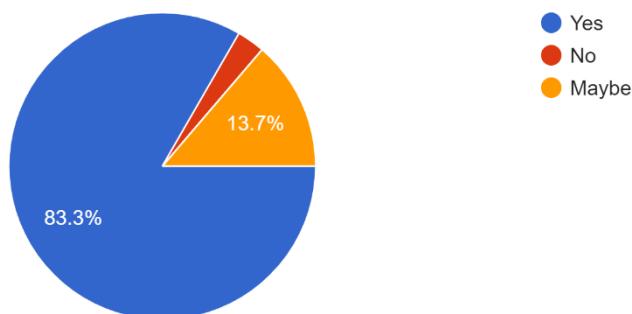


Figure 6-17: Result of Questionnaire Section 4 - Question 4

Analysis	Based on the results from the question that assess on how much the people will support the idea of making social media like application where users can share their recipes together, it was found that majority of people at 83.3% has voted in confidence with the idea, while 13.7% being uncertain and small amount thinks otherwise. With the strong support from the public, this has very well showed that most people tend to think that recipe sharing through social media like experience is one attractive feature that is offered from the proposed application.
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If you have found an interesting recipe that you would like to try out later, where and how will you keep it? (Pick 1 or more)

102 responses

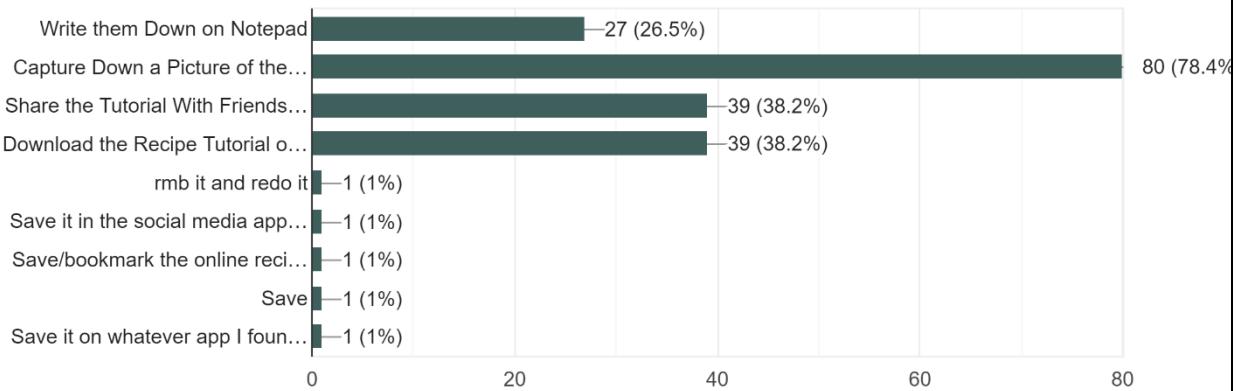


Figure 6-18: Result of Questionnaire Section 4 - Question 5

Analysis	From the outcome of the question asking how the participants will prefer to store their recipe they found from elsewhere, it was identified that most of the people are still using the rather obsolete method which is to capture down a picture of the recipe instructions with 78.4% of people responding to it. While second highest come in as sharing tutorial with friends/families and downloading the recipe tutorial on phone storage with a total percentage of 38.2% votes, and 26.5% on writing the recipe down on a notepad. The rest of the answers will prefer to save it down or bookmark it in social apps or online whenever they found interesting recipes. This shows that most of the people in public tend to keep recipes via a digital approach. While the supports garnered for sharing of the recipes with friends and families is as well a good indicator in showing that the general public are open for sharing recipes with people which is primarily the concept for the proposed system which users are encouraged to share their recipes there.
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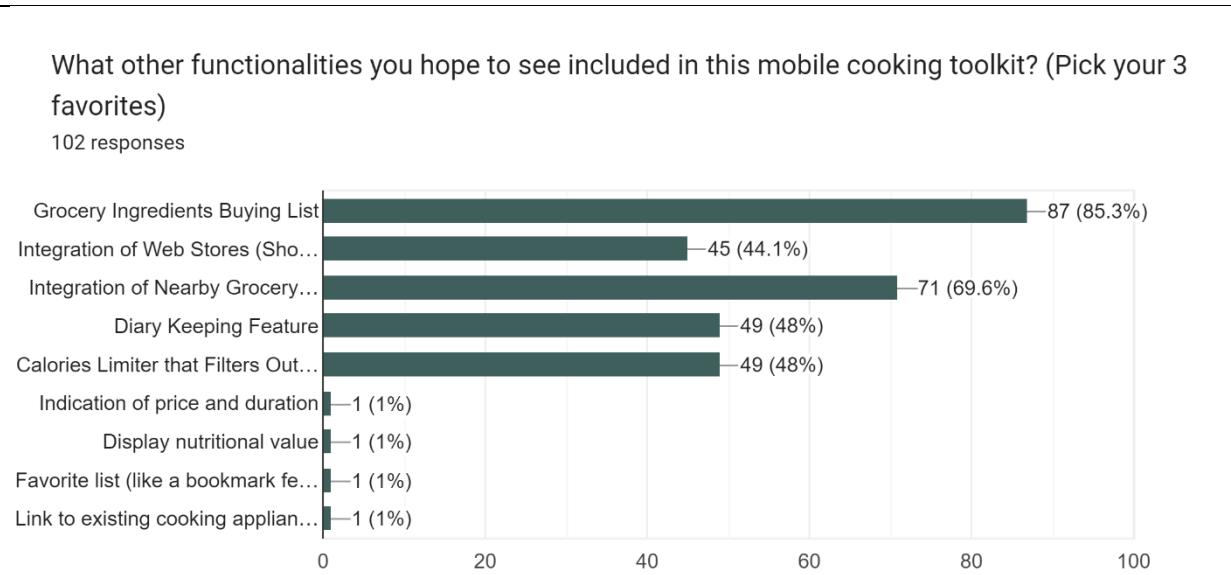


Figure 6-19: Result of Questionnaire Section 4 - Question 6

Analysis	Based on the results shown, the highest two anticipated functionalities from the respondents are the grocery buying list and integration of showing nearby grocery shops on map. While the diary keeping feature and calorie limiting filter on the recipes come after, which has an equal support from the respondents at 48%. With the integration of web stores for grocery shopping coming at final, with only 44.1% of supported vote. This shows that it is necessary for the application to come with a grocery buying list in the application and a map view integration of the nearby grocery shops. While the application could as well have a diary feature to keep their recipes and meals that were planned out with as well a calorie filter on the search recipes to help controlling the calories intake. For the features that might be added is the integration of web storers online for groceries, indication of price for preparing the meal, nutritional value for the dish, bookmarking feature and integration with existing cooking appliances. This analysis has very well applied the MoSCoW method for prioritizing the requirements.
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No
-
None
no
nope
Nope
No comment
No comment
None

Figure 6-20: Result of Questionnaire Section 4 - Question 7-1

N/A
none
Maybe can include functions like "most popular dishes" in a certain area to let users know what is the trending dishes and at the same time they can try cooking more
Intergration with online ordering/delivery platform other than shopee
Search function
budget range function
Very nice tool, can rank community recipe every month to promote learning new recipes
Could have short video features like tiktok, YouTube,...

Figure 6-21: Result of Questionnaire Section 4 - Question 7-2

even thou can work with younger generation, but also hv some cater to middle age people like the age of 30-40

Could add a feature of tags to filter certain cooking style or culture to ease user search especially for vegetarians or others with strict diet.

a great application to encourage people to cook by themselves

I would say include a section for users to post their own recipe and let other user rate it. This not only help good recipes to be past to other people, it will also help the person who share the recipe to recieve feedback, and it will actually motivate the person who post to cook more

Contains e-shop feature to buy famous chef's recipe online so the user can access it and learn on the mobile cooking toolkit.

Allow pictures and video post

Figure 6-22: Result of Questionnaire Section 4 - Question 7-3

More interaction between mobile and users, easy to understand and able to share with other platforms would be more interesting :))

Mobile app very nice, can learn cooking on Irt. Maybe can set to recommend a random recipe every week as notification.

Got apps to make own recipe?

Provide videos for each recipe to demonstrate the way to cook the meal.

Since the system allows the users to purchase ingredients through e-commerce, it is important to ensure the security of online payment system

more recipe would be nice

Figure 6-23: Result of Questionnaire Section 4 - Question 7-4

The user interface needs to be attractive to attract users

Include customers' cooking experiences and feedback to improve the dishes with diverse tastes and suit global foodies

NA

No comments

Cool app

may classified recipes according to regions to allow user to find their recipes faster and easier according to the ingredients and culinary tools available, provide the recipe that are able to cook by the user

Figure 6-24: Result of Questionnaire Section 4 - Question 7-5

Walk through videos on cooking

it need to be automatedand can try prepare ingredient that is ready or easy to preapre

Nil

Check the app sidechef. They already do this for the American market.

No suggestions

User friendly

give more example about the cooking recipes and cooking short video

Figure 6-25: Result of Questionnaire Section 4 - Question 7-6

Photos of ingredients & cooking procedure have to be shown

Interactions between users

It sounds like a cool idea! Maybe a review function from those who tried out the recipe

Maybe can stated more details

Provided one section for all kind of special dietary such as vegan, vegetarian, and so on.

All good.

Categorize the recipe, eg healthy food, easy to cook food, baby food etc

The system should have a clean and easy to use UI to provide a better user experience

Figure 6-26: Result of Questionnaire Section 4 - Question 7-7

online exchange between users.

Maybe to include the calories count, carbohydrate, protein and fat content of each dish recipe.

The recipes should be very diverse and not focus only one continent.

It sounds interesting and something i might use

Get daily cooking tips

good idea

No.

No

Figure 6-27: Result of Questionnaire Section 4 - Question 7-8

	<p>Able to recommend varieties of dishes for people with allergies</p> <p>Conciseness is somewhat important for me</p> <p>Low cholesterol ,Organic food</p> <p>Integrate video tutorial as sometimes recipes and instructions are not that easily understandable.</p> <p>Ability to link with cooking appliances i.e pressure cooker or thermomix</p> <p>Search up popular meals to find ingredients for them</p> <p>Allow people to take pic of their dishes and share with others</p> <p>Maybe have something that records what you've been eating weekly so it can suggest what not eat for a while based on healthiness level. Like maybe you've been having too much baked food or cheesy foods this week so try different foods or foods without cheese in them for the next ones.</p>
Analysis	<p>Among 20 responses out of the 102 are not providing any constructive suggestion comments on the proposed system. Above are the feedbacks that are categorized based on the similar responses gathered. The list of suggestions can help the developer in understanding what are the</p>

	<p>potential features that can be included in the application in order to make the application more appealing. These suggestions will be made for consideration if the team has more resources that can be allocated for realizing it.</p>
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6.3. Analysis of Interview Data

In this research, interview sessions have been conducted with 2 interviewees that are coming from the younger age group of 20-25 years old with a total number of 12 qualitative research questions produced by the researcher with various goals for gathering and eliciting participants' experiences, thoughts and domain knowledge for the proposed mobile cooking toolkit application. In this section the researcher will be looking over and analyze the responses to each interview question, and the results are displayed as below.

1. Do you think that there's a need for making an application where users can share of what they cook and the recipe to an app where other users can follow and learn?	
Interviewee 1	Yes. I think that we can discover better new recipes and to share their "original/traditional" recipes which were passed down the generations.
Interviewee 2	Yep absolutely... especially for those staying hostel alone, sometimes it gets really hard to figure out what to cook for meal. At least this app could provide ideas for cooking.
Analysis	Judging from the responses from the interviewees, it is found that the app has positive feedbacks on how the app can be used by the users. From the first response, it suggests that this application may be a good motivator for people to share the authentic recipes that are passed down few generations. For the second response, it shows that the app may as well be useful for providing cooking ideas when they are clueless on what to cook.

2. How often do you cook at home?	
Interviewee 1	2-3 times a week. I cooked almost every day during MCO.
Interviewee 2	Quite often like 4,5 times a week?

Analysis	Based on the responses from both the interviewees, it is identified that they cook quite often at home, thus it also determines that the participants in the interview have good cooking experience which may be contributing for assessing the knowledge in regard to the domain of cooking.
-----------------	---

3. Do you eat processed foods regularly? As these foods do not need any complicated cooking methods.

Interviewee 1	Nope, however I usually will still add in cheese tofu or squid balls if I ever cook for Maggie mee (very rare).
Interviewee 2	Yes, I do. They are just simple and nice.
Analysis	From the responses gathered, it is found that processed foods are being consumed by both of the interviewees, as these food are simple to prepare and have nice taste. Nevertheless, the first interviewee insists that though the processed food are good additional add-ons when preparing for a quick meal, however it is not consumed in a regular manner.

4. Do you think that cooking skills is still relevant or needed to be mastered in today's world.

Interviewee 1	Yes. We really shouldn't depend 100% on food deliveries. I think that you don't need to be a master in cooking but at least have a basic cooking skills and knowledge.
Interviewee 2	I agree that cooking skill is important but not until the extent of "mastering" it. As long as don't starve yourself, just learn a couple of simple recipes will be more than enough.
Analysis	Both of the responses from the interviewee have shown good backing on the statement where cooking skill is rather still relevant these days. From the analysis, it is identified that both the respondents have gave the same perspectives where some basic cooking skills and knowledge should at least be acquired. This characterizes that cooking skill is still seem as an

	important skill for people as for ensuring that they do not have to stay starved and acting cluelessly when hungry.
--	---

5. Do you think that if an application can integrate with nearby stores/ecommerce stores online, will it be useful for users like you when purchasing the required food ingredients?

Interviewee 1	Yes, I find it hard to purchase some specific/rare ingredients. I ended up driving here and there to find that one ingredient and eventually went back with empty hands.
Interviewee 2	Yes! And it would be better if they could provide delivery services. It's really annoying that some ingredients are not available while you're in the mood of preparing yourself a food fiesta.
Analysis	While both the interviewees have expressed that, integration of online stores can be considered to include into the proposed application as there may be times where certain ingredients are difficult to find and may usually get frustrated traveling between stores.

6. Do you agree that younger generation nowadays are less likely to be equipped with good culinary skills and do you think that by promoting an interesting cooking app can possibly help entice them to learn cooking (or some basic cooking skills)?

Interviewee 1	Yes. Most of the kids only know how to cook instant noodles which is unhealthy if eaten as a daily main dish. I believe that cooking app can help to boost their interest in cooking as they can search for the dishes they like.
Interviewee 2	Yes, well we're all spoiled kids who waited our mum to feed. Jokes aside, I think a fun and interesting cooking app could help cultivate their interest with appropriate advertising and marketing. Maybe could make use of the influence of social medias? Just a suggestion.
Analysis	Based on the replies given to the question, it is determined that the younger generations are indeed far lacking basic cooking skills and only know how in preparing unhealthy meals such as convenience foods and

	instant noodles. However, some suggestion has been prompted which mention that the application can effectively help boosting the interest from the younger generations considered that if the application is promoted well with influence of social media.
--	--

7. What other suggestions and features would you like to see it integrated in the mobile cooking toolkit application?

Interviewee 1	Allow people to take picture of their dishes and share to others, can as well be used as a daily recording of the cooked dishes.
Interviewee 2	Please do neat UI layout.
Analysis	From the responses of the interviewees, it is quite on note that User Interface layout should be highlighted by the developers in providing a neat and easy to navigate application. Asides, features such as ability to share digital media contents like pictures are also recommended to be included in the proposed application to enable more attractive using experience of the application. A daily recording of the cooked dishes by the users can also be made available as part of the ideation from tracking back what the user has cooked in the past and always be referred to in future.

6.4. Summary

In general, this chapter has helped in allowing the project team in understanding what are the responses and perspective views on each of the uncertain doubt that the team has. This has greatly permitted the team in having clearer depiction on the preference from the general public as well in giving a direction to the proposed application, assuring that the produced deliverable of this project is applicable in actual real-world market. Moreover, through the analysis of the results from both data collection techniques, it can also enable the project team in understanding the domain of this study about cooking experience and attributes from the respondents who have better cooking skills and knowledge. To summarize all, this section has helped in giving a full depth understanding to the general public's opinions as well as some constructive ideas that is recommended for improving the proposed solution.

Chapter 7 : SYSTEM ARCHITECTURE

7.1 Introduction

In Cookit, the developer has concluded from other competitors and similar systems in the market and plans to improve the existing system with an approach of consuming and delivering the contents in more interesting ways. Therefore, the system is designed to be a revolutionary content sharing platform for publishing cooking recipes and intended to present the contents to users in an interactive approach. When compared with other recipe keeping or identical recipe apps, they are quite content-fixed, which means that flexibility of the system is very limited and contents scalability will have to be largely dependent on the app companies to maintain, if they do not push for new recipes updates then the app will mean to say, too rigid and fixed with its contents delivered, asides recipe keeping apps are also very private in a sense that what the users written and saved are only readable by the user itself, which in general acts more like a digital notebook for own cooking recipes rather than being an open source platform where users are free to exchange for better cooking ideas and try out something new, opening up the field of knowledge for users.

7.1.1 Content Generating Features

Therefore, we have plans to include several special features to improve what the existing systems could give. First and foremost, the developer plans to provide a better approach where users can share their recipe and hence why the developer has thought on integrating Artificial Intelligence into the application where generating lengthy and wordy contents would be eased for authors. Not only automated text contents generation, but it is also found out that users might also be clueless on selecting an image as the poster before publishing their written posts. Therefore, an image engine would be useful for selecting the best image for users as a poster image for their recipe posts.

7.1.2 Cooking Steps Navigation Features

The app has also utilized the proximity sensor which is found to exist in almost all the Android smartphones in market. The proximity sensor is applied to allow users to navigate to the proceeding cooking instruction page without the actual need of touching the screen when they are cooking as

the hands might get greasy in kitchen. Asides, the application also does include a Text-To-Speech functionality where users can eye focus on the cooking process while listening to the instructions without the need of switching focus between the text cooking instructions and losing focus on the foods that are being cooked. Moreover, the user can also opt to turn on a timer in the app while remaining the screen of cooking instructions where the user is paused at. This will be greatly helpful if the user needs to set a reminder while multi-tasking in the kitchen. An example of the timer's usage in real world condition would be that when a person wants to preheat an oven while making dough, then with the timer included, users can set a duration and begins the countdown so that the user gets to be reminded to check the oven over a certain period.

7.1.3 Favoriting & Rating Recipe Features

Cookit also allows users to favorite one or several recipe posts that the users would want to keep as their collection for future reference. This feature will also be used to keep count on how many users have kept a recipe post as their favorite so that the system can as well to use it to generate a top list where it will show all users the current most popular recipes that are preferred by most of the users. Other from favorite counts, the system will also generate the popular recipe list depending on the ratings given by the users as well. The higher the favorite counts and the rating of the recipe is, the higher possibility that the recipe post will be pushed to the popular list view. Users may also rate a recipe by giving a complete star scaled ratings and further comments elaboration explained., so that future readers can know what the rest of the users thinks about the recipe post shared.

7.2 Abstract Architecture

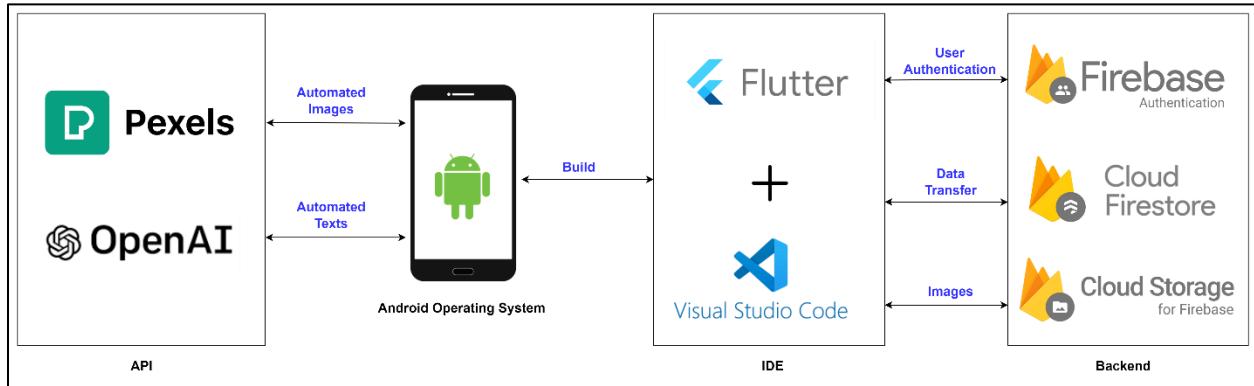


Figure 7-1: Abstract Architecture of Cookit

To develop Cookit application, Flutter was chosen as the programming framework to support the development of the application. Flutter is a framework that is developed by Google to run apps across multiple hybrid platforms like Web, Desktop, and mobile devices, however the development of Cookit was focused to be used on Android OS devices only for the current time being. To code the system, Visual Studio Code was chosen as the Integrated Development Environment (IDE) for development since Visual Studio Code has good supports for running Dart language, which is a programming language that runs by Flutter, as well as substantial support for other Flutter extensions.

Firebase products can also be seen to be included in the architecture of the system. First one being the Firebase Authentication which will be used to authorize, authenticate, and manage the user credentials. With the implementation of Firebase authentication, it can help in generating a token to automatically authorize users when they attempt to login to the application or even to create a user account. For image objects transfers, Firebase Cloud Storage was used to store and organize the repositories of images that are uploaded by the users. It acts as a cloud storage for holding all the necessary image media files. Lastly, a Firestore instance was created to act as a database that supports all the operational activities in the application. One of the reasons picking Firestore as the database was due to the reason being that Firestore is an improved product from Firebase real-time database which cannot be used while in offline conditions. However, Firestore can allow users to temporarily manage the data even if the device has gone offline for a short while. With that said, Firestore is the best alternative chosen after the Firebase real-time database for this system as an

effort to avoid any data loss in editing or uploading of contents even if the device has lost the internet connection for a very short period.

Pexels engine and Open AI were both integrated into the architecture to support the automated content generating capability for the system. Pexels engine is one of the largest image repositories where it can be used to query an image based on the search query text given. Whereas Open AI is integrated to act as an AI for automated text contents writer. Open AI will automatically fetch relevant data based on the search query that was dumped and construct a short paragraph of texts that it has crawled from online sources. With the help of both Pexels and Open AI, content generation will greatly be eased so that content writer in the application can share contents without the need for writing a long and lengthy texts each time when publishing a content.

7.3 System Design

7.3.1 Use Case Diagram

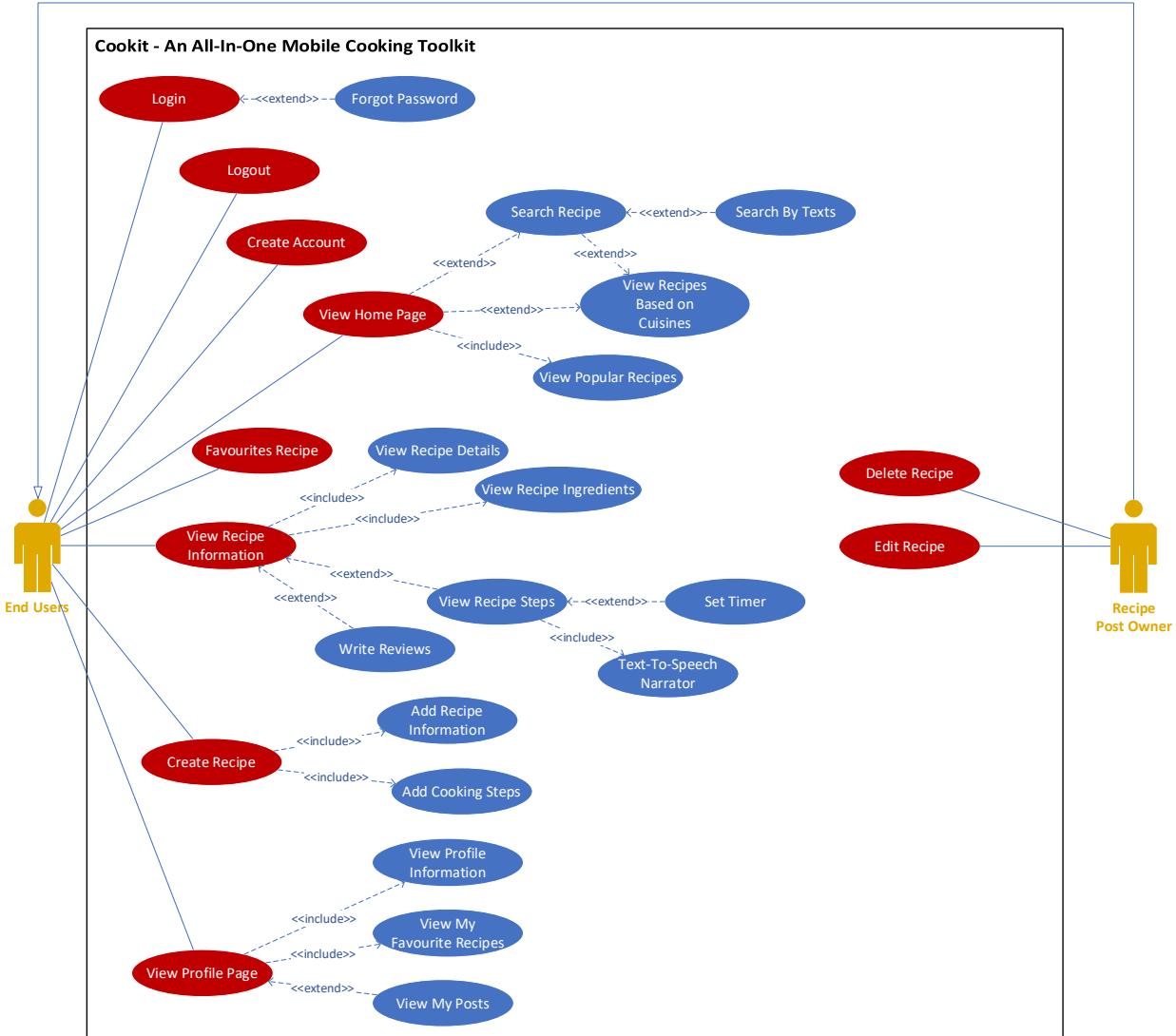


Figure 7-2: Use Case Diagram of Cookit

7.3.2 Use Case Specification

Login

Use Case	Login
Description	This use case allows the end users to login into the application with pre-registered user account credentials.
Actors	End Users
Preconditions / Dependency	When the end users open the application and has not logged in into the application before.
Postconditions	<ol style="list-style-type: none"> 1. The system displays the home page of the application after the end users have successfully logged in.
Standard Process	<ol style="list-style-type: none"> 1. The end users open the application. 2. The system initializes the Firebase Authentication instance. 3. The system displays a login page view. 4. The end users put in their login credentials. 5. The end users tap on the login button 6. The system authenticates with the Firebase Authenticator. 7. The system displays the home page to the end user.
Alternative Process	<u>4.1 User forgot the password credentials</u> <p>4.1.1 The user taps on the forgot password button.</p> <p>4.1.2 The system request Firebase Authenticator to send an email to the provided email address.</p> <p>4.1.3 User taps on the link to reset the password from the received email.</p>
Exception Flow	<u>6.1 System Fails to Authenticate</u> <p>6.1.1 If the system fails to authenticate due to connection issue with the Firebase Authenticator or the User has failed to provide correct user Credentials, the system will show an error message to notify the end users.</p> <p>6.1.2 The flow continues back to step 3.</p>

Logout

Use Case	Logout
Description	This use case allows the end users to logout from the application.
Actors	End Users
Preconditions / Dependency	When the end users are logged in and clicks on the logout button at the profile page.
Postconditions	<ol style="list-style-type: none"> 1. The system discards the credentials and returns the end users back to the login page.
Standard Process	<ol style="list-style-type: none"> 1. The end users tap on the logout button. 2. The system removes the login credentials and account token from the device. 3. The system triggers the StreamBuilder to rebuild the context screen when the provided Credentials Stream has no more end users' credential token. 4. The system displays the login page to the end user.
Alternative Process	-
Exception Flow	-

Create Account

Use Case	Create Account
Description	This use case allows the end users to create an account with the Firebase Authenticator to be used to login the application.
Actors	End Users
Preconditions / Dependency	When the end users have never registered an active account on the application, or the end users are first time users.
Postconditions	<ol style="list-style-type: none"> 1. The system displays the home page once the end users have created an account on the application.
Standard Process	<ol style="list-style-type: none"> 1. The user taps on the register button. 2. The system initializes the Firebase Authentication instance. 3. The system displays a register page view. 4. The end users will need to provide a profile picture that represent themselves. 5. The end users will need to provide their information and credentials details in the given text fields. 6. The end users tap on the register account button. 7. The system will communicate with Firebase Authenticator by sending all the filled information to the authenticator and expects a credential token to login when the user account is created. 8. The system displays the home page to the end user.
Alternative Process	-
Exception Flow	<p><u>7.1 System unable to create an account</u></p> <p>7.1.1 If the system fails to communicate with the Firebase Authenticator, then the system will show an error message indicating the error.</p> <p>7.1.2 The flow continues back to step 3.</p>

[View Home Page](#)

Use Case	View Home Page
Description	This use case allows the end users to view the home page of the application and perform operations such as search and view recipes.
Actors	End Users
Preconditions / Dependency	When the end users have successfully logged in to the application.
Postconditions	<ol style="list-style-type: none"> 1. The system displays the home page of the application which has several widgets that the end users can pick from.
Standard Process	<ol style="list-style-type: none"> 1. The system retrieves data from the Firebase instance. 2. The system will render the widgets based on the results that have been returned from the Firebase. 3. The system finish building all the widgets and display them to the view of the screen where end users can select and perform activities by tapping on it. A list view of popular recipes will also be constructed with a maximum index number of 10 recipe posts.
Alternative Process	<p><u>3.1 View Recipes Based on Cuisine Category</u></p> <p>3.1.1 The user taps on one of the category icons that represents the cuisine type.</p> <p>3.1.2 The system displays recipes based on the selected cuisine category.</p> <p style="padding-left: 2em;"><u>3.1.2.1 Search Recipe by Cuisine</u></p> <p style="padding-left: 3em;">3.1.2.1.1 The system proceeds to step 3.2</p> <p><u>3.2 Search Recipe</u></p> <p>3.2.1 The end users will tap on the search bar widget which will cause the application to prompt a soft keyboard that the user can type on.</p> <p>3.2.2 The end users will type the queries for recipes that they intend to look for.</p>

	3.2.3 The system displays the relevant results of recipes based on the query texts given by the user.
Exception Flow	-

Favorites Recipe

Use Case	Favorites Recipe
Description	This use case allows the end users to keep a recipe post that they like to their list of favorites.
Actors	End Users
Preconditions / Dependency	When the end users are viewing the recipes from the list or within the opened recipe post where it displays the information of the recipes.
Postconditions	<ol style="list-style-type: none"> 1. The system will add the selected recipe post to the favourite list that belongs to the user. 2. The system increases the counter of the favourite number that belongs to the chosen recipe post.
Standard Process	<ol style="list-style-type: none"> 1. The end users tap on the favourite icon on the particular recipe. 2. The system senses the tap and triggers itself to update the ID of the recipe to the list of favourites that belongs to the current user. 3. The system will then update the favourite number counter of the particular recipe post.
Alternative Process	-
Exception Flow	<u>2.1 Post ID was found exist in the favourite list</u> <p>2.1.1 The system will remove the ID of the recipe post from the favorite list.</p>

View Recipe Information

Use Case	View Recipe Information
Description	This use case allows the end users to view the detailed information of the chosen recipe.
Actors	End Users
Preconditions / Dependency	When the end users click on the recipe from the list view.
Postconditions	<ol style="list-style-type: none"> 1. The system displays the details that belongs to the recipe such as the ingredients, cooking steps and reviews.
Standard Process	<ol style="list-style-type: none"> 1. The system passes the selected recipe to the page where it will show all the details of the recipes. 2. The system shows a list of all the required ingredients needed to cook with the recipe.
Alternative Process	<p><u>1.1 Write Reviews</u></p> <p>1.1.1 The user taps on the button to write a review of the recipe post shared.</p> <p>1.1.2 The system prompts a dialog where the end users can rate the recipe from the scale of number of stars given and write a comment review.</p> <p>1.1.3 The user submits the written review to the system.</p> <p>1.1.4 The system uploads the review to Firebase.</p> <p><u>2.1 View Recipe Steps</u></p> <p>2.1.1 The user taps on the cook now button</p> <p>2.1.2 The application redirects the user to display the steps of recipe.</p> <p><u>2.1.2.1 Set Timer</u></p> <p>2.1.2.1.1 The user may set a timer with hours and minutes selection.</p> <p>2.1.2.1.2 The system will initiate a countdown timer.</p> <p>2.1.2.1.3 The countdown finishes, the alarm rings the user as notification.</p>

	2.1.3 The system will narrate the recipe cooking steps out loud in voice.
Exception Flow	-

Create Recipe

Use Case	Create Recipe
Description	This use case allows the end users to create a new recipe post that they want to share with other end users.
Actors	End Users
Preconditions / Dependency	When the end users click on the add button icon at the bottom navigation bar.
Postconditions	<ol style="list-style-type: none"> 1. The system redirects the user to create recipe page. 2. The system will consume the general information of the recipe such as title, difficulty level and total preparation time. 3. The system consumes the detailed steps data information such as image, description texts and ingredients required for each step. 4. The system pushes the data to Firebase.
Standard Process	<ol style="list-style-type: none"> 1. The end users click the add button. 2. The system displays two page views where user can change in between. 3. First one being the page view that contains fields that consume the title, description, preparation time, difficulty level and the poster image for the recipe post. 4. The end users may proceed to the second page view once completed filling the general information, the user will be required to fill up the cooking steps. This is done by adding in the information for each step such as the ingredients, image, and step description. 5. The system will post the information to Firebase once the above steps have been completed.
Alternative Process	-
Exception Flow	<u>5.1 Failed to Upload to Firebase</u>

	<p>5.1.1 The system fails to upload the data to Firebase due to connection issue with Firebase. An error message will be shown to notify the end users.</p> <p>5.1.2 The system returns to step 5.</p> <p><u>5.2 Required Information Not Filled</u></p> <p>5.2.1 The system displays error messages and will not allow the user to proceed with publishing the data to Firebase.</p> <p>5.2.2 The system returns to step 3.</p>
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Edit Recipe

Use Case	Edit Recipe
Description	This use case allows the recipe post owner to edit the recipes that are written by their own.
Actors	Recipe Post Owner
Preconditions / Dependency	When the recipe that is opened is published by the current logged in user.
Postconditions	<ol style="list-style-type: none"> 1. The system will allow the recipe post owner to change the details of the recipe and upload the changes back to Firebase.
Standard Process	<ol style="list-style-type: none"> 1. The recipe post owner taps on the edit button. 2. The system redirects the recipe post owner to the editing page. 3. The system retrieves the selected recipe data from Firebase. 4. The recipe post owner modifies the information of the recipe. 5. The system uploads the latest modified version of the recipe to Firebase.
Alternative Process	-
Exception Flow	<p><u>5.1 Failed to Upload to Firebase</u></p> <p>5.1.1 The system fails to upload the data to Firebase due to connection issues with Firebase. An error message will be shown to notify the end users.</p> <p>5.1.2 The system returns to step 5.</p> <p><u>5.2 Required Information Not Filled</u></p> <p>5.2.1 The system displays error messages and will not allow the user to proceed with publishing the data to Firebase.</p> <p>5.2.2 The system returns to step 4.</p>

Delete Recipe

Use Case	Delete Recipe
Description	This use case allows the recipe post owner to delete the recipe that they have posted.
Actors	Recipe Post Owner
Preconditions / Dependency	When the end users click on the recipe that they have published.
Postconditions	<ol style="list-style-type: none"> 1. The system removes the recipe from the Firebase.
Standard Process	<ol style="list-style-type: none"> 1. The recipe post owner taps on the delete button. 2. The system looks for the particular recipe post from Firebase. 3. The system removes the recipe post from the Firebase. 4. The system renders the list view once the post has been deleted to show latest changes of the database.
Alternative Process	-
Exception Flow	-

View Profile Page

Use Case	View Profile Page
Description	This use case allows the end users to view the profile information and the favorited recipes.
Actors	End Users
Preconditions / Dependency	When the end users click on the profile icon button at the bottom navigation bar.
Postconditions	<ol style="list-style-type: none"> 1. The system displays the page where it contains the profile information of the current logged in user and the list of favourited recipes.
Standard Process	<ol style="list-style-type: none"> 1. The system retrieves data from Firebase. 2. The system displays the profile information that contains the data such as name, user ID, number of favourited posts and published posts. 3. The system displays a tab where it initially points to display the list view of the favourited recipes.
Alternative Process	<p><u>3.1 View My Posts</u></p> <p>3.1.1 The pointer of the tab changes to view all the end user's published posts.</p> <p>3.1.2 The user will be able to view all the post shared by them in a list view.</p>
Exception Flow	-

7.3.3 Activity Diagram

Overview

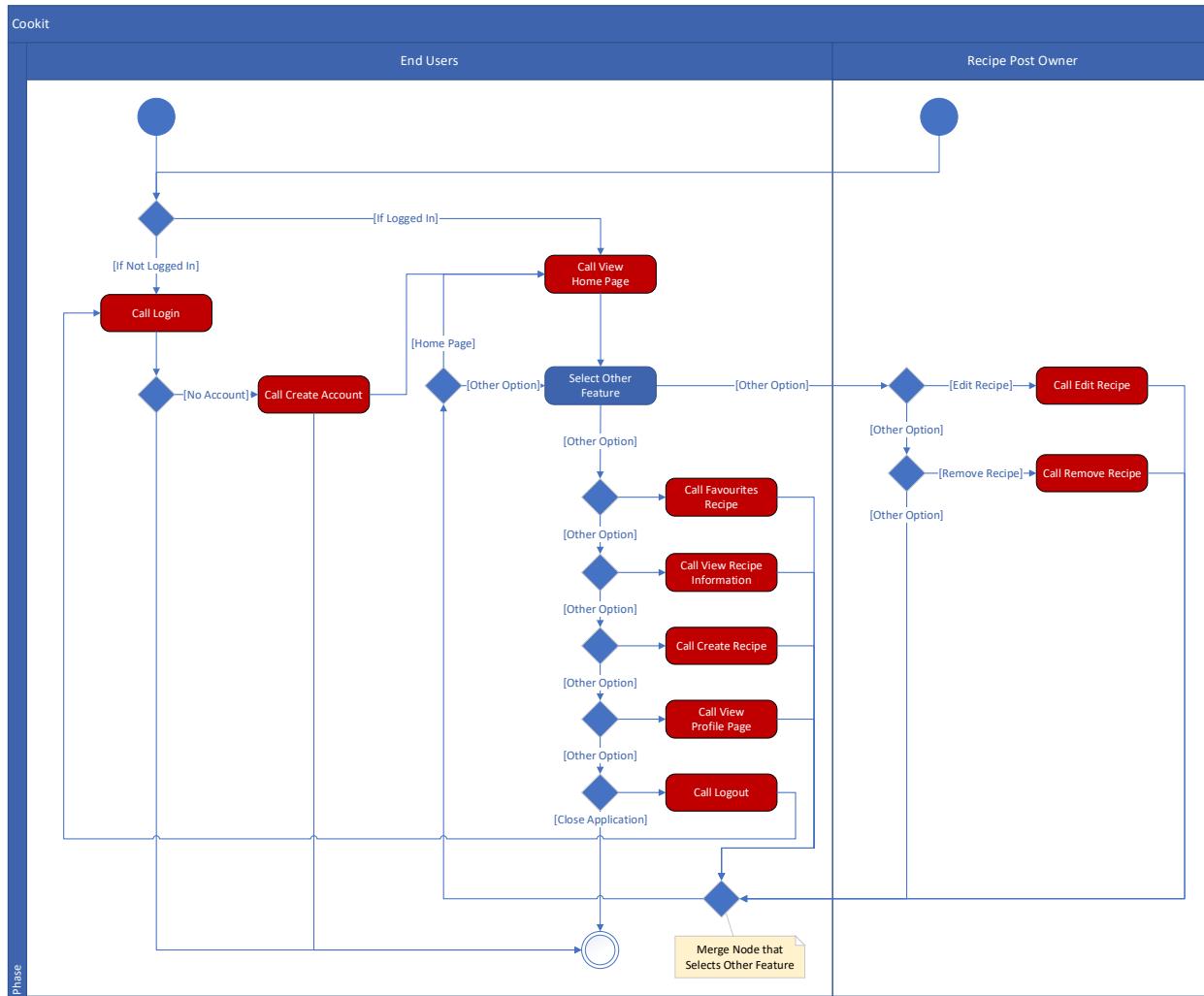


Figure 7-3: Overview of Activity Diagram for Cookit

Login

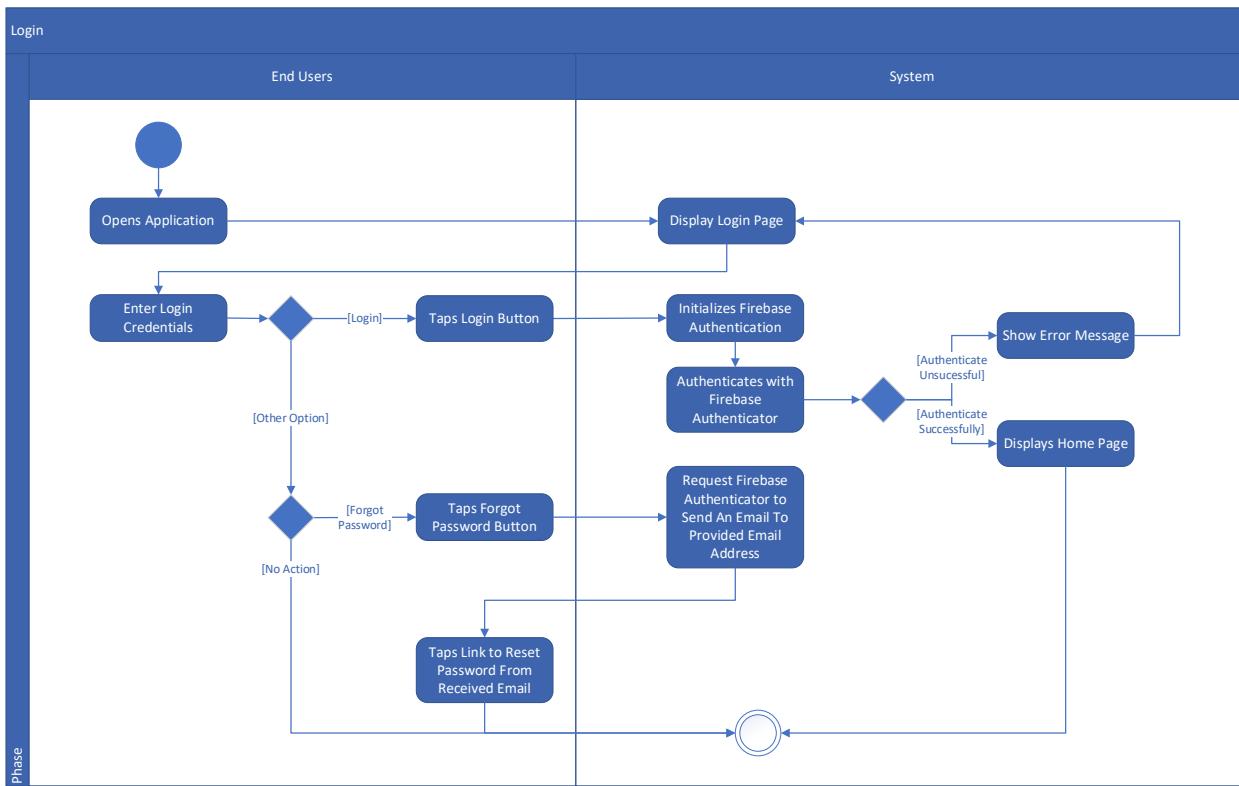


Figure 7-4: Activity Diagram for Login

Logout

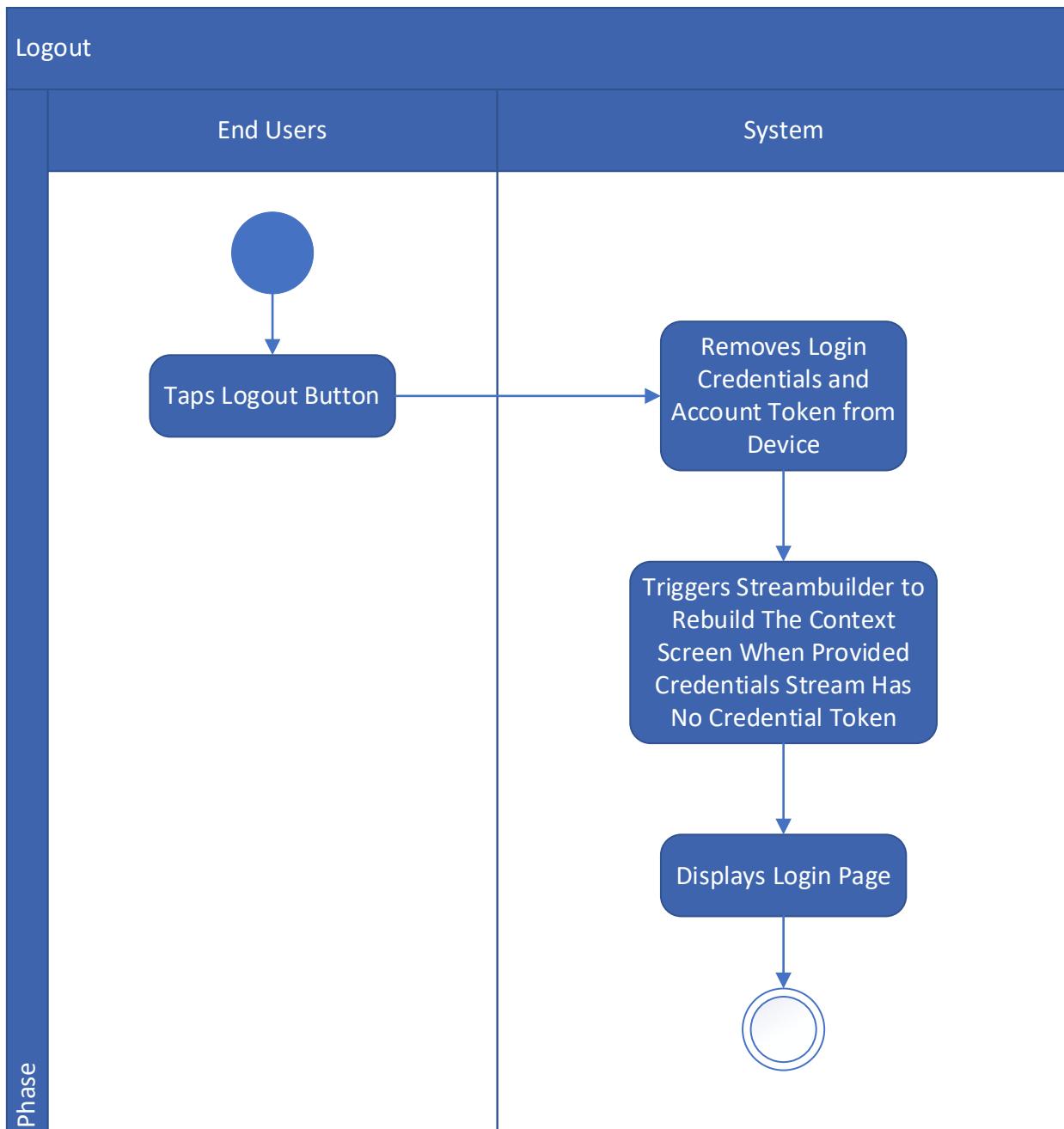


Figure 7-5: Activity Diagram for Logout

Create Account

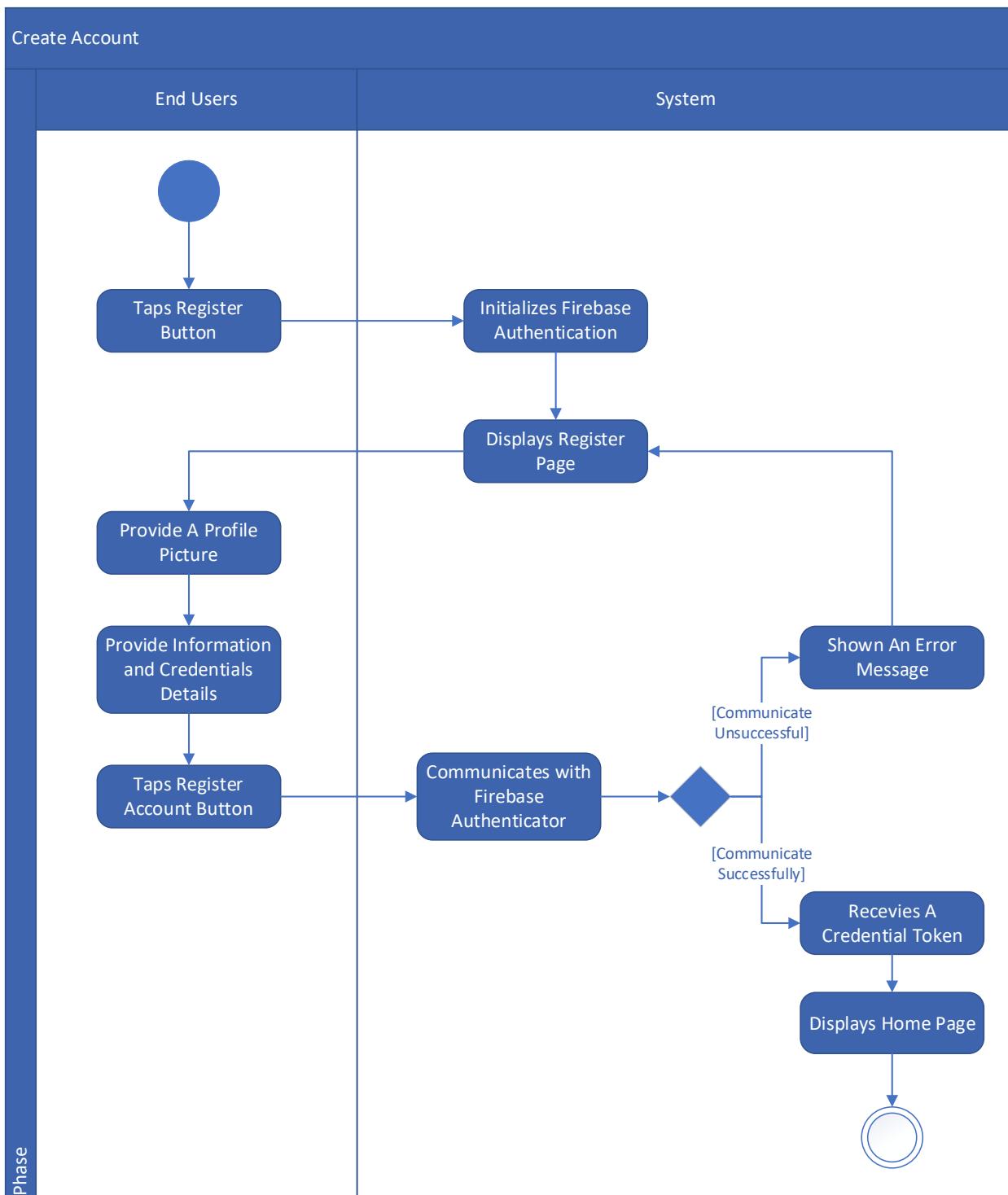


Figure 7-6: Activity Diagram for Logout

View Home Page

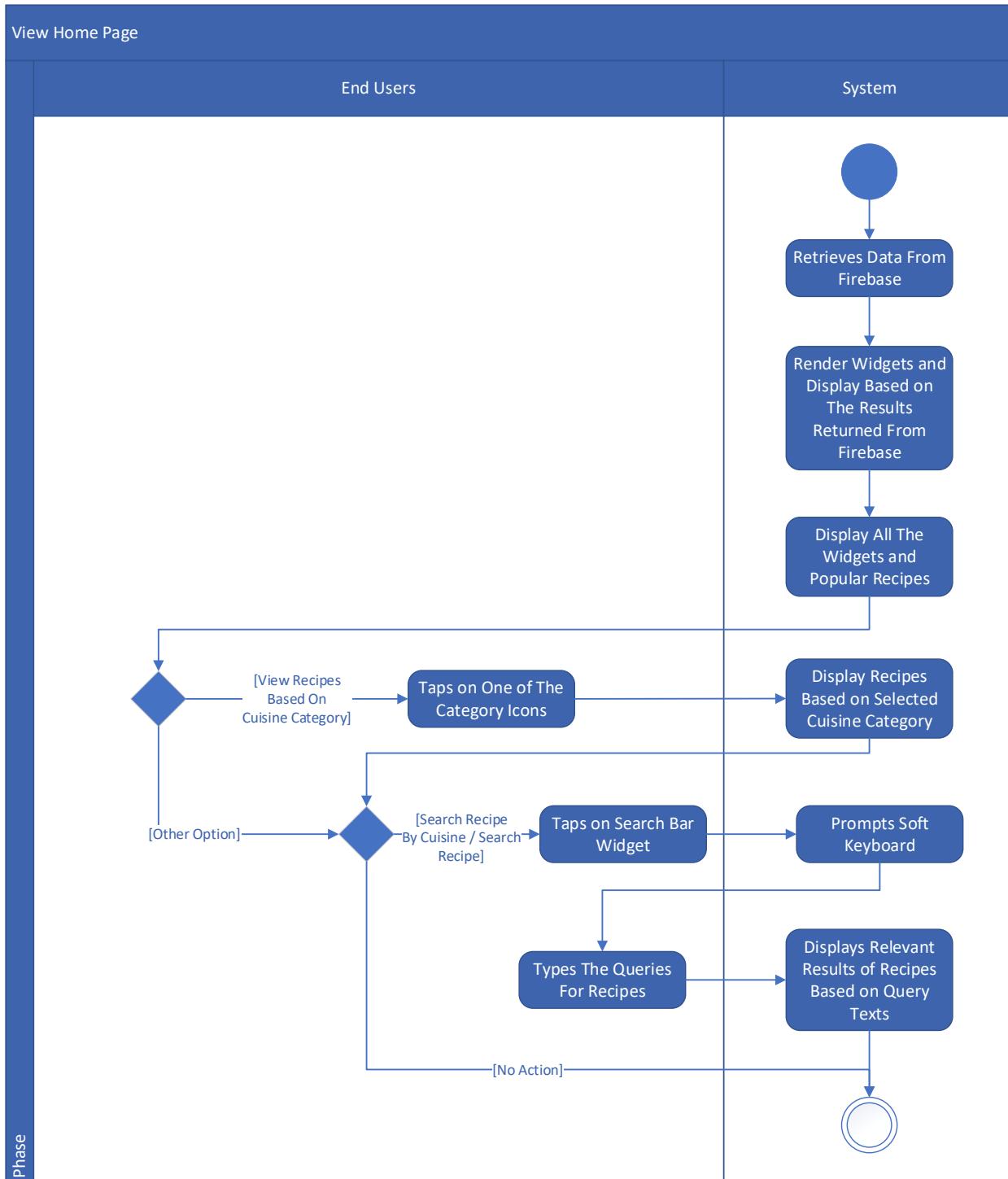


Figure 7-7: Activity Diagram for View Home Page

Favorites Recipe

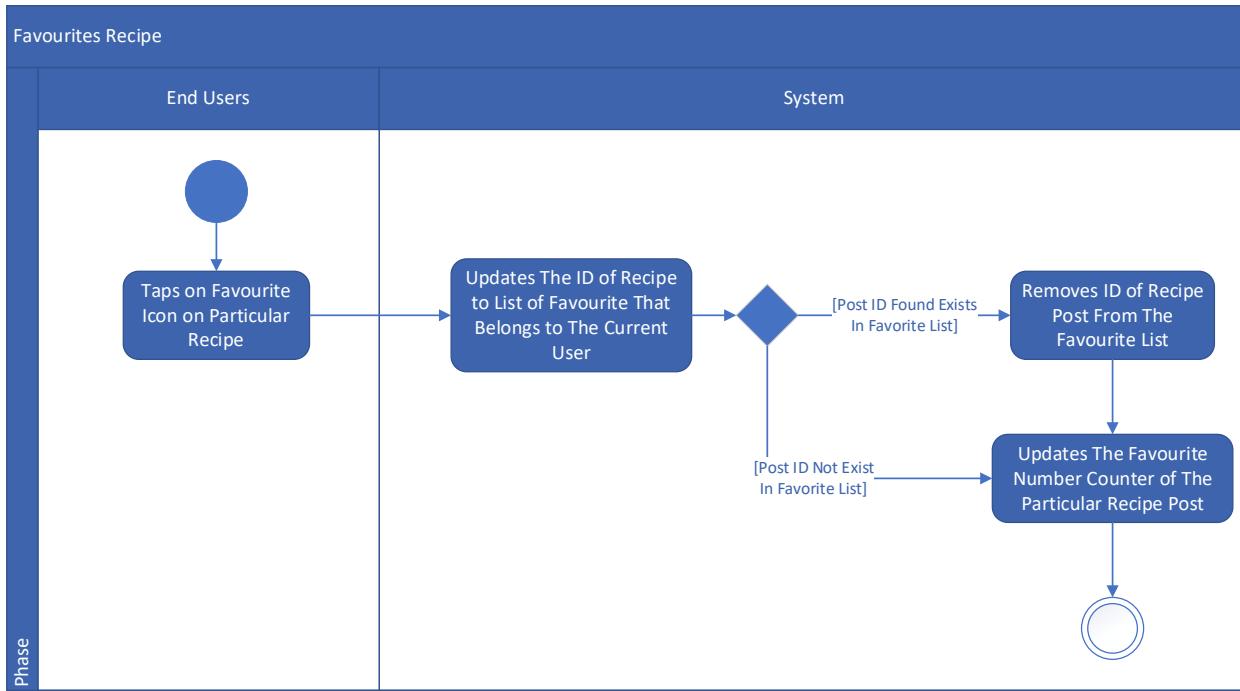


Figure 7-8: Activity Diagram for Favorites Recipe

View Recipe Information

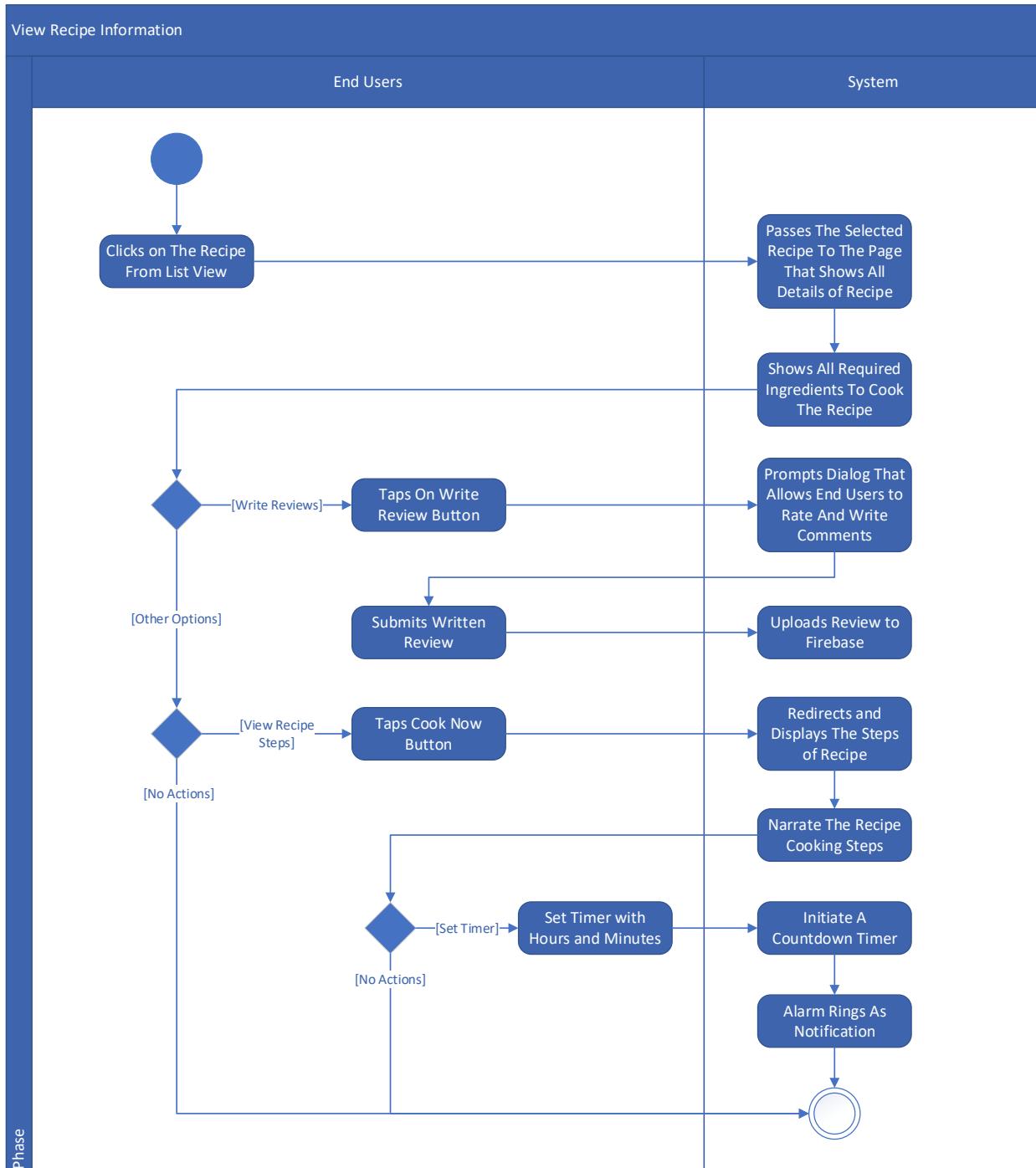


Figure 7-9: Activity Diagram for View Recipe Information

Create Recipe

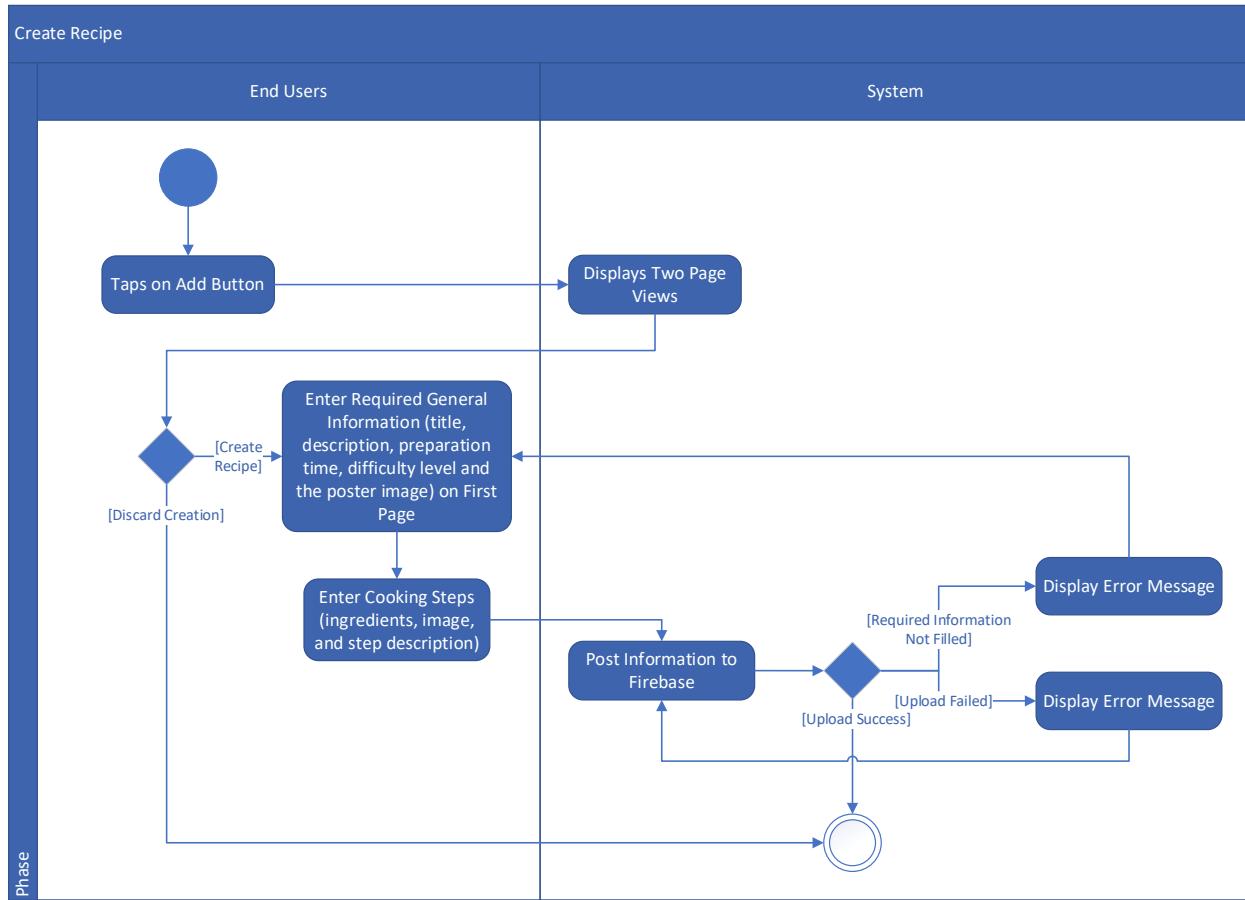


Figure 7-10: Activity Diagram for Create Recipe

View Profile Page

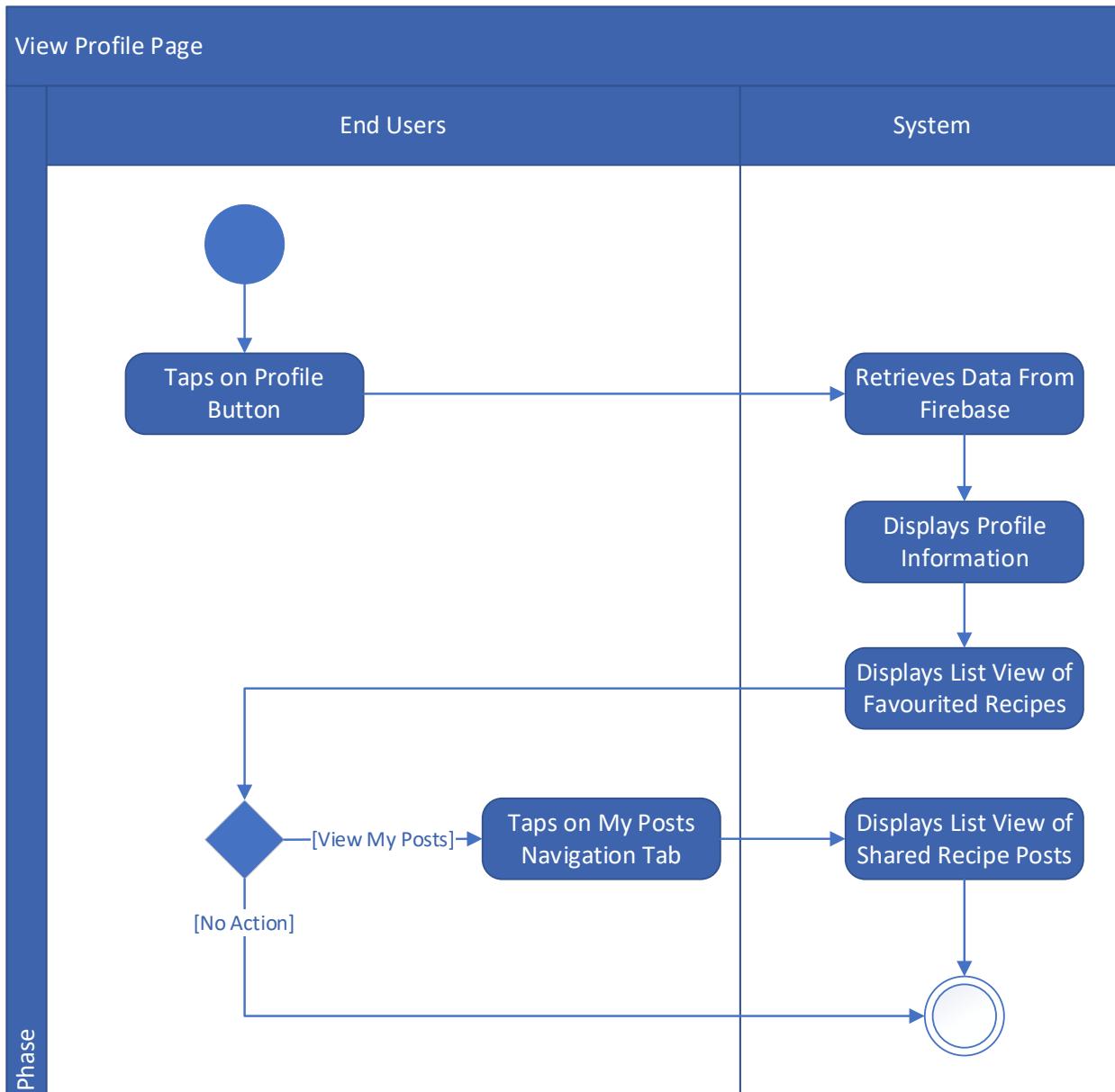


Figure 7-11: Activity Diagram for View Profile Page

Edit Recipe

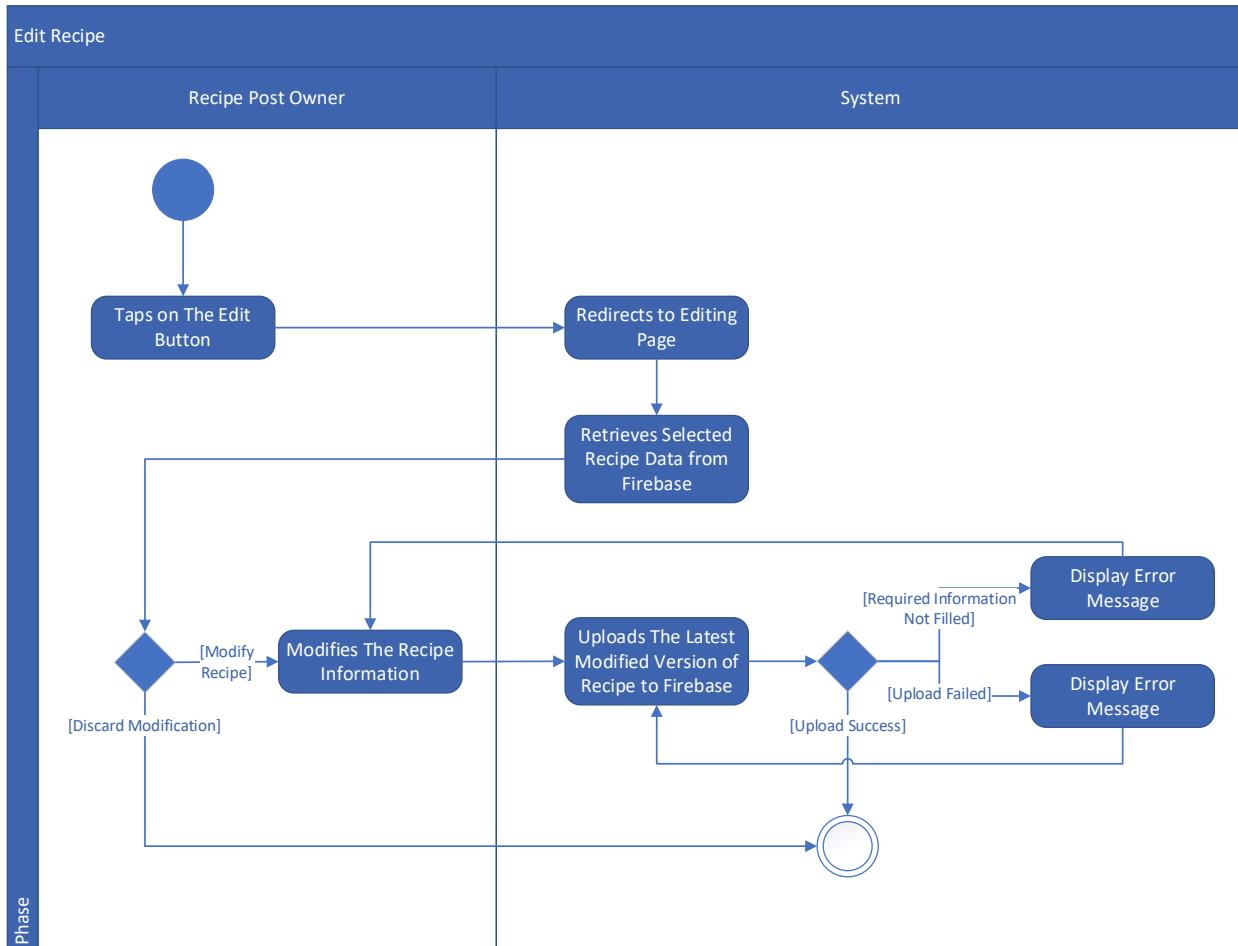


Figure 7-12: Activity Diagram for Edit Recipe

Remove Recipe

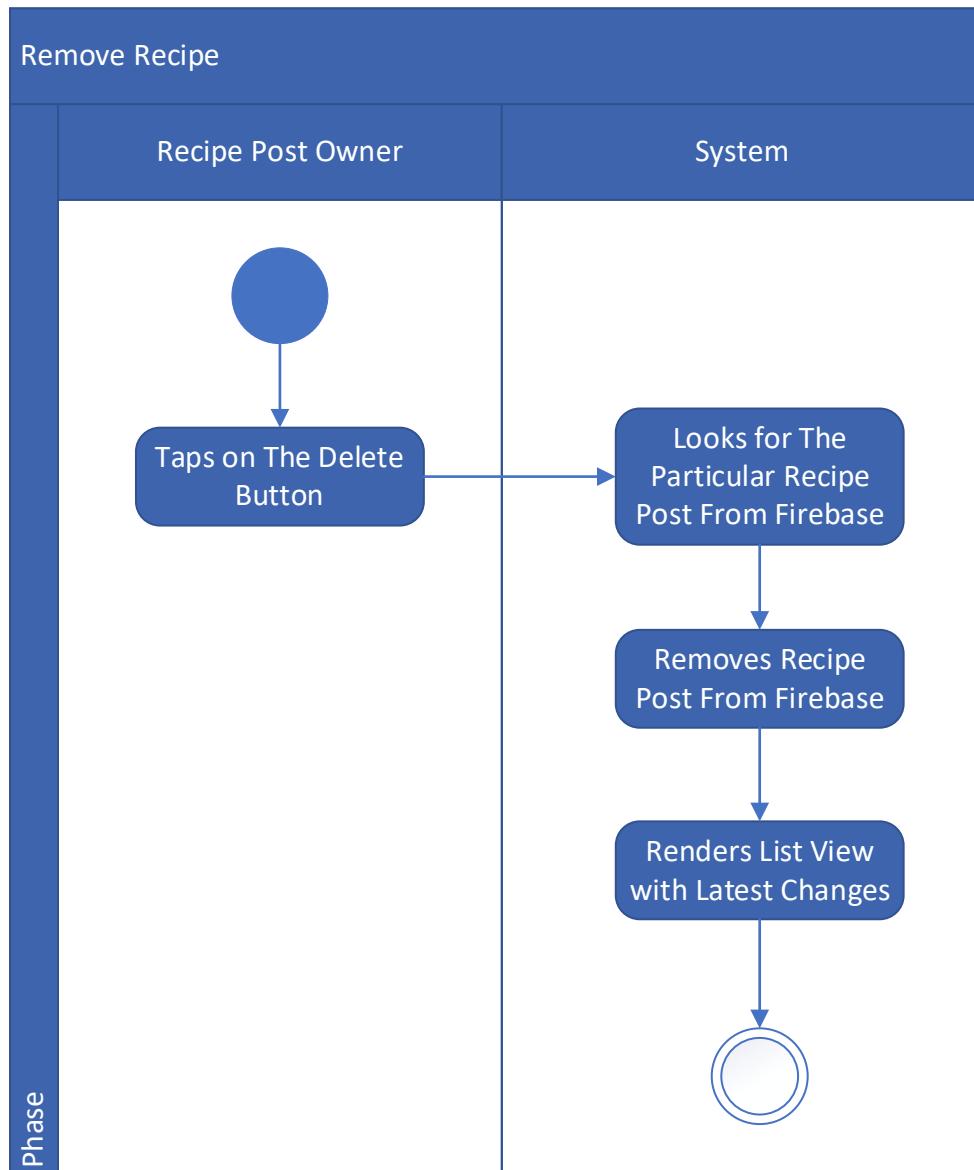


Figure 7-13 Activity Diagram for Remove Recipe

7.3.4 Sequence Diagram

Login

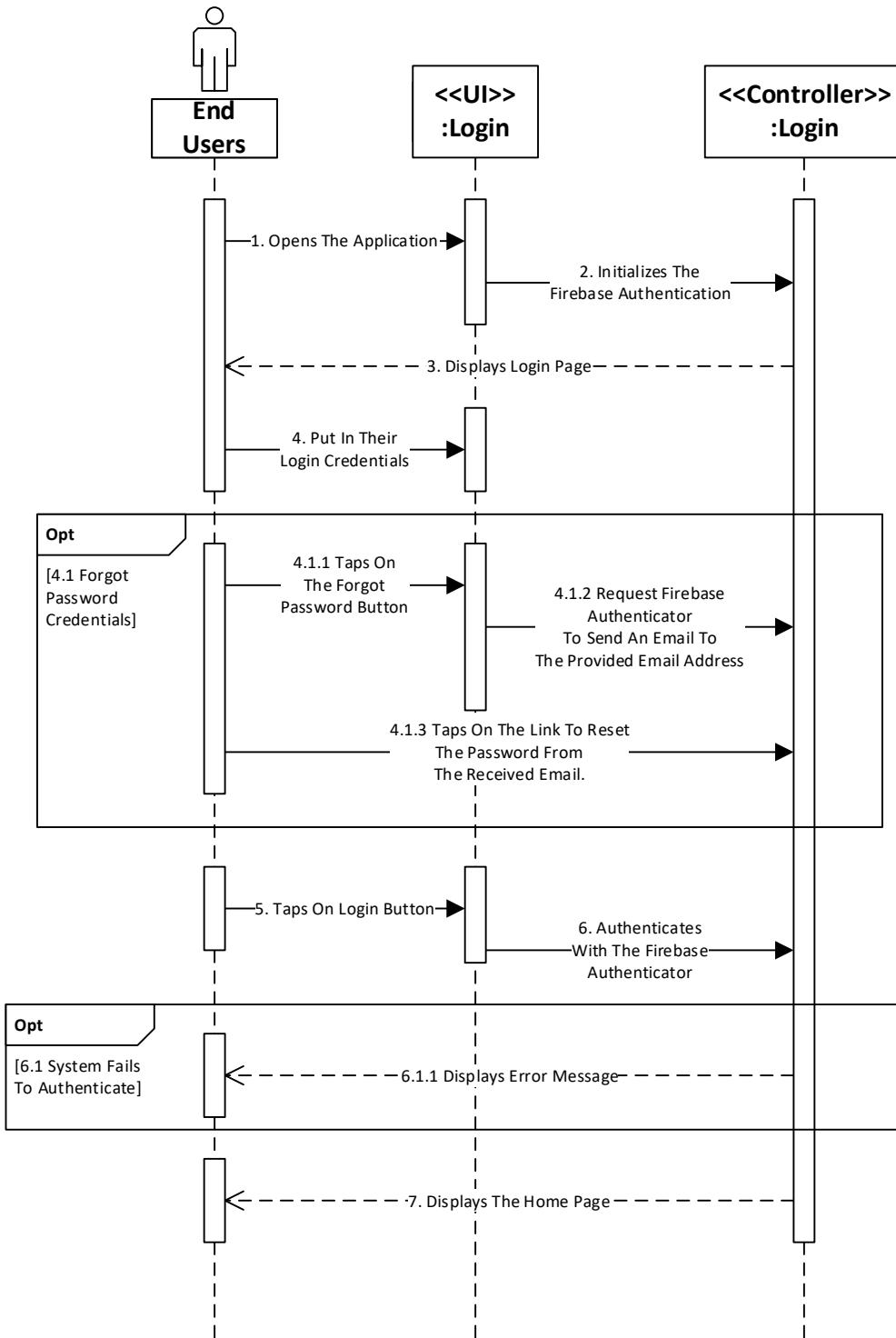


Figure 7-14: Sequence Diagram for Login

Logout

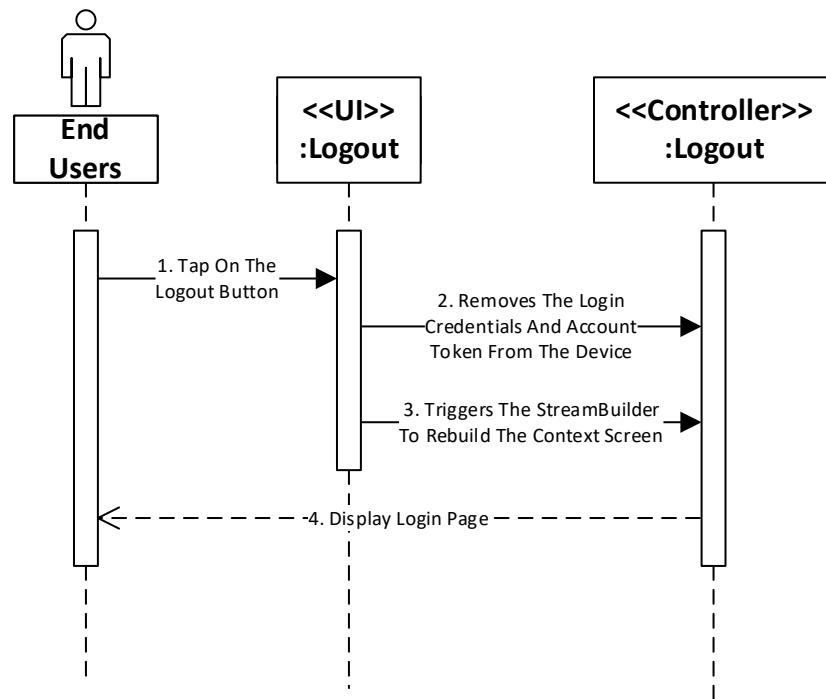


Figure 7-15: Sequence Diagram for Logout

Create Account

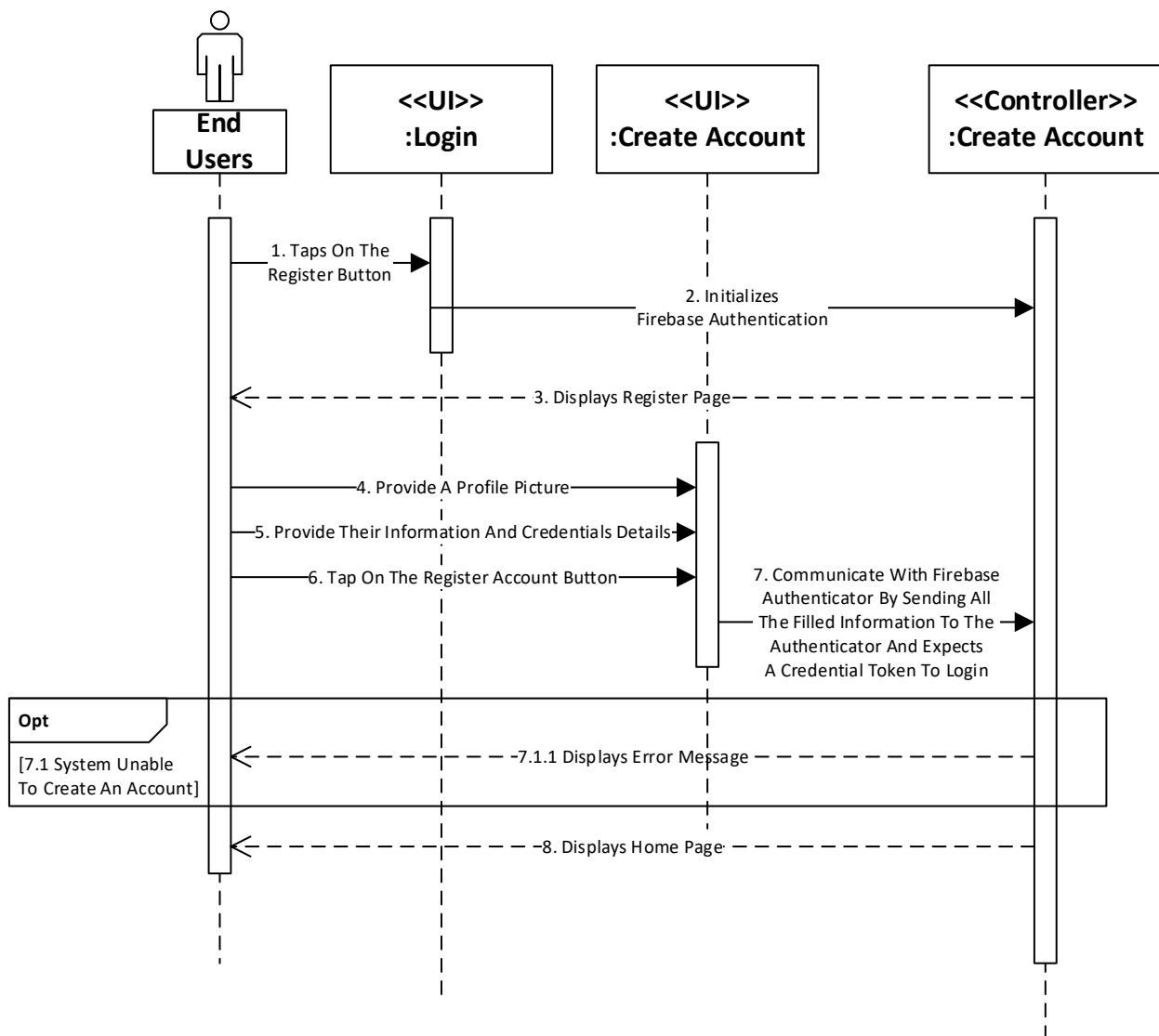


Figure 7-16: Sequence Diagram for Create Account

View Home Page

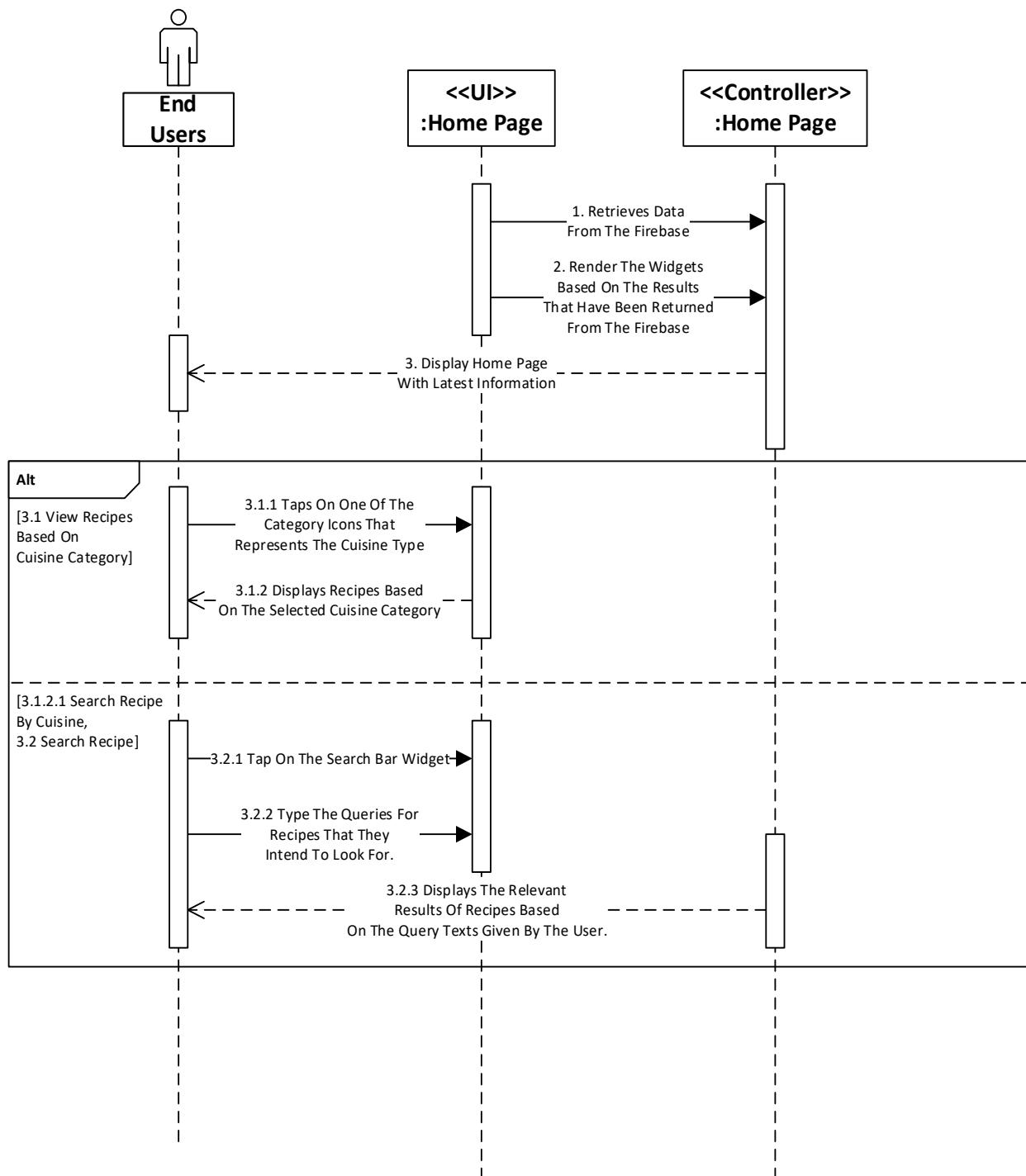


Figure 7-17: Sequence Diagram for View Home Page

Favorites Recipe

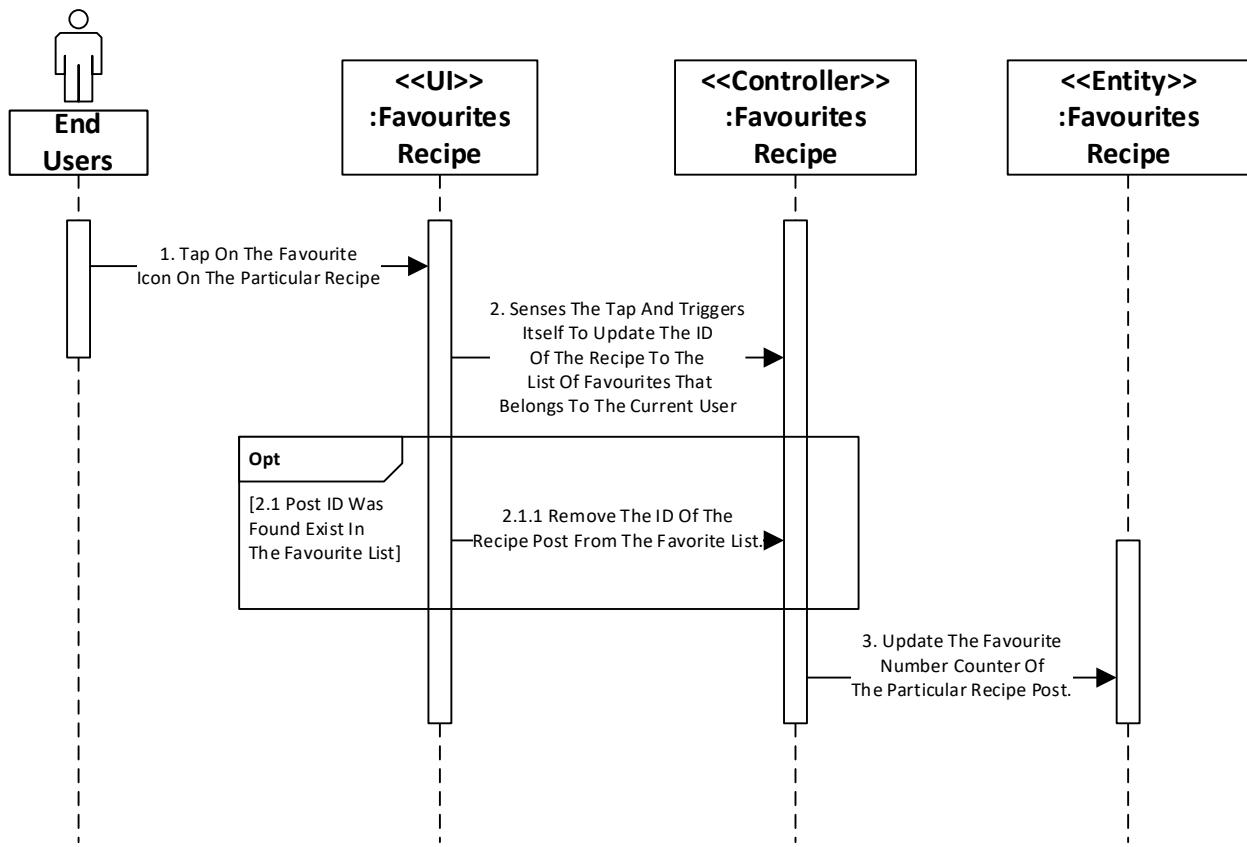


Figure 7-18: Sequence Diagram for Favorites Recipe

View Recipe Information

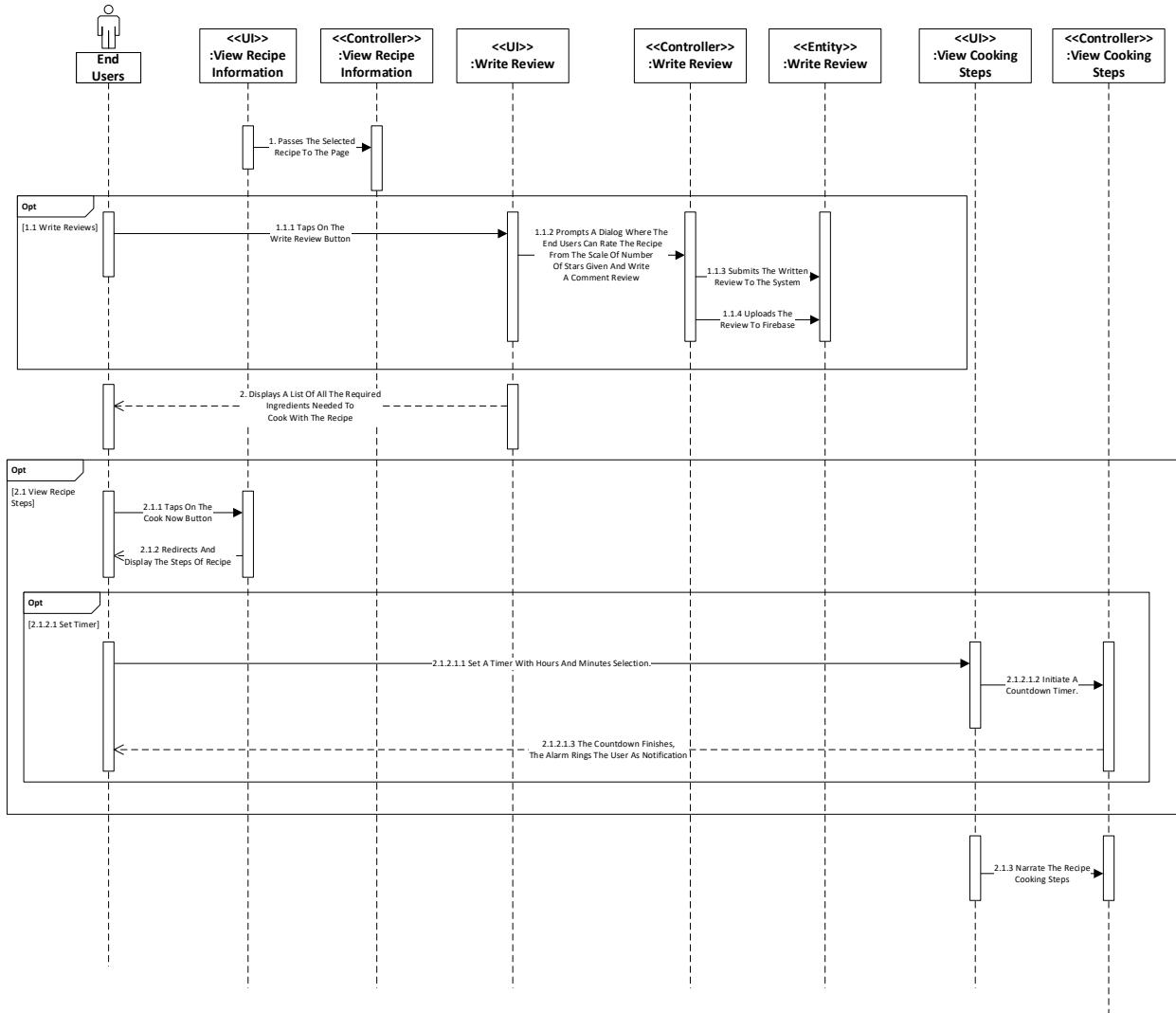


Figure 7-19: Sequence Diagram for View Recipe Information

Create Recipe

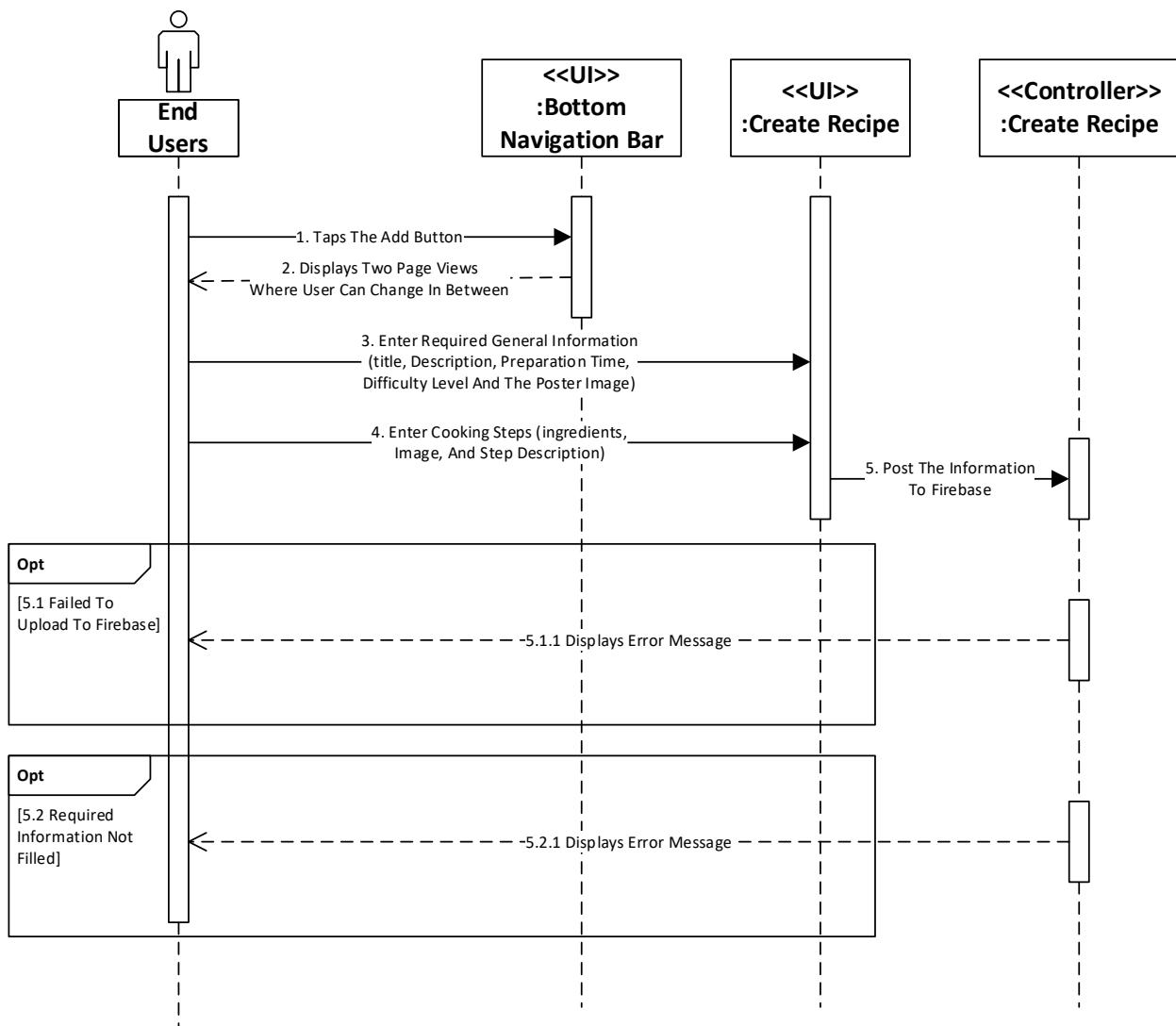


Figure 7-20: Sequence Diagram for Create Recipe

Edit Recipe

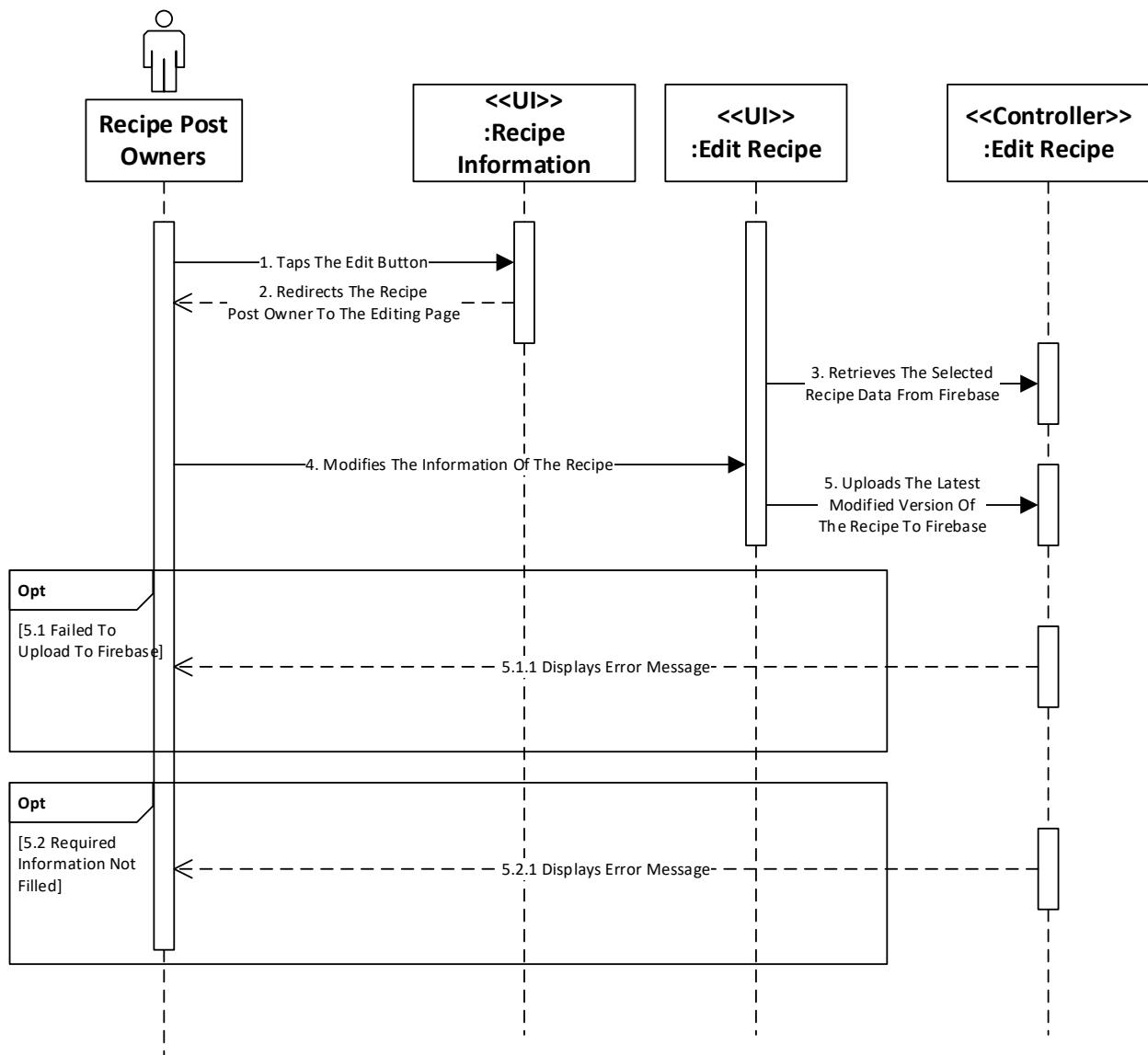


Figure 7-21: Sequence Diagram for Edit Recipe

Remove Recipe

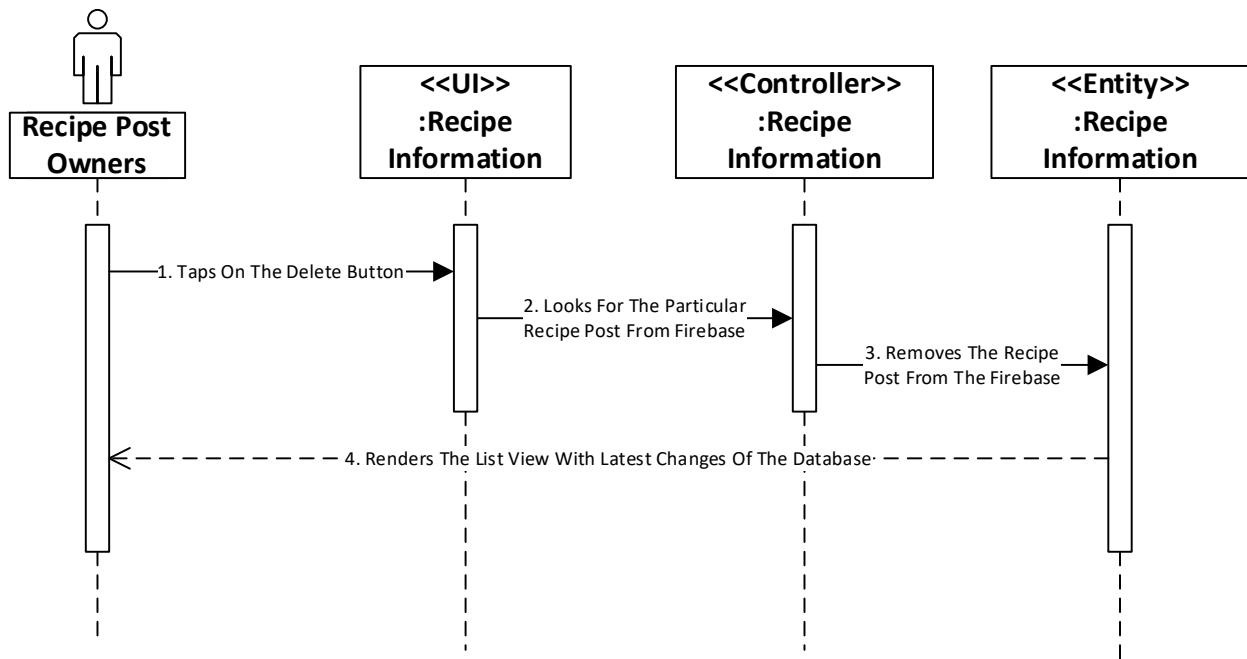


Figure 7-22: Sequence Diagram for Remove Recipe

View Profile Page

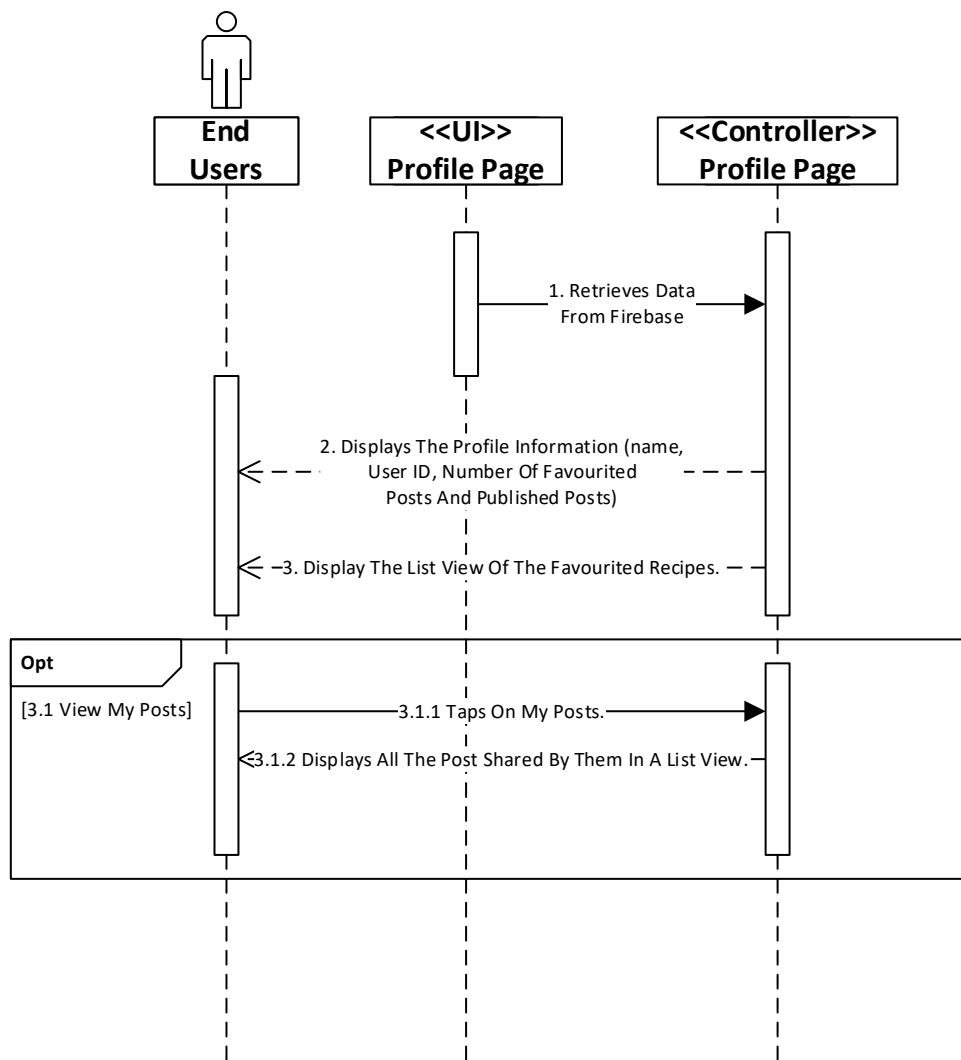


Figure 7-23: Sequence Diagram for View Profile Page

7.4 Database Diagram (No-SQL)

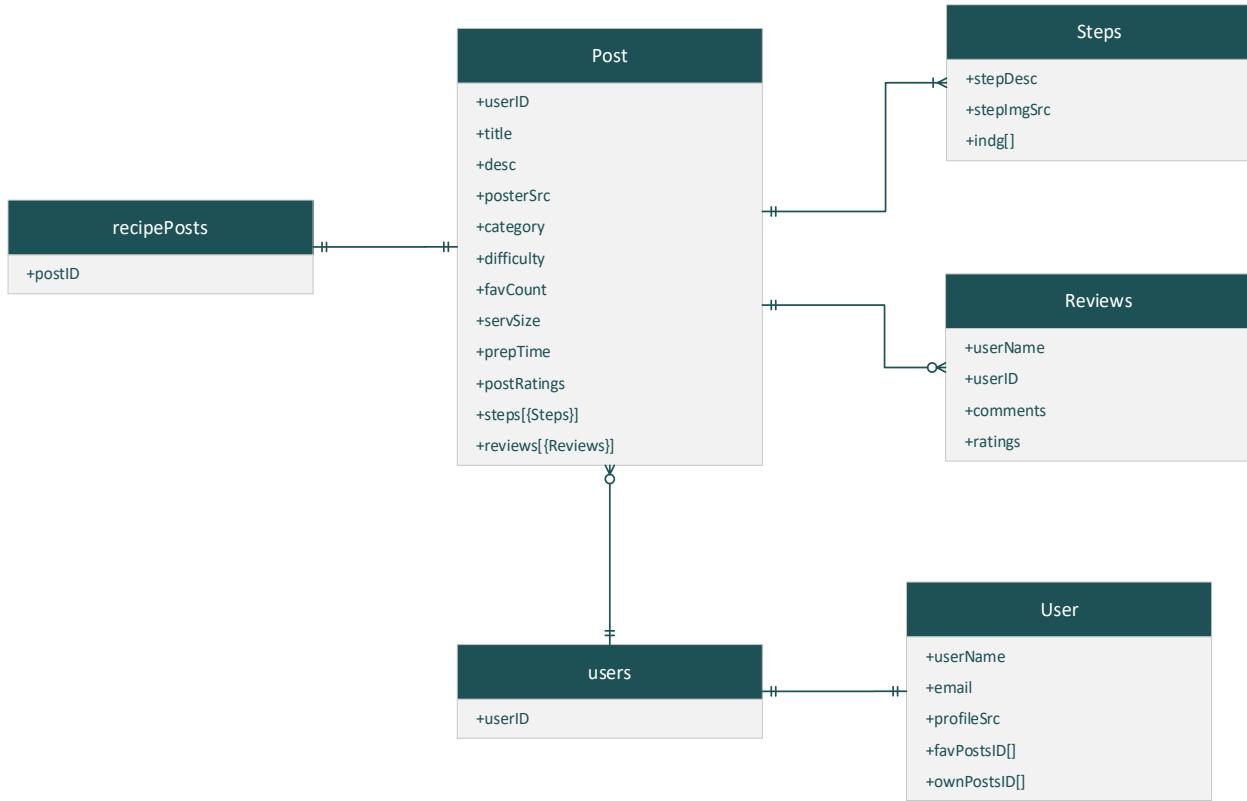


Figure 7-24: Database Diagram

In the recipe posts model, it holds the post ID where each post ID is used to represent a specific post object. A post object contains certain field values such as a user ID which is taken from the users model so that it knows which user it was who published the recipe post. Besides, it also holds some general fields like title, description, a poster source, category, difficulty levels, favorite counts, serving size as well as preparation time and ratings of the post itself from other users. Whereas for the steps and reviews list, it holds an object list from Steps object model and Reviews object model each respectively. In a Steps model, it contains values such as the step description, image source as well as a list of the ingredients. On the other hand, for Reviews model will hold fields to store the username and user ID who has reviewed the recipe post and the comments and ratings given as well. Speaking of the users model, each of them holds a user ID which represents a single User object. A User object will contain some basic data of each user with fields like username, email, profile image source, list of favorite post IDs and own published post IDs.

7.5 Interface Design

View Home Page

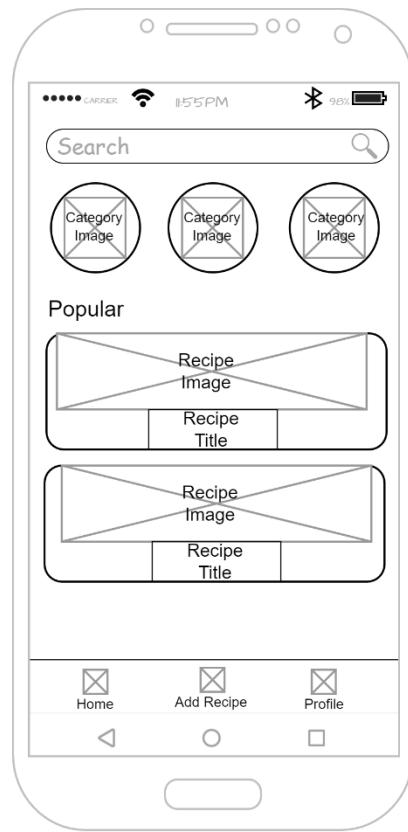


Figure 7-25: Interface Design for View Home Page

The main page of the application should contain several eye-catching yet impacting widgets that can deliver the most important contents to the users, hence in the main page is designed to hold widgets like icon buttons that allows users to view recipes based on cuisine categories filters and a short list of recipes that are currently most popular so that users can check out the current popular recipes.

View Profile Page

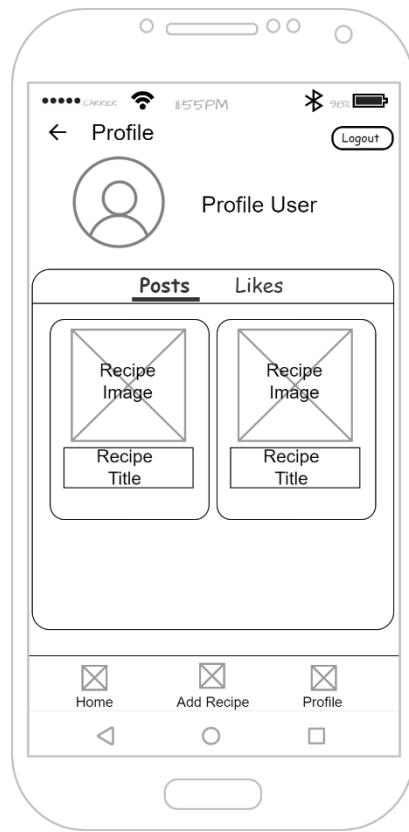


Figure 7-26: Interface Design for View Profile Page

The profile viewing page consists of some general information like the user's profile name, image as well as a log out button included so user may opt to logout if necessary. Other than that, recipe posts that the user has liked and published may also be viewed by switching between the tabs in the page.

Edit or Create Recipe Pages

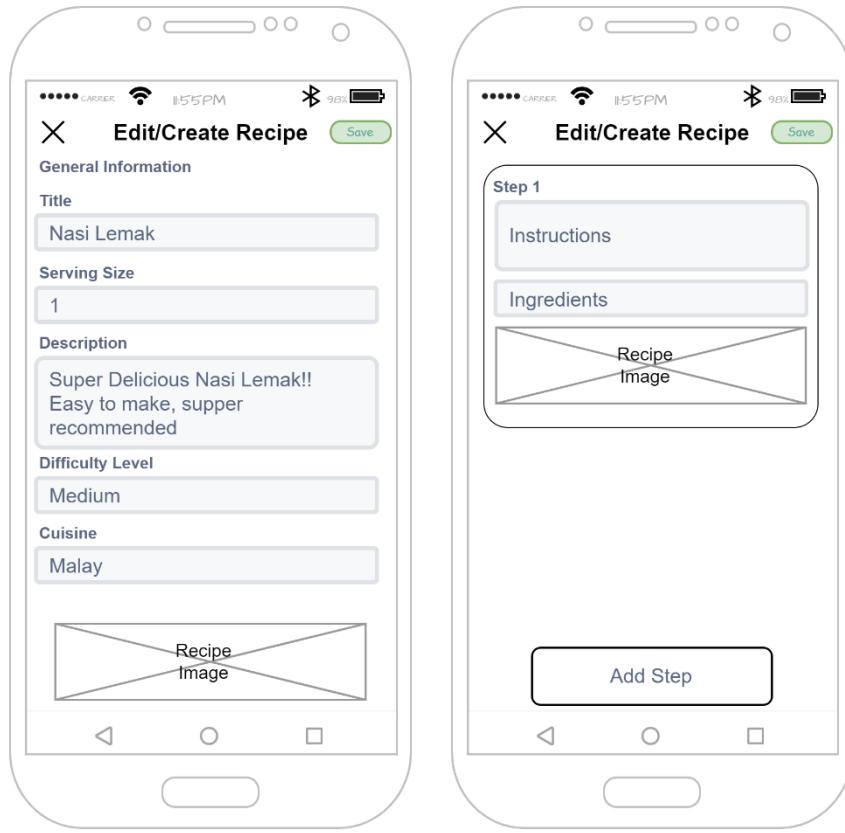


Figure 7-27: Interface Design for Edit or Create Recipe Pages

The edit and create recipe page view consists of two interchangeable pages where the first page view will be responsible to hold some general information like the title of the recipe, serving size, description, and difficulty level of the recipe so that other users may be prepared to know how hard it may be to prepare the same dish.

Search Recipe Page

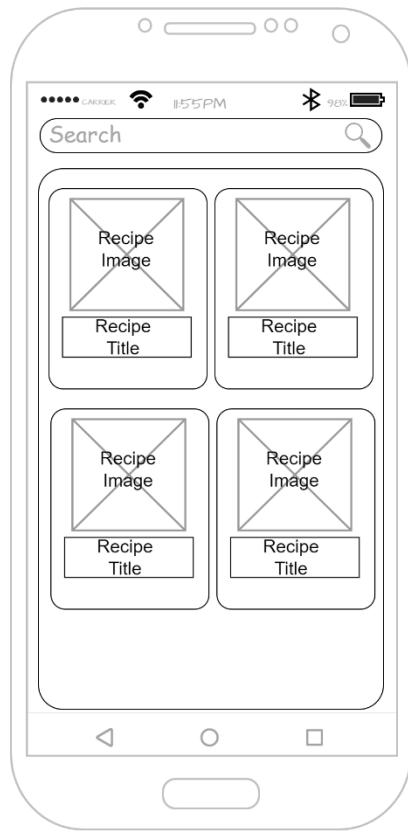


Figure 7-28: Interface Design for Search Recipe Page

In the search recipe page, it is designed with a search bar where users can input the relevant searching queries so that the application will look for identical searches and return it to user's view in a list, user interface for this page should remain simple yet efficient.

View Recipe Information Page

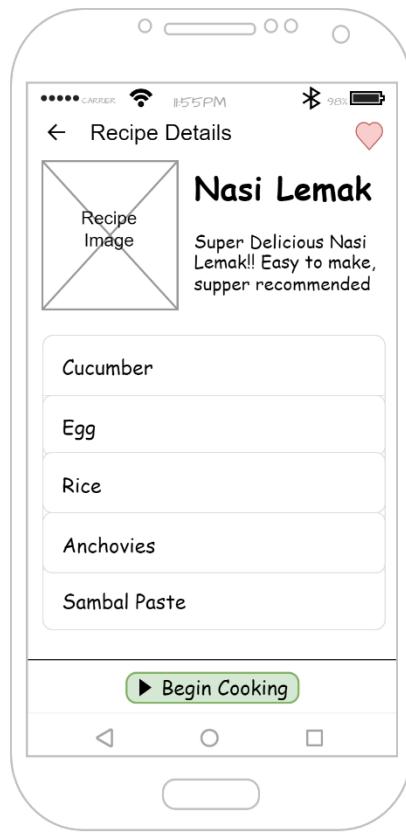


Figure 7-29: Interface Design for View Recipe Information Page

In view recipe information, it holds the general information of the recipe where users can view it all in one glace with information such as the poster image of the recipe post, title, description as well as a list of ingredients that may be required for the users to prepare to have if they would want to cook for the same dish.

View Cooking Steps Page

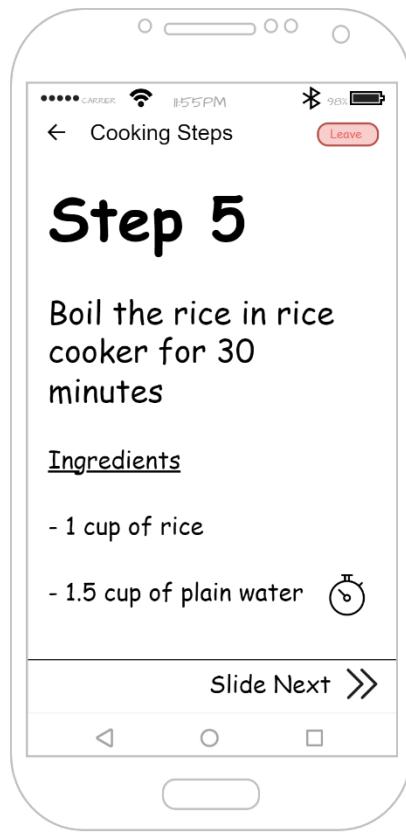


Figure 7-30: Interface Design for View Cooking Steps Page

The cooking steps page view can be changed forward and backward, with each page holding a single individual cooking step for the recipe. The page view also should contain instructions for each step as well as the ingredients needed.

Login Page

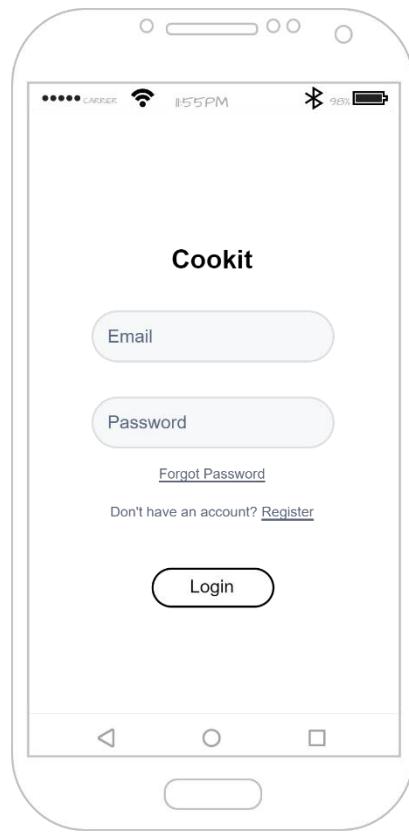


Figure 7-31: Interface Design for Login Page

The login page in the system will be designed to remain simple where essential widgets such as a text field for users to enter the email address and password should be placed. Users can login by tapping the login button and switch to register view if they do not have an account registered.

Create Account Page

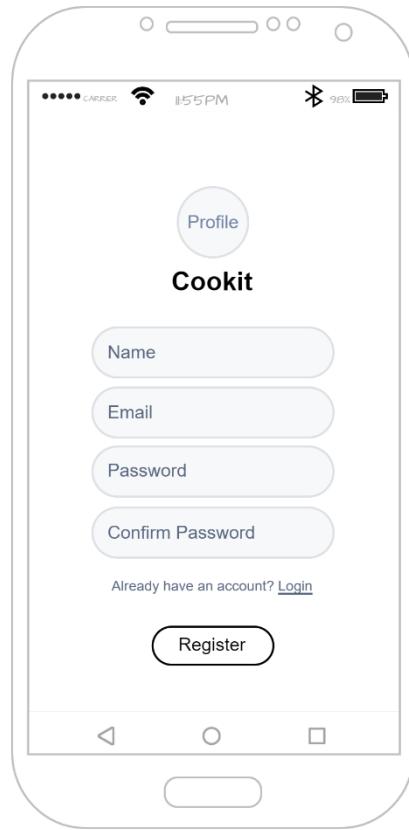


Figure 7-32: Interface Design for Create Account Page

In the register page, it requires user to put in some basic information of the user itself such as the name, email, password as well as a field for user to type the password for a second time for safety purpose so that it ensures user confirms of the password that it has chosen.

Chapter 8 : PROJECT PLAN

8.1 Release Plan

A release plan is a comprehensive document that encapsulates and tracks the system's features in each release phase. It should outline a product's vision and features. Release plans are often working papers used by developers to pipeline the software product and are intended to make the software roll out process more assembled and ordered. As a result, in this part, the developer will illustrate the difference in each version release.

Version 1.0 of Cookit

The first version of the Cookit application was planned to release on the first week in November 2022 whereby the following listed features and action plans are expected to be covered in this release version:

- Creates a view that can contains all the essential functions of the application such as a main screen, a profile viewing page and also a simple view design for adding recipes.
- Includes a bottom navigation bar that allows users to switch between pages that have been mentioned in the previous point above.
- Generate a simple Grid View and include them into the pages where recipes post is expected to be scrolled and viewed by the users.

Version 2.0 of Cookit

The second version of the Cookit application was planned to release on the second week in November 2022 whereby the following listed features and action plans are expected to be covered in this release version:

- Creates instances of Firebase Firestore, Firebase Storage and Firebase Authentication and integrated to the application
- Includes a view for users to login and register a user account if the end user does not have one.
- Added logout feature into the profile viewing page where users can make an option to logout from their credential account after they have logged in from the login page.

- Incorporates the Firebase Storage and Firebase Firestore instances to the add and modify recipe page so that users can upload their recipe or modify them if necessary.

Version 3.0 of Cookit

The third version of the Cookit application was planned to release on the third week in November 2022 whereby the following listed features and action plans are expected to be covered in this release version:

- Retrieves data from Firebase Firestore instance where the received data will also trigger the rendering of the widgets so that the application is always updated with latest provided data.
- Added the favouriting feature where once a user has favourited on the recipe post, the application will pass the trigger to the Firebase Firestore instance to notify that the user has added one recipe post to its favourite list as well as increasing the counter of the number of total favourites from other users for that particular recipe.
- Added the functionality of where the users can view the recipe details as well as control the page views of the cooking steps of the recipe with Proximity Sensor.

Version 4.0 of Cookit

The final version of the Cookit application was planned to release on the fourth week in November 2022 whereby the following listed features and action plans are expected to be covered in this release version:

- Improved User Interface and User Experience design of the application with theme design, icon design as well as widgets design.
- Added Text-To-Speech feature to the cooking steps page views where the application will automatically narrate the cooking steps in voice as an attempt to improve the UX design of the application.
- Added Splash Screen to the application on start up where the animated logo of the application will be shown when user initially opens up the Cookit app.

8.2 Test Plan

8.2.1 Test Plan for Unit Testing

Login Page

Case ID	Description	Test Condition	Expected Result	Actual Result	Pass/Fail
1.1	Enters an email address with invalid format	Email: -	Displays 'Please enter a valid email'		
1.2	Enters the password with invalid format	Password: -	Displays 'Must be longer than or equal to 6 characters'		
1.3	Does not enter the correct email	Email: test@mail.com	Displays 'No user record'		
1.4	Does not enter the correct password	Password: testing	Displays 'Must contain uppercase character'		
1.5	Shows the obscured password text	-	Displays the hidden entered password texts		
1.6	Enters the credentials with correct format and correct information	Email: mztang52@gmail.com Password: Mingze52	Redirects user to the home page screen		

Register Page

Case ID	Description	Test Condition	Expected Result	Actual Result	Pass/Fail
2.1	Does not provide a profile image	-	Displays 'Please Provide a Profile Picture'		
2.2	Does not enter the name	Name: -	Displays 'Must be equal or more than 2 characters'		
2.3	Does not enter an email address	Email: -	Displays 'Please enter a valid email'		
2.4	Does not enter the password	Password: -	Displays 'Must be longer than or equal to 6 characters'		
2.5	Enters the email with wrong format	Email: test@ mail.com	Displays 'Please enter a valid email'		
2.6	Enters the password and confirm password with wrong format	Password: testing	Displays 'Must contain uppercase character'		
2.7	Shows the obscured password text	-	Displays the hidden entered password texts		
2.8	Enters the credentials with correct format and provided a profile picture	Email: mztang52@gmail.com Password: Mingze52	Redirects user to the home page screen		

Forgot Password

Case ID	Description	Test Condition	Expected Result	Actual Result	Pass/Fail
3.1	Does not enter a valid email address	Email: -	Displays 'Please enter a valid email'		
3.2	Enters a valid email address	Email: mztang52@ gmail.com	Displays 'Password reset email has been sent' and email received by end user		

View Selected Recipe

Case ID	Description	Test Condition	Expected Result	Actual Result	Pass/Fail
4.1	Clicks ‘Ingredients’ tab on the tab bar	-	Displays the list of ingredients needed		
4.2	Clicks ‘Info’ tab on the tab bar	-	Displays the description of the recipe		
4.3	Clicks ‘Reviews’ tab on the tab bar	-	Displays the Reviews that have been commented by other users		

Favorite a Recipe

Case ID	Description	Test Condition	Expected Result	Actual Result	Pass/Fail
5.1	Clicks on the 'Favorite' icon on the recipes shown in home page	-	The favorite icon glows and counter increases by 1		
5.2	Clicks on the 'Favorite' icon on the recipes shown in the searching page	-	The favorite icon glows and counter increases by 1		
5.3	Clicks on the 'Favorite' icon on the recipes shown in the profile page	-	The favorite icon glows and counter increases by 1		
5.4	Clicks on the 'Favorite' icon in the specific recipe view page	-	The favorite icon glows		

Review a Recipe

Case ID	Description	Test Condition	Expected Result	Actual Result	Pass/Fail
6.1	Clicks on the 'Write Review' button	-	A dialog box for rating shows up		
6.2	Clicks on the closing button	-	Dialog box dismisses		
6.3	Submit with no star ratings and no comments given	Star: - Ratings: -	Submit button is disabled		
6.4	Submit with comments given but no star ratings	Star: - Ratings: Good	Submit button is disabled		
5.5	Submit with star ratings given but no comments	Star: 5.0 Ratings: -	Submitted review will show 'No Comment'		
5.6	Submit with star ratings and comments given	Star: 5.0 Ratings: Good	Submitted review will be shown in the review page		

View Recipe's Cooking Steps

Case ID	Description	Test Condition	Expected Result	Actual Result	Pass/Fail
7.1	Test Text-To-Speech when changing page	-	Text-To-Speech able to narrate instructions		
7.2	Change page using proximity sensor	Palm put near phone screen	Page view proceeds to next page		
7.3	Timer can ring a notification with a duration time set	Timer set at 5 seconds	Timer rings when timer reaches 0 second		
7.4	Page controls can direct the page view to a previous page	Clicks on the previous button	Page view change to previous page		
7.5	Page controls can direct the page view to next page	Clicks on the next button	Page view proceeds to next page		
7.6	Page controls do not allow users to move to previous page at the first page	Swipe page view to first page	Previous control button is disabled		
7.7	Page controls allows users to dismiss the page view at last page	Swipe page view to last page	Page view dismisses when 'Done' button is clicked		

Publish a Recipe

Case ID	Description	Test Condition	Expected Result	Actual Result	Pass/Fail
8.1	Clicks on Auto-Fill button with no recipe title given	-	Displays 'Please enter a title for recipe'		
8.2	Clicks on Auto Image switcher with no recipe title given	-	Displays 'Please enter a title for recipe'		
8.3	Submit with no recipe general information and cooking steps given	Title: - Description: - Category: - Recipe Image: - Steps: -	Displays 'Please Check If All Fields Are Filled Completely'		
8.4	Submit with no recipe cooking steps given but recipe general information given	Title: Test Description: test Category: Others Recipe Image: Attached Steps: -	Displays 'Please Check If All Fields Are Filled Completely'		
8.5	Submit with recipe general information and	Title: - Description: - Category: -	Displays 'Please Check If All Fields Are Filled Completely'		

	but no cooking steps given	Recipe Image: - Steps: Step 1, Step 2			
8.6	Submits with recipe general information and cooking steps given.	Title: Test Description: test Category: Others Recipe Image: Attached Steps: Step 1, Step 2	Displays 'Post Upload Successful'		

Edit a Recipe

Case ID	Description	Test Condition	Expected Result	Actual Result	Pass/Fail
9.1	Clicks on Auto-Fill button with no recipe title given	-	Displays 'Please enter a title for recipe'		
9.2	Clicks on Auto Image switcher with no recipe title given	-	Displays 'Please enter a title for recipe'		
9.3	Submit with no recipe general information and cooking steps given	Title: - Description: - Category: - Recipe Image: - Steps: -	Displays 'Please Check If All Fields Are Filled Completely'		
9.4	Submit with no recipe cooking steps given but recipe general information given	Title: Test Description: test Category: Others Recipe Image: Attached Steps: -	Displays 'Please Check If All Fields Are Filled Completely'		
9.5	Submit with recipe general information and but no cooking steps given	Title: - Description: - Category: - Recipe Image: -	Displays 'Please Check If All Fields Are Filled Completely'		

		Steps: Step 1, Step 2			
9.6	Submits with recipe general information and cooking steps given.	Title: Test Description: test Category: Others Recipe Image: Attached Steps: Step 1, Step 2	Displays 'Post Edit Successful'		

Delete a Recipe

Case ID	Description	Test Condition	Expected Result	Actual Result	Pass/Fail
10.1	Attempt to delete a recipe that is not posted by the user account	-	No delete option is displayed to the user		
10.2	Attempt to delete a recipe that is posted by the user account	-	Displays a delete button and recipe post deletes after clicking		

Search Recipe

Case ID	Description	Test Condition	Expected Result	Actual Result	Pass/Fail
11.1	Clicks on the search bar widget in home page	-	Directs to search page view		
11.2	Enters searching query in the search bar in search page	Search: Pasta	Shows the result of the query		
11.3	Clicks on the cuisine category icon in home page	-	Directs to search page of selected cuisine category		
11.4	Enters searching query in the search bar in selected category page	Search: Pasta	Shows the result of the query that belongs to the cuisine category		
11.5	Clicks on the dismiss button in the search bar to clear the query.	-	Search page shows all results without filtered		

8.2.2 Test Plan for User Acceptance Testing

Tester Name:						
Occupation:						
Date of Testing:						
System Objective:	Cookit is an application inspired by social media applications where it aims to target users especially teenagers and young adults to learn and share their cooking recipes and experience online. Cookit also aims to be revolutionary and a pioneer by integrating and transforming technologies such as controlling page switching with sensors and AI engine that has been quite a hot topic over the recent years to ensure that Cookit can be the center for content creating and content reading that will be loved and attracting younger generations to begin learning and master their cooking skills.					
S/N	Attributes	Legend: 0-Poor, 5-Excellent				
		1	2	3	4	5
1.	User Interface Design					
2.	Correctness & Completeness					
3.	Error-free					
4.	System Responsiveness					
5.	Layout & colors Consistency					
6.	Data Accuracy					
7.	Overall User Experience on App					
Feedbacks and Suggestions:						
Actions Taken from Developer:						

Signature (Tester): _____

Signature (Developer): _____

Chapter 9 : IMPLEMENTATION

9.1 System Screenshots

9.1.1 Login Page

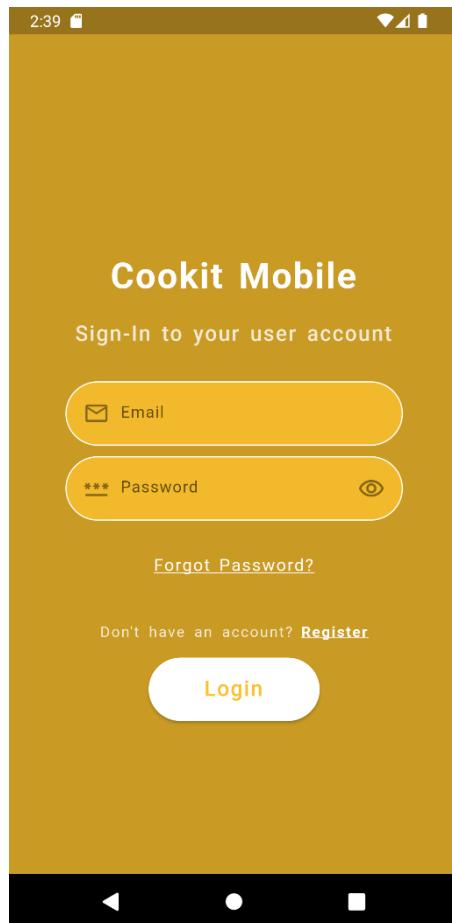


Figure 9-1: Screenshot of Login Page

Above is the screenshot of the system's login page where the user is required to put in their email address and password to authenticate their user account with the server. The user may also click on the forgot password button at the bottom of the text fields if they have lost their login password.

9.1.2 Register Page

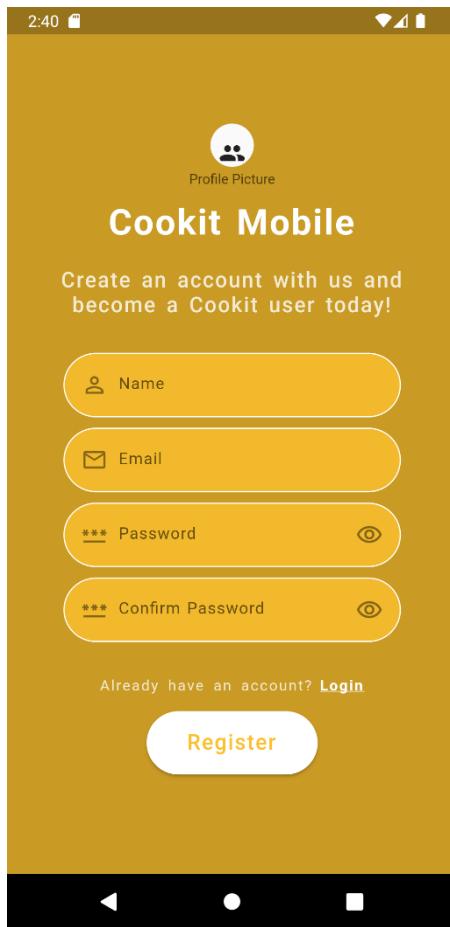


Figure 9-2: Screenshot of Register Page

The screenshot on top is an illustration of the actual register page where users would be required to provide a profile picture, name, email address, password, and a confirmed password prior before they can successfully register a user account with Cookit. The user may also choose to unhide the obscured password typed in the page so that they can view the password texts that they have typed into the application. The register page is made for the users who do not have an account with Cookit on prior.

9.1.3 Main Page

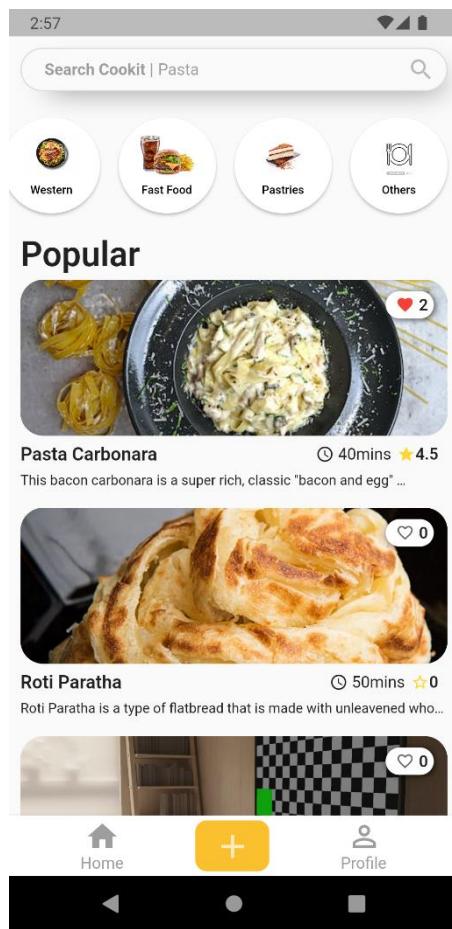


Figure 9-3: Screenshot of Main Page

Above shows a screenshot of the main page view in Cookit. At the top part of the page, it has a search widget with changeable texts to indicate users on what they can search with some sample food names. Below the search bar, it is a scrollable list of the cuisine categories where users can select on and view all the recipes that belong to the cuisine itself in [Cuisine Category Page](#). Other than that, a list of the popular dishes is also presented to the users with recipes that are ranked by the topmost favorited and reviewed recipe posts from other users.

9.1.4 Profile Viewing Pages

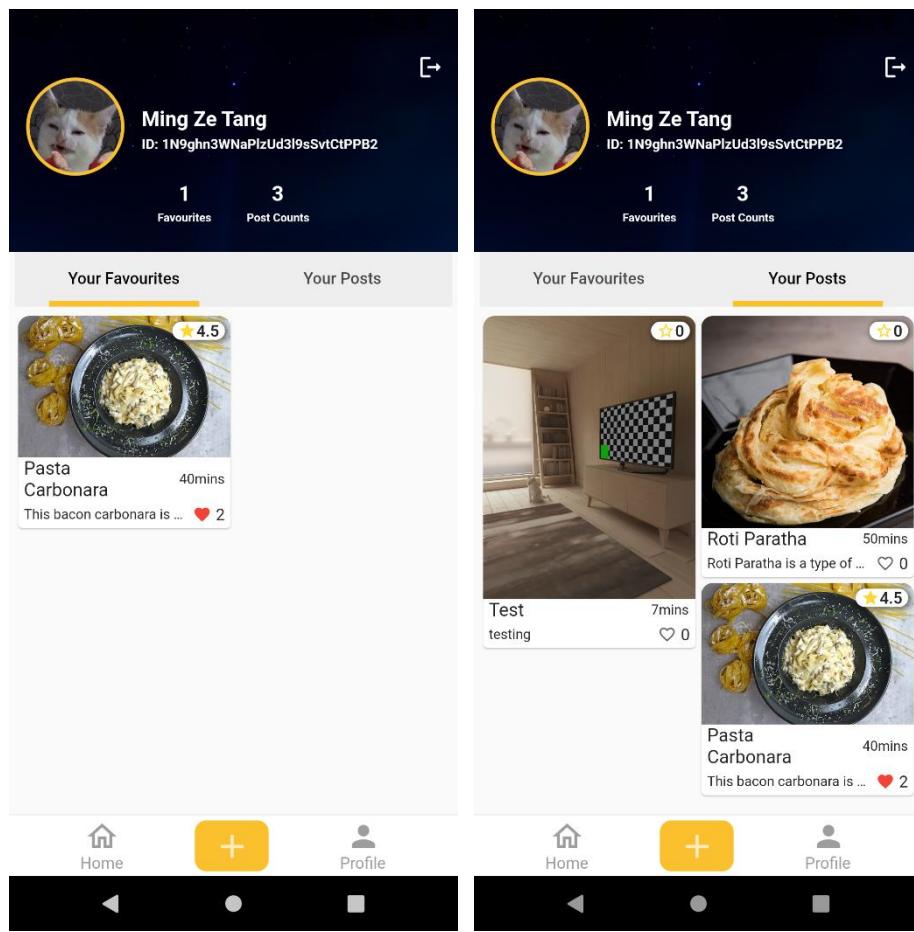


Figure 9-4: Screenshot of Profile Viewing Pages

In the profile viewing page, it is separated into two parts where the first tab will include all the favorite recipes that the users have added to their archive. Following the next tab is the posts that have been published by the user, from the screenshot above, it shows the view of all the recipe posts that were shared by the user. At the top part of the profile page view, it holds some general information of the user such as the name as well as the user ID along with a user profile image. A logout button is also available at the top right corner of the screen if user wish to log out their account from the application.

9.1.5 Search Pages

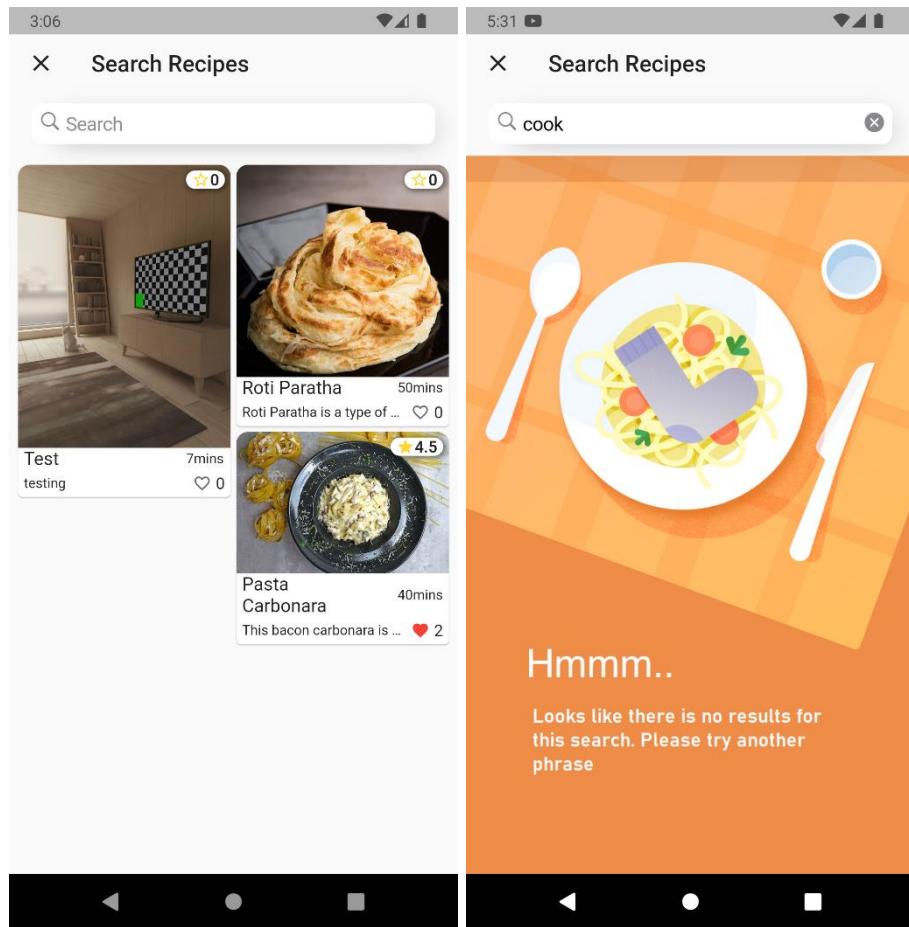


Figure 9-5: Screenshot of Searching Pages

In the search page, it has a search bar at the topmost part of the screen view. Users may enter a searching query text into the search bar so that the page can renders the list of recipe post views based on the returned result. If there are no relevant results found, then the system will return a page where it says there is no results for the current search.

9.1.6 Cuisine Category Page

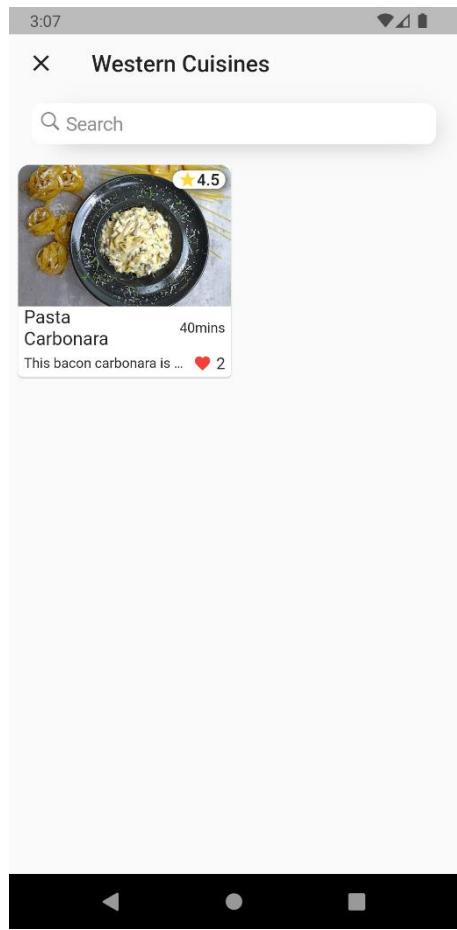


Figure 9-6: Screenshot of Cuisine Category Page

Similar just like how the Search Page looks, in the cuisine category page, the difference between the search page and the cuisine category page is that the results that are shown in this page are always only relevant to the selected cuisine category only.

9.1.7 Recipe Viewing Pages

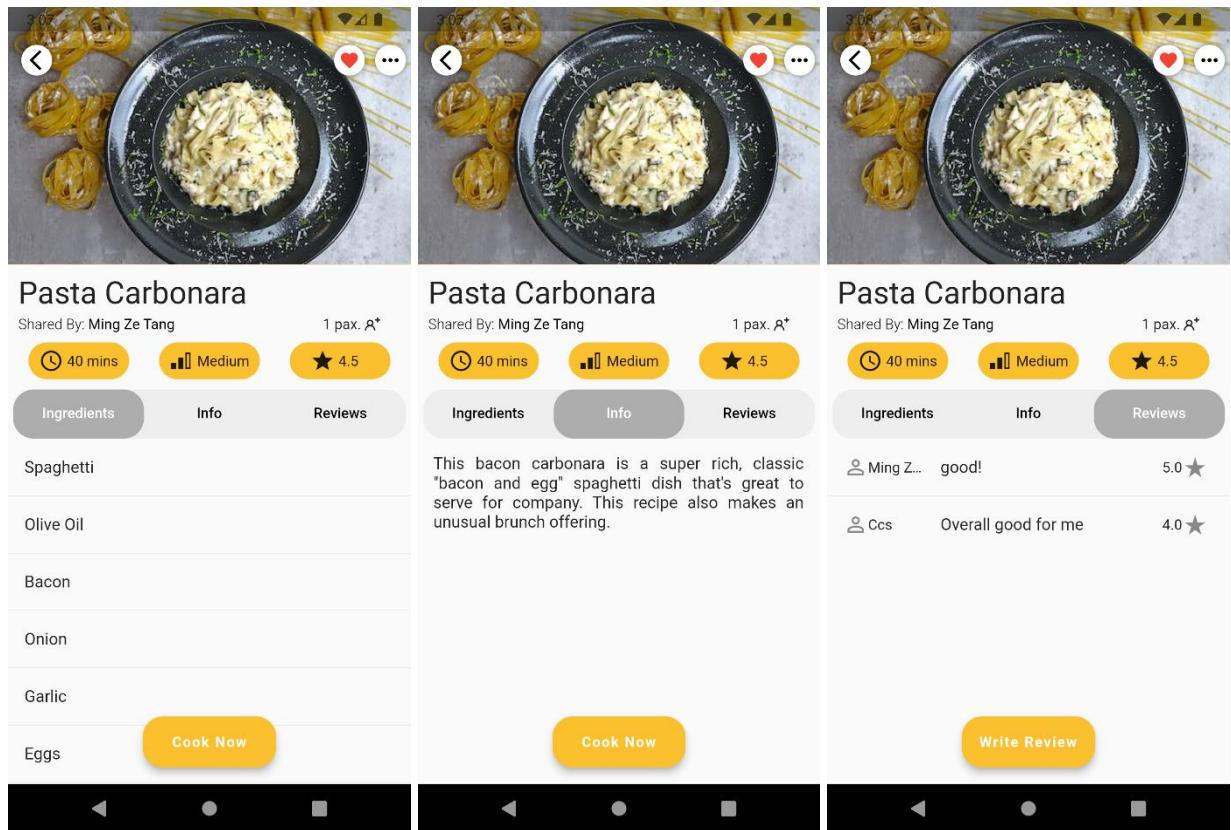


Figure 9-7: Screenshot of Recipe Viewing Pages

In the screenshots of the recipe viewing page shown above, the first tab displays all the required ingredients that the user would need to prepare before making the dish. On the second tab, it is a brief introduction of the description of the dish itself. It introduces to the users what the dish is and may include some other appropriate description of the recipe. Lastly in the third tab, it is a list of reviews that the user may check out to know what the other users may think about the recipe itself and to leave their honest opinion at [Recipe Rating Dialog](#).

9.1.8 Cooking Steps Pages

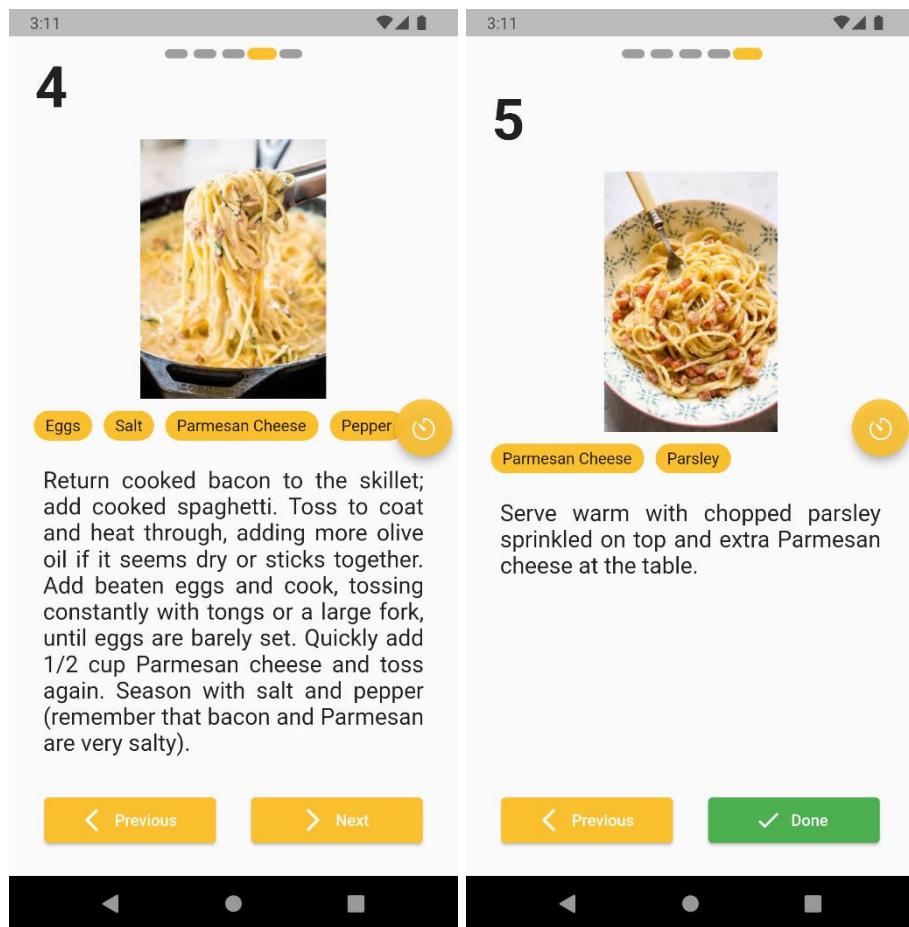


Figure 9-8: Screenshot of Cooking Steps Pages

In the cooking steps page, it contains a general view of each individual cooking steps with each page holding the image that the author has posted for the step, list of required ingredients, as well as a text of explanation of the cooking step. Control buttons are also put in place at the bottom most section in the page where users can use the buttons to control the page view whether to move forward or to the next page.

9.1.9 Recipe Rating Dialog

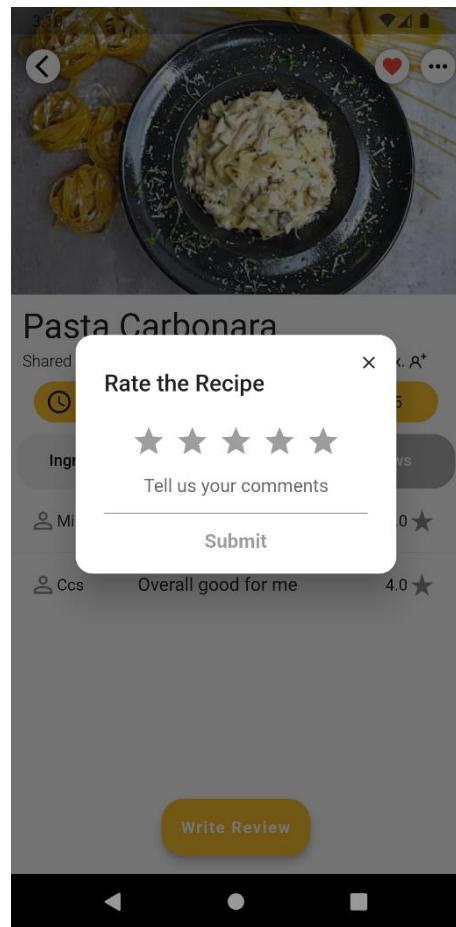


Figure 9-9: Screenshot of Recipe Rating Dialog

In the recipe rating dialog, it is a dialog where users can leave their reviews and ratings about the recipe. The star ratings are scaled from 1 to 5 with 1 star being the lowest point and 5 stars being the highest point. Comments are optional in the review dialog and to submit the ratings that they have given, user would only be required to click on the Submit button on the dialog.

9.1.10 Add/Modify Recipe Pages

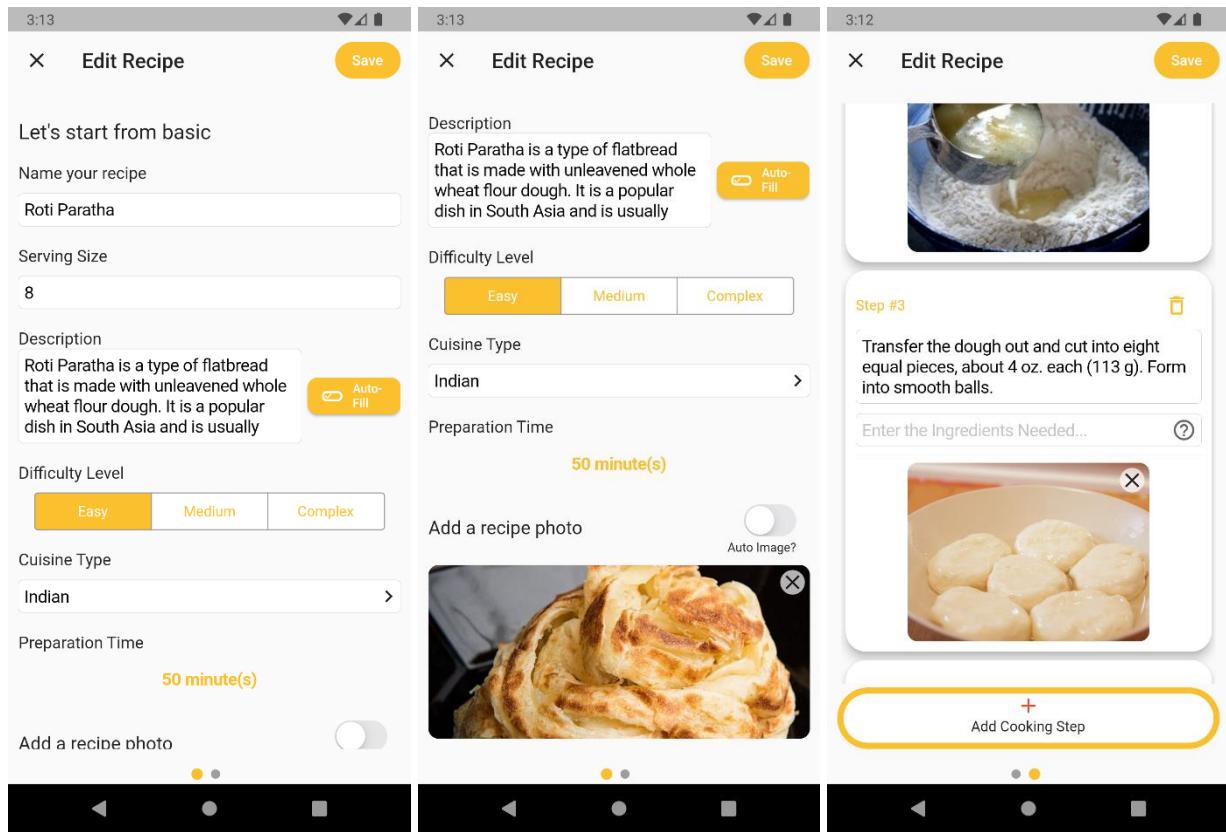


Figure 9-10: Screenshot of Add/Modify Recipe Pages

In the Add/Modify recipe page, it is where users can fill in the information of the recipe post that they are writing. In this section it is separated into two page views, the first page view will hold the necessary basic information of the recipe post such as a title, description, serving size, difficulty level, preparation time and a photo as poster image for the recipe post. Users may also choose to auto-fill at the description section if they are clueless or not feeling to type an over-lengthy description for the recipe post. An auto image switch is also available if the user does not have the poster image prepared beforehand. Moving towards to the second page view, it is where the users can fill in the cooking steps of the recipe. In this page, users may add a cooking step by clicking on the button at below or remove the particular by clicking on the delete button found in each step. Ingredients and instructions for the cooking steps need to be filled up by users to allow other followers to know what are needed to have and to do when coming to the cooking step. Lastly, users are also allowed to attach an image for each cooking step if they need to.

9.2 Sample Codes

9.2.1 Login

```
static void login(String email, String password, BuildContext ctx) async {
  try {
    authResult = await authInstance.signInWithEmailAndPassword(
      email: email, password: password);
  } on FirebaseAuthException catch (e) {
    ScaffoldMessenger.of(ctx).showSnackBar(
      SnackBar(
        content: Text('Error: ${e.message}'),
        backgroundColor: Theme.of(ctx).errorColor,
      ), // SnackBar
    );
  }
}
```

Figure 9-11: Sample Codes for Login

In the block of code above, it is used for authenticating a user's login. It fetches some data that are commonly required for authenticating a login which are the email and password. The consumed data will then be passed to the authentication instance with the authentication result cached back to the variable named authResult. If there is an error during the login, then a snack bar message will pop up to the user.

9.2.2 Register

```

static void register(String email, String password, String confirmPassword,
|   String username, File? profile, BuildContext ctx) async {
|   if (profile == null) {
|     ScaffoldMessenger.of(ctx).showSnackBar(SnackBar(
|       content: Text('Please Provide a Profile Picture!'),
|       backgroundColor: Theme.of(ctx).errorColor,
|     )); // SnackBar
|     return;
|   }

|   if (password != confirmPassword) {
|     ScaffoldMessenger.of(ctx).showSnackBar(SnackBar(
|       content: Text('Password Entered are Different!'),
|       backgroundColor: Theme.of(ctx).errorColor,
|     )); // SnackBar
|     return;
|   }

|   try {
|     authResult = await authInstance.createUserWithEmailAndPassword(
|       email: email, password: password);

|     final ref = cloudInstance
|       .ref()
|       .child('userPhoto')
|       .child('${authResult.user!.uid}.jpg');

|     await ref.putFile(profile);

|     final profileURL = await ref.getDownloadURL();

|     authInstance.currentUser!.updatePhotoURL(profileURL);
|     authInstance.currentUser!.updateDisplayName(username);

|     await dbInstance
|       .collection('users')
|       .withConverter(
|         fromFirestore: Users.fromFirestore,
|         toFirestore: (Users userItem, options) => userItem.toFirestore(),
|       )
|       .doc(authResult.user!.uid)
|       .set(Users(userName: username, email: email, profileSrc: profileURL));

|   } on PlatformException catch (error) {
|     if (error.message != null) {
|       ScaffoldMessenger.of(ctx).showSnackBar(SnackBar(
|         content: Text(error.message.toString()),
|         backgroundColor: Theme.of(ctx).errorColor,
|       )); // SnackBar
|     }
|   }
| }

```

Figure 9-12: Sample Codes for Register

In the register block of function codes, firstly it checks for if the profile image of the user is at null then it also checks for the similarity of the password and the confirmed password given. If the condition fails for one of these two validations, then the system will pop up a snack bar to tell user

of the errors. Otherwise, the function will proceed further to try registering for a user account with the given email address and password. Once done, the system will then upload the provided profile picture to Firebase Storage and retrieve a download link. The link of the profile image and the user's name given will be passed on to update into the instance of the current user. Upon completion, the Firestore database will then be called to upload the user data that was newly created and store it into the database for keeping purpose. Given the situation that if anything has gone wrong during the entire execution, then the catch trigger will be activated and show a snack bar message with the error message retrieved from the Firebase.

9.2.3 Forgot Password

```
static void forgotPassword(String email, BuildContext ctx) async {
  if (email.trim() != '') {
    try {
      await authInstance
        .sendPasswordResetEmail(email: email.trim())
        .then((_) {
      return ScaffoldMessenger.of(ctx).showSnackBar(
        SnackBar(
          content: Text('Password Reset Email Has Been Sent!'),
          backgroundColor: Colors.green[700],
        ), // SnackBar
      );
    });
  } on FirebaseAuthException catch (e) {
    ScaffoldMessenger.of(ctx).showSnackBar(
      SnackBar(
        content: Text('Error: ${e.message}'),
        backgroundColor: Theme.of(ctx).errorColor,
      ), // SnackBar
    );
  }
} else {
  ScaffoldMessenger.of(ctx).showSnackBar(SnackBar(
    content: Text('Please Enter an Email Address!'),
    backgroundColor: Theme.of(ctx).errorColor,
  )); // SnackBar
}
```

Figure 9-13: Sample Codes for Forgot Password

In the lines of code for forgot password, the system will initially trim off the email to identify if the email address given is an empty value after removing white spaces from the email address, the code will not be executed ask the user to provide an email address if found empty after trimming. Otherwise, the system will first try to make a request for sending one password reset email from the authentication instance. If successful, then a snack bar will be popped to notify the user about the execution being successful, else it will notify user with an error message.

9.2.4 Favorite Controller

```
static void addToFav(String postID) {
    dbInstance
        .collection('users')
        .doc(Config.authInstance.currentUser!.uid)
        .update({
            'favPostsID': FieldValue.arrayUnion([postID])
        });
    dbInstance
        .collection('recipePosts')
        .doc(postID)
        .update({'favCount': FieldValue.increment(1)});
}

static void removeFromFav(String postID) {
    dbInstance
        .collection('users')
        .doc(Config.authInstance.currentUser!.uid)
        .update({
            'favPostsID': FieldValue.arrayRemove([postID])
        });
    dbInstance
        .collection('recipePosts')
        .doc(postID)
        .update({'favCount': FieldValue.increment(-1)});
```

Figure 9-14: Sample Codes for Favorite Controller

In the favorite controller, it contains two blocks of function codes where the first one being used to add the post to favorite and the other being used to remove the post from favorite list. Both operations are similar except that adding a post to favorite will result in binding the post ID in union with the existing list of favorite posts and increase the favorite counter of the recipe to raise by 1. Similarly, for removing the post from favorite list will be done by calling an array remove function to remove the post ID from the list of favorites while the favorite counter of the recipe post to decrease by value of 1.

9.2.5 Open AI

```
class OpenAI {  
    //create new client for AI  
    final smartAIClient = OpenAIClient(  
        configuration: const OpenAIConfiguration(  
            apiKey: 'sk-g0oQvbucN8GKTNZUzw9vT3B1bkFJGRmzb2UOX6pPI816UJLt',  
        )); // OpenAIConfiguration // OpenAIClient  
  
    Future<String> generateResult(String query) async {  
        final completion = await smartAIClient.completions  
            .create(  
                model: 'text-davinci-003',  
                prompt: query,  
                temperature: 0.7,  
                maxTokens: 300,  
            )  
            .data;  
        return completion.choices.first.text.replaceAll('\n', '');  
    }  
}
```

Figure 9-15: Sample Codes for Open AI Integration

In the Open AI block of code, it first creates the instance of the Open AI client instance with configuration attached with an API key. Once the client instance has been successfully created, then the user may call for generated results based on the query given. The model of the AI system used is called text-davinci-003 which is one of the latest and most consistent AI model engines developed in Open AI system. A temperature value is set to tell the Open AI that each time a request is made, the result generated will largely be different from the previous written text. The highest number of temperature is 1 while lowest being at 0, the higher the temperature is, the larger the degree of difference it is for the generated results each time the same query is called.

9.2.6 Dynamic Card List for Cooking Steps

```
//=====Card-List=====

class MyCardList extends GetxController {
  var steps = <TextEditingController>[];
  var indg = <TextEditingController>[];
  var cards = <MyCard>[].obs;
  var imageFiles = <File?>[].obs;
  var imageURL = <String?>[];
  /* -----
  MyCardList();
  * -----
  */
  void addCard() {
    cards.add(MyCard());
    steps.add(TextEditingController());
    indg.add(TextEditingController());
    imageFiles.add(null);
    imageURL.add('');
  }

  void delCard(int index) {
    cards.removeAt(index);
    steps[index].dispose();
    indg[index].dispose();
    steps.removeAt(index);
    indg.removeAt(index);
    imageFiles.removeAt(index);
    imageURL.removeAt(index);
  }
}
```

Figure 9-16: Sample Codes for Dynamic Card List for Cooking Steps (card list)

```
Expanded(
  child: Container(
    padding: const EdgeInsets.all(4),
    child: Scrollbar(
      child: Obx(
        () => ListView.builder(
          itemCount: widget.cardList.cards.length,
          itemBuilder: (context, index) =>
            | | | widget.cardList.cards[index],
        ), // ListView.builder
      ), // Obx
    ), // Scrollbar
  ), // Container
), // Expanded
```

Figure 9-17: Sample Codes for Dynamic Card List for Cooking Steps (card widget)

In the codes shared above displays the MyCardList class as well as the card widget itself in a widget builder. In the first image, it is creating a memory instance for holding the steps, ingredients, cards and imageFiles or imageURL for each individual card of steps with an active observer to observe for any data changes. While a card needs to be added to the list view, the system will always listen for updates from the observer using Obx, which is very useful for helping the

developer to perform state management related activities within the page so that the system does not need to constantly call for set state when there are little updates. On the other picture it shows how the list view is wrapped with an Obx instance to look for any value updates and renders the widgets each time the data changes.

9.2.7 Page Control with Proximity Sensor

```
///////////////////////////////Proximity Sensor/////////////////////
Future<void> listenSensor() async {
  FlutterError.onError = (FlutterErrorDetails details) {
    if (foundation.kDebugMode) {
      FlutterError.dumpErrorToConsole(details);
    }
  };
  _streamSubscription = ProximitySensor.events.listen((int event) {
    setState(() {
      _pageIndex < widget.selectedPost.steps!.length - 1
        ? _pageIndex += event
        : _pageIndex = _pageIndex;
    });
    pageController.animateToPage(_pageIndex,
      duration: Duration(milliseconds: 300), curve: Curves.easeIn);
  });
}
```

Figure 9-18: Sample Codes for Page Control with Proximity Sensor

Coming to the page control with proximity sensor, here will briefly go through with the lines of code that makes the page switching with a hand gesture in air being made possible. Firstly, it is checking if there are any errors that are required to be dumped in the debugger as sensors might fail on initial due to sensor broken, unavailable or currently being used by other application. If it is cleared of any errors, then the stream subscription will start listening for sensor changes and perform a set state to refresh for the latest updates and increase the page index by a counter of 1 as to trigger the page switching process.

Chapter 10 : SYSTEM VALIDATION

10.1 Unit Testing

Login Page

Case ID	Description	Test Condition	Expected Result	Actual Result	Pass/Fail
1.1	Enters an email address with invalid format	Email: -	Displays 'Please enter a valid email'	As Expected	Pass
1.2	Enters the password with invalid format	Password: -	Displays 'Must be longer than or equal to 6 characters'	As Expected	Pass
1.3	Does not enter the correct email	Email: test@mail.com	Displays 'No user record'	As Expected	Pass
1.4	Does not enter the correct password	Password: testing	Displays 'Must contain uppercase character'	As Expected	Pass
1.5	Shows the obscured password text	-	Displays the hidden entered password texts	As Expected	Pass
1.6	Enters the credentials with correct format and correct information	Email: mztang52@gmail.com Password: Mingze52	Redirects user to the home page screen	As Expected	Pass

Register Page

Case ID	Description	Test Condition	Expected Result	Actual Result	Pass/Fail
2.1	Does not provide a profile image	-	Displays 'Please Provide a Profile Picture'	As Expected	Pass
2.2	Does not enter the name	Name: -	Displays 'Must be equal or more than 2 characters'	As Expected	Pass
2.3	Does not enter an email address	Email: -	Displays 'Please enter a valid email'	As Expected	Pass
2.4	Does not enter the password	Password: -	Displays 'Must be longer than or equal to 6 characters'	As Expected	Pass
2.5	Enters the email with wrong format	Email: test@ mail.com	Displays 'Please enter a valid email'	As Expected	Pass
2.6	Enters the password and confirm password with wrong format	Password: testing	Displays 'Must contain uppercase character'	As Expected	Pass
2.7	Shows the obscured password text	-	Displays the hidden entered password texts	As Expected	Pass
2.8	Enters the credentials with correct format and provided a profile picture	Email: mztang52@gmail.com Password: Mingze52	Redirects user to the home page screen	As Expected	Pass

Forgot Password

Case ID	Description	Test Condition	Expected Result	Actual Result	Pass/Fail
3.1	Does not enter a valid email address	Email: -	Displays 'Please enter a valid email'	As Expected	Pass
3.2	Enters a valid email address	Email: mztang52@ gmail.com	Displays 'Password reset email has been sent' and email received by end user	As Expected	Pass

View Selected Recipe

Case ID	Description	Test Condition	Expected Result	Actual Result	Pass/Fail
4.1	Clicks ‘Ingredients’ tab on the tab bar	-	Displays the list of ingredients needed	As Expected	Pass
4.2	Clicks ‘Info’ tab on the tab bar	-	Displays the description of the recipe	As Expected	Pass
4.3	Clicks ‘Reviews’ tab on the tab bar	-	Displays the Reviews that have been commented by other users	As Expected	Pass

Favorite a Recipe

Case ID	Description	Test Condition	Expected Result	Actual Result	Pass/Fail
5.1	Clicks on the 'Favorite' icon on the recipes shown in home page	-	The favorite icon glows and counter increases by 1	As Expected	Pass
5.2	Clicks on the 'Favorite' icon on the recipes shown in the searching page	-	The favorite icon glows and counter increases by 1	As Expected	Pass
5.3	Clicks on the 'Favorite' icon on the recipes shown in the profile page	-	The favorite icon glows and counter increases by 1	As Expected	Pass
5.4	Clicks on the 'Favorite' icon in the specific recipe view page	-	The favorite icon glows	As Expected	Pass

Review a Recipe

Case ID	Description	Test Condition	Expected Result	Actual Result	Pass/Fail
6.1	Clicks on the ‘Write Review’ button	-	A dialog box for rating shows up	As Expected	Pass
6.2	Clicks on the closing button	-	Dialog box dismisses	As Expected	Pass
6.3	Submit with no star ratings and no comments given	Star: - Ratings: -	Submit button is disabled	As Expected	Pass
6.4	Submit with comments given but no star ratings	Star: - Ratings: Good	Submit button is disabled	As Expected	Pass
6.5	Submit with star ratings given but no comments	Star: 5.0 Ratings: -	Submitted review will show ‘No Comment’	As Expected	Pass
6.6	Submit with star ratings and comments given	Star: 5.0 Ratings: Good	Submitted review will be shown in the review page	As Expected	Pass

View Recipe's Cooking Steps

Case ID	Description	Test Condition	Expected Result	Actual Result	Pass/Fail
7.1	Test Text-To-Speech when changing page	-	Text-To-Speech able to narrate instructions	As Expected	Pass
7.2	Change page using proximity sensor	Palm put near phone screen	Page view proceeds to next page	As Expected	Pass
7.3	Timer can ring a notification with a duration time set	Timer set at 5 seconds	Timer rings when timer reaches 0 second	As Expected	Pass
7.4	Page controls can direct the page view to a previous page	Clicks on the previous button	Page view change to previous page	As Expected	Pass
7.5	Page controls can direct the page view to next page	Clicks on the next button	Page view proceeds to next page	As Expected	Pass
7.6	Page controls do not allow users to move to previous page at the first page	Swipe page view to first page	Previous control button is disabled	As Expected	Pass
7.7	Page controls allows users to dismiss the page view at last page	Swipe page view to last page	Page view dismisses when 'Done' button is clicked	As Expected	Pass

Publish a Recipe

Case ID	Description	Test Condition	Expected Result	Actual Result	Pass/Fail
8.1	Clicks on Auto-Fill button with no recipe title given	-	Displays 'Please enter a title for recipe'	As Expected	Pass
8.2	Clicks on Auto Image switcher with no recipe title given	-	Displays 'Please enter a title for recipe'	As Expected	Pass
8.3	Submit with no recipe general information and cooking steps given	Title: - Description: - Category: - Recipe Image: - Steps: -	Displays 'Please Check If All Fields Are Filled Completely'	As Expected	Pass
8.4	Submit with no recipe cooking steps given but recipe general information given	Title: Test Description: test Category: Others Recipe Image: Attached Steps: -	Displays 'Please Check If All Fields Are Filled Completely'	As Expected	Pass
8.5	Submit with recipe general information and	Title: - Description: - Category: -	Displays 'Please Check If All Fields Are Filled Completely'	As Expected	Pass

	but no cooking steps given	Recipe Image: - Steps: Step 1, Step 2			
8.6	Submits with recipe general information and cooking steps given.	Title: Test Description: test Category: Others Recipe Image: Attached Steps: Step 1, Step 2	Displays 'Post Upload Successful'	As Expected	Pass

Edit a Recipe

Case ID	Description	Test Condition	Expected Result	Actual Result	Pass/Fail
9.1	Clicks on Auto-Fill button with no recipe title given	-	Displays 'Please enter a title for recipe'	As Expected	Pass
9.2	Clicks on Auto Image switcher with no recipe title given	-	Displays 'Please enter a title for recipe'	As Expected	Pass
9.3	Submit with no recipe general information and cooking steps given	Title: - Description: - Category: - Recipe Image: - Steps: -	Displays 'Please Check If All Fields Are Filled Completely'	As Expected	Pass
9.4	Submit with no recipe cooking steps given but recipe general information given	Title: Test Description: test Category: Others Recipe Image: Attached Steps: -	Displays 'Please Check If All Fields Are Filled Completely'	As Expected	Pass
9.5	Submit with recipe general information and but no cooking steps given	Title: - Description: - Category: - Recipe Image: -	Displays 'Please Check If All Fields Are Filled Completely'	As Expected	Pass

		Steps: Step 1, Step 2			
9.6	Submits with recipe general information and cooking steps given.	Title: Test Description: test Category: Others Recipe Image: Attached Steps: Step 1, Step 2	Displays 'Post Edit Successful'	As Expected	Pass

Delete a Recipe

Case ID	Description	Test Condition	Expected Result	Actual Result	Pass/Fail
10.1	Attempt to delete a recipe that is not posted by the user account	-	No delete option is displayed to the user	As Expected	Pass
10.2	Attempt to delete a recipe that is posted by the user account	-	Displays a delete button and recipe post deletes after clicking	As Expected	Pass

Search Recipe

Case ID	Description	Test Condition	Expected Result	Actual Result	Pass/Fail
11.1	Clicks on the search bar widget in home page	-	Directs to search page view	As Expected	Pass
11.2	Enters searching query in the search bar in search page	Search: Pasta	Shows the result of the query	As Expected	Pass
11.3	Clicks on the cuisine category icon in home page	-	Directs to search page of selected cuisine category	As Expected	Pass
11.4	Enters searching query in the search bar in selected category page	Search: Pasta	Shows the result of the query that belongs to the cuisine category	As Expected	Pass
11.5	Clicks on the dismiss button in the search bar to clear the query.	-	Search page shows all results without filtered	As Expected	Pass

10.2 User Acceptance Testing

Tester Name:	Chew					
Occupation:	Student					
Date of Testing:	21/12/2022					
System Objective:	Cookit is an application inspired by social media applications where it aims to target users especially teenagers and young adults to learn and share their cooking recipes and experience online. Cookit also aims to be revolutionary and a pioneer by integrating and transforming technologies such as controlling page switching with sensors and AI engine that has been quite a hot topic over the recent years to ensure that Cookit can be the center for content creating and content reading that will be loved and attracting younger generations to begin learning and master their cooking skills.					
S/N	Attributes	Legend: 1-Poor, 5-Excellent				
		1	2	3	4	5
1.	User Interface Design		✓			
2.	Functionalities			✓		
3.	Error-free				✓	
4.	System Responsiveness			✓		
5.	Layout & colors Consistency	✓				
6.	Data Accuracy			✓		
7.	Overall User Experience on App	✓				
Feedbacks and Suggestions:						
The system is good and produces zero errors, however the UI/UX experience -wise there is still little room for improvement needed to achieve the goal of becoming a better product compared to other alternative systems.						
Actions Taken from Developer:						
Added some colors to buttons and widgets with a primary color to improve the UI design.						

Signature (Tester):



Signature (Developer):



Tester Name:	Cheon					
Occupation:	Student					
Date of Testing:	22/12/2022					
System Objective:	Cookit is an application inspired by social media applications where it aims to target users especially teenagers and young adults to learn and share their cooking recipes and experience online. Cookit also aims to be revolutionary and a pioneer by integrating and transforming technologies such as controlling page switching with sensors and AI engine that has been quite a hot topic over the recent years to ensure that Cookit can be the center for content creating and content reading that will be loved and attracting younger generations to begin learning and master their cooking skills.					
S/N	Attributes	Legend: 1-Poor, 5-Excellent				
		1	2	3	4	5
1.	User Interface Design		✓			
2.	Functionalities			✓		
3.	Error-free				✓	
4.	System Responsiveness			✓		
5.	Layout & colors Consistency		✓			
6.	Data Accuracy				✓	
7.	Overall User Experience on App		✓			
Feedbacks and Suggestions:						
User experience and UI design are very far lacking. Colors and layout design are so basic, may consider changing the widgets to make them feel more fluid or dynamic-like. Could go for minimalistic look and feel design instead of painting everything in single color.						
Actions Taken from Developer:						
Removed coloring on certain widgets to make it look neat and clean. Added some animations on the widgets as well so that it could present some special effects to users.						

Signature (Tester):



Signature (Developer):



Tester Name:	Wang					
Occupation:	Student					
Date of Testing:	26/12/2022					
System Objective:	<p>Cookit is an application inspired by social media applications where it aims to target users especially teenagers and young adults to learn and share their cooking recipes and experience online. Cookit also aims to be revolutionary and a pioneer by integrating and transforming technologies such as controlling page switching with sensors and AI engine that has been quite a hot topic over the recent years to ensure that Cookit can be the center for content creating and content reading that will be loved and attracting younger generations to begin learning and master their cooking skills.</p>					
S/N	Attributes	Legend: 1-Poor, 5-Excellent				
		1	2	3	4	5
1.	User Interface Design			✓		
2.	Functionalities				✓	
3.	Error-free				✓	
4.	System Responsiveness				✓	
5.	Layout & colors Consistency			✓		
6.	Data Accuracy					✓
7.	Overall User Experience on App		✓			
Feedbacks and Suggestions:						
<p>Poor user interface could consider working on things like buttons, picker widget and page transitions. Also, please add some icons, if possible, try not to make the app to look so wordy, overall, the user experience that it gives does not make me feel better.</p>						
Actions Taken from Developer:						
<p>Animated page transitions have been added when navigating to other pages. Added some image assets and icons on buttons and pages where it updates dynamically based on user input.</p>						

Signature (Tester):



Signature (Developer):



10.3 Summary

To sum up a brief on what was done in this section, generally unit testing and User Acceptance Test were both performed against the developed system. In unit testing, it is essential in pointing out the possible undiscovered errors that may be produced for each individual units of the system such as testing of the searching capability of the system, favoriting a recipe post to test out if an individual unit is workable as it is intended to be. To perform unit tests, it is required to have test conditions defined clear on prior the test was taken as well as the expected results the developer would like to see. If the actual result turns out to be different from the expectations defined earlier, then the developer would know that there is an underlying error that needs to be rectified immediately to avoid it causing future errors. Fortunately, the system has passed every test case written for the unit test and produced a good sign that the system is consistent.

The User Acceptance Test (UAT) on the other hand was done through approaching the targeted user group of people, which in this case is the younger generations, to ensure that the system is on par with user satisfaction. In the UAT conducted test, it aims at knowing how the user feels about the system itself from several perspectives such as the user design, functionalities, responsiveness, data accuracy and the overall user experience that the system application produces. Analysis on the UAT results produced turns out to be on the downside where out of the 3 testers questioned, all 3 of them have equally emphasized the need to improve the UI/UX of the system. Therefore, the developer has gone over to an extent fixing the issues by adding some animations effects, rebalanced out the layout and color mixing, added some little icons on widgets etc. to fulfill the comments and tackle the issues raised. In final words, UAT test has eased the developers to know what has gone wrong based on the reviews and feedback from the testers and what needs to be done to make the system acceptable by the users.

Chapter 11 : CONCLUSION AND REFLECTIONS

11.1 Critical Evaluation

In critical evaluation, it is where the author will provide detail explanations on what the outcome of the developed system is like on exact and composed with the developer's thought after completing the development of the system such as the reflection of the challenges faced during the implementation, potential system benefits on how it can bring an impact. Eventually, at the end of this section will be followed along with the explanation on the limitations of the system and what the future plan is to enhance the system.

11.1.1 System Benefits

When speaking of culinary within the group of current young ages, the rate of people knowing how to cook well is unrealistically low as people these days tend to be overdependent on eating out, take-away or even ordering food deliveries, and hence expecting more and more younger generations to have poorer culinary skills. Hence with Cookit, it has been made to entice these young people to be interested in learning and growing their culinary skills together while sharing the recipes and cooking methods that they have tried out cooking a dish. Inspired from the perspective of social media applications structure, the system is designed to create a space for users to actively share and discuss the post of their shared cooking recipes so that people can refine and master together as a community.

Other than that, the application has also brought in some solutions that aim on solving user's hassles from the point of view of being a user, while adapting the system to make it more user oriented. One of it being at the cooking step viewing page where when user starts following the cooking step it will automatically narrates the instructions to users so that as a cooker, users do not have to constantly lose focus on the food that is in cook to read the text instructions on the screen. This approach is done considering that if focus is lost for too long to read an over lengthy instruction, then the food might run on the possibility of being overcooked. Other from that, users also can directly point at knowing what ingredients are needed when reaches at every cooking step so users would not need to find out the required ingredients on their own within the wordy instructions. Asides, page navigation control for the page slide between the cooking steps are made to available through multiple approaches so that users can easily to reach out maneuver between

the page of cooking steps with their preferred method, while the gesture control is put in place for helping the user to switch to the next page as considering that the user's hand might get greasy for touching the screen when cooking.

Last but not least, the system has also integrated both the Open AI and Pexels image engine for performing the automated content generating capabilities. With the help of Open AI, it can write a good description of the dish based on the title name given for the recipe. So that users would not need to hassle much on writing a narrative description of the recipe but to pass the job to an AI to complete it. Meanwhile for Pexels, it is implemented to create an image automatically depending on the title given for the dish. It will return the best search that it retrieved from and pass it to the users when writing a recipe post before posting it.

11.1.2 Reflection on Implementation and Challenges Met

During the initial period when the development was just started, it was one tough road that the developer has to do lots of tests and research throughout multiple days and nights just to experiment around with the sensors on the mobile phone as an effort on reaching out for the best solution for controlling the page change without needs to scroll through the page each with fingers. The process was taken as an approach of being considerate for the users. Therefore, the developer has tried out to look for the sensors and compare between to identify which sensor would be the best and has it made widely available across most of the mobile devices so that users from all devices range would have the feature included when they install the application to their mobile device. Apart from just listening to the sensors one of the challenges faced by the developer was the integration of AI into the system, choosing a right AI for writing quality contents is important hence the developer has tried to test out several text-writing AIs and compare them to identify one most appropriate AI that can generate accurate and quality contents.

Furthermore, the developer has also put in a significant effort in ensuring that the produced program system is consistent at times that will not affect the general user's using experience, allowing a smooth application operation whereby users does not suffer a significant impact from any errors. To achieve such level, the developer has to make out a roadmap plan on what activities are so that the developer can consistently track each and every of the process refine them in iteration with the implementation of a RAD concept to achieve the best outcome desired.

11.2 Conclusion

Overall at the very beginning stage of the project in Chapter 1 to 6, it aims at providing the developer a rudimental knowledge of the mobile cooking toolkit application with various procedures and phases of research and analysis. Initially, the document gives an overview comprehension of the proposed project such as the background, problem context, aim and scope of the project. Coming after, a good study on the academic and research papers conducted by other researchers is performed to get a good grasp of looking into what the previous researchers have concluded on the domain. Some similar applications that are found on the market are taken as well and put into comparison side by side to identify the advantages and the weaknesses of each system. Technical tools are also evaluated to help the developer in selecting the best tools in supporting the development of the proposed application. Among of all the available tools, a hybrid architecture application is chosen with the proposed application to be developed with Flutter using Visual Studio Code as the IDE for writing the coding scripts and Firebase as the database system for storing relevant data information. Aside from that, a system development approach was also decided after making good analysis between two methodologies which are the waterfall model and Rapid Application Development (RAD) model. Two research methods were also picked in collecting the opinions and perspectives of the public which are questionnaire and interview. The responses turned out to be highly positive with a response rate of 102 responses to the questionnaire and 2 interviewees on completing the study.

A system architecture was designed based on the considerations from user's perspective wise to try to adapt the system to work and fulfill certain requirements defined and help providing the developer with a more comprehensive understanding of how the system should look on backbone. Moreover, tests such as unit testing and user acceptance testing are conducted to ensure that the system developed is able to perform the functionalities and satisfy the aim of this project, while feedbacks are collected from the user acceptance test done to allow the developer to work on improving the system that will suit the user better.

As reaching the end of this project, the project developer has learned a lot from the ideas and suggestions as well as viewing the problems from the sight of another spectrum. This has greatly helped the developer in understanding how feasible the project can be and what other expectations are raised from the public to expect the proposed application to do better. Moreover, with the

completion of the detailed analysis of information from research and testing conducted, the developer is said to have better knowledge in knowing what each of the tools are suitable for and this may be extremely useful in the occasion that if the developer is looking to develop a mobile application project again in mere future. Overall, through this project, the developer has gained a lot of valuable knowledge and would like to recognize and appreciate for the assistance and cooperation given by the participants in the research for contributing both qualitative and quantitative data to help the developer in making a complete and accurate analysis of the public reaction on the application and domain study.

11.2.1 System Limitations

As compound query is very limited in Firestore, queries such as range operator comparisons are only allowed on one single field, hence the developer was unable to fulfill the very initial plan of the system where the application was planned to perform searches with multiple parameters like returning results based on the range of Star ratings, Difficulty levels, Dietary highlights (pork-free, gluten-free, etc.) and Cuisine types all in a singular searching page. Even though with the developer making multiple attempts to try reviving this initial design plan, however it was found out that there was nothing that can be done as this is a limitation that is bounded by the database framework itself and beyond the fix that can be done on the application program.

Other than that, the developer has also found out that the cloud storage (Firebase Storage) that was used as an image repository for the system has a limited file storage of 1Gig only and to store anything beyond the limit would require the developer to buy for extra storages at the cost of US Dollars. Hence why the developer has tried to be very careful with what to store in the system to avoid the Firebase Storage to run out of space to store other image Files. Moreover, data transfers are also at a limited number each day for free tier users, therefore as part of the initiative, the developer tries not to touch on too many data fields that may be unnecessary for producing a good recipe content sharing platform. Therefore, any secondary data that are irrelevant to a recipe post are not made available to be modified at this level so that no necessary actions to upload and frequent retrieval of data updates and transfers would be required to consume the offered numbers of data transfer limit for free tier user.

With explanations given from both the paragraphs above, the developer has overall faced a huge difficulty in deciding on the disposal of certain requirements that are targeted to be included into the system at the beginning stage such as a **grocery shopping list** where users can add the selected ingredients to another created list. Hence it is to obvious to conclude that benefits and drawbacks from the Firebase are very obvious and it is clear that though Firebase being super responsive and offers lots of convenience by offering various different range of products to support an application's cloud backend development, however limitations that it has is still rather huge and this is an important point that needs to be highlighted for future projects if they would want to consider Firebase, perhaps developers might need to consider wisely.

11.2.2 Future enhancements

Certainly, the system itself is not perfect with limitations and setbacks as explained in previous sections. However, the developer is also optimistic in looking for future enhancements on the system itself with the first one being able to **perform searches with parameters that users can tweak around so that the search function in the application could be more powerful** than what it is right now. This is achievable with the help of using **third parties that are officially endorsed by Google such as Elastic, Algolia and Typesense**. Through combining a hybrid of both the third-party search service and Firestore database, it could greatly facilitate the issues that Firestore has with its ability to perform searches. These third-party services are a **provider that offers advanced data indexing than what a general database query presents**.

Moreover, the developer has also eyed to do an **own host server where data transfers and cloud storage limitations issues would be elicited**. With a self-host server, the cost to operate, manage and utilize services like database queries and data transfers within the file repositories for images would be considerably cheaper than the chargeable amount by Google. Therefore, once the **backend data responsibility has moved to a self-hosted server, consequently bringing in a more complete system would be feasible as data transfers are no longer held with limits**.

References

- Akervik, T. (2020, July 14). *WHAT ARE THE CHANCES OF LOSING INFORMATION IN CLOUD STORAGE?* Retrieved from MacroNet: <https://www.marconet.com/blog/what-are-the-chances-of-losing-information-in-cloud-storage>
- Bhandari, P. (2022, July 12). *Questionnaire Design / Methods, Question Types & Examples.* Retrieved from Scribbr: <https://www.scribbr.com/methodology/questionnaire/>
- Caraher, M. (1999). Can't cook, won't cook: A review of cooking skills and their relevance to health promotion. *International Journal of Health Promotion and Education*, 40.
- Chien, C. (2020, February 4). *What is Rapid Application Development (RAD)?* Retrieved from Codebots: <https://codebots.com/app-development/what-is-rapid-application-development-rad>
- Cint. (2022, June 29). *What Is a Questionnaire and How Is It Used in Research?* Retrieved from Cint: <https://www.cint.com/blog/what-is-a-questionnaire-and-how-is-it-used-in-research>
- Davies, P. B., Carne, C., Mackay, H., & Tudhope, D. (1999). Rapid application development (RAD): An empirical review. *European Journal of Information Systems*, 211-223.
- DS&AI. (2021). *Introduction to System Development Process.* Retrieved from DS&AI: https://dsai.asia/assets/courseware/v1/ad493382deed6fe4bb89bdc3bc8fdf25/asset-v1:KKU+KKU_02+2021+type@asset+block/unit01_SDPM.pdf
- Ducrohet, X., Norbye, T., & Chou, K. (2013, May 15). *Android Studio: An IDE built for Android.* Retrieved from Android Developers BLog: <https://android-developers.googleblog.com/2013/05/android-studio-ide-built-for-android.html>
- Easwaramoorthy, M., & Zarinpoush, F. (2006). *INTERVIEWING FOR RESEARCH.* Retrieved from http://sectorsource.ca/sites/default/files/resources/files/tipsheet6_interviewing_for_research_en_0.pdf
- ELM Learning. (2021, August 23). *Edutainment: Why Learning While Having Fun Works.* Retrieved from ELM Learning: <https://elmlearning.com/blog/edutainment-elearning/>
- Engler-Stringer, R. (2010). Food, Cooking Skills, and Health: A Literature Review. *Canadian Journal of Dietetic Practice and Research*, 141.

- Glanz, K. (2021). Diet and Health Benefits Associated with In-Home Eating and Sharing Meals at Home: A Systematic Review. *International Journal of Environmental Research and Public Health*, 19.
- Hardcastle, E. (2011). Systems Development Methodologies. In E. Hardcastle, *Business Information Systems* (pp. 31-37). Ventus Publishing ApS.
- Hindsight Labs LLC. (2018, November 24). *Paprika Recipe Manager 3*. Retrieved from Google Play:
<https://play.google.com/store/apps/details?id=com.hindsightlabs.paprika.android.v3&hl=en&gl=US>
- IBM. (n.d.). *Database management systems on z/OS*. Retrieved from IBM: <https://www.ibm.com/docs/en/zos-basic-skills?topic=zos-what-is-database-management-system>
- Indeed Editorial Team. (2021, November 8). *What Is An Interview? (Types Of Interviews And Formats)*. Retrieved from Indeed: <https://in.indeed.com/career-advice/interviewing/what-is-interview>
- Instagantt. (n.d.). *A Complete Guide to know What is Waterfall Project Management?* Retrieved from Instagantt: <https://instagantt.com/project-management/what-is-waterfall-project-management>
- IVASHYNA, A. (2022, January 31). *DOIT Software*. Retrieved from Software Development Plan: How to Build One in 2022: <https://doit.software/blog/software-development-plan#screen1>
- Kim, J. E. (2021). Factors affecting home cooking behavior of women with elementary school children applying the theory of planned behavior. *Nutrition Research and Practice*, 106.
- Kolodinsky, J. M., & Goldstein, A. B. (2011). Time Use and Food Pattern Influences on Obesity. *Obesity*, 2327-2335.
- Konjin Design Studio. (2019, April 1). *What is RAD (Rapid Application Development)*. Retrieved from Konjin Design Studio: <https://blog.konijnstudio.com/2019/04/rapid-application-development.html>
- Lucid Content Team. (n.d.). *4 Phases of Rapid Application Development Methodology*. Retrieved from Lucidchart: <https://www.lucidchart.com/blog/rapid-application-development-methodology>

- Mealime Meal Plans Inc. (2016, May 30). *Mealime Meal Plans & Recipes*. Retrieved from Google Play: <https://play.google.com/store/apps/details?id=com.mealime&hl=en&gl=US>
- Mills, S. (2017). Health and social determinants and outcomes of home cooking: A systematic review of observational studies. *Appetite*, 116-134.
- Plan to Eat. (2018, May 31). *Plan to Eat: Meal Planner*. Retrieved from Google Play: <https://play.google.com/store/apps/details?id=com.plantoeat.mobile&hl=en&gl=US>
- Red Hat. (2019, January 18). *What is an IDE?* Retrieved from Red Hat: <https://www.redhat.com/en/topics/middleware/what-is-ide>
- Ruël, H. J., Bondarouk, T., & Smink, S. (2010). The Waterfall Approach and Requirement Uncertainty. *An In-Depth Case Study of an Enterprise Systems Implementation at a Major Airline Company*, 43-45.
- Sarda, B. (2021). Changes in home cooking and culinary practices among the French population during the COVID-19 lockdown. *Appetite*, 1-8.
- Satish. (2015, October 31). *APNA Course*. Retrieved from 6 Stages You Need To Know About Waterfall And V-Model: <https://www.apnacourse.com/blogs/waterfall-vs-v-model-implementation-phases/>
- Sharma, L., & Singh, V. (2021, October 18). *What is WaterFall Model?* Retrieved from ToolsQA: <https://www.toolsqa.com/software-testing/waterfall-model/>
- Talent Services. (2021, February 24). *What is Interview and Types of Interviews*. Retrieved from Talent Services: <https://asktalentservices.com/blogs/what-is-interview-and-types-of-interviews/>
- Taneja, A. (2020, September 4). *10 Best Apps To Learn Cooking On Android!* Retrieved from Cashify: <https://www.cashify.in/10-best-apps-to-learn-cooking-on-android>
- Thakur, N. (2018, July 20). *What is Visual Studio Code? What are the advantages of Visual Studio Code*. Retrieved from Webner Solutions: <https://blog.webnersolutions.com/visual-studio-code/>
- The University of Edinburgh. (2021, September 10). *Literature review*. Retrieved from The University of Edinburgh: <https://www.ed.ac.uk/institute-academic-development/study-hub/learning-resources/literature-review>
- tutorialspoint. (n.d.). *SDLC - Waterfall Model*. Retrieved from tutorialspoint: https://www.tutorialspoint.com/sdlc/sdlc_waterfall_model.htm

Yusov, K. (n.d.). *Top 15 JavaScript IDEs and JS Editors for Frontend Development 2022.*

Retrieved from Jelvix: <https://jelvix.com/blog/best-javascript-ides>

Zulqadar, A. (2019, February 12). *SDLC Waterfall Model: The 6 phases you need to know about.*

Retrieved from Rezaid: <https://rezaid.co.uk/sdlc-waterfall-model/>

APPENDICES

Turnitin Report

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PLS V1.0

Project Log Sheet – Supervisory Session

Notes on use of the project log sheet:

1. This log sheet is designed for meetings of more than 15 minutes duration, of which there must be at minimum **SIX (6)** during the course of the project (SIX mandatory supervisory sessions).
2. The student should prepare for the supervisory sessions by deciding which question(s) he or she needs to ask the supervisor and what progress has been made (if any) since the last session, and noting these in the relevant sections of the form, effectively forming an agenda for the session.
3. A log sheet is to be brought by the STUDENT to each supervisory session.
4. The actions by the student (and, perhaps the supervisor), which should be carried out before the next session should be noted briefly in the relevant section of the form.
5. The student should leave a copy (after the session) of the Project Log Sheet with the supervisor and to the administrator at the academic counter. A copy is retained by the student to be filed in the project file.
6. It is recommended that students bring along log sheets of previous meetings together with the project file during each supervisory session.
7. The log sheet is an important deliverable for the project and an important record of a student's organisation and learning experience. The student **must** hand in the log sheets as an appendix of the final year documentation, with sheets dated and numbered consecutively.

Student's name: TANG MING ZE**Date:** 20-June-2022 **Meeting No:** 1**Project title:** Cookit - An Intelligent Recipe Content Sharing Platform**Intake:** APU3F2205SE**Supervisor's name:** MR. AU YIT WAH**Supervisor's signature:** **Items for discussion (noted by student before mandatory supervisory meeting):**

1. Explain the problem statements to the supervisor
2. Explain the possible approaches towards solving the problems identified
3. Identify the framework of the system that could be possibly used to achieve the goal

Record of discussion (noted by student during mandatory supervisory meeting):

1. Problems discussed involved many areas, mainly need to show a strong stance on what are the recent issues
2. Make the project to more attractive by considering what can be offered for the users
3. Either web or mobile application, whichever is best and suitable according to my skills and knowledge, as long as a proper system can be delivered to achieve high grades

Action List (to be attempted or completed by student by the next mandatory supervisory meeting):

1. PPF completion for supervisor to check
2. Evaluate what needs to be done to make the FYP project more towards an A+ work

Note: A student should make an appointment to meet his or her supervisor (via the consultation system) at least ONE (1) week prior to a mandatory supervisor session – please see document on project timelines. In the event a supervisor could not be booked for consultation, the project manager should be informed ONE (1) week prior to the session so that a meeting can be subsequently arranged.



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PLS V1.0

Project Log Sheet – Supervisory Session

Notes on use of the project log sheet:

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6. It is recommended that students bring along log sheets of previous meetings together with the project file during each supervisory session.
7. The log sheet is an important deliverable for the project and an important record of a student's organisation and learning experience. The student **must** hand in the log sheets as an appendix of the final year documentation, with sheets dated and numbered consecutively.

Student's name: TANG MING ZE**Date:** 28-July-2022 **Meeting No:** 2**Project title:** Cookit - An Intelligent Recipe Content Sharing Platform **Intake:** APU3F2205SE**Supervisor's name:** MR. AU YIT WAH**Supervisor's signature:****Items for discussion (noted by student before mandatory supervisory meeting):**

1. Present PSF for supervisor to check
2. Demonstrates PPF along
3. Request supervisor to sign on the Ethical Form

Record of discussion (noted by student during mandatory supervisory meeting):

1. Identify the gap between existing system and the system application that I am proposing
2. Make problem statements to be identified as clearly as possible
3. Submit the modified PSF in Teams chat soon to be checked again by the supervisor to determine for appropriateness

Action List (to be attempted or completed by student by the next mandatory supervisory meeting):

1. Modify the problem statements in PSF and forward to supervisor for check-up soon
2. Make clear comparison between the proposed system and other alternatives on market

Note: A student should make an appointment to meet his or her supervisor (via the consultation system) at least ONE (1) week prior to a mandatory supervisor session – please see document on project timelines. In the event a supervisor could not be booked for consultation, the project manager should be informed ONE (1) week prior to the session so that a meeting can be subsequently arranged.



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Project Log Sheet – Supervisory Session

Notes on use of the project log sheet:

1. This log sheet is designed for meetings of more than 15 minutes duration, of which there must be at minimum SIX (6) during the course of the project (SIX mandatory supervisory sessions).
2. The student should prepare for the supervisory sessions by deciding which question(s) he or she needs to ask the supervisor and what progress has been made (if any) since the last session, and noting these in the relevant sections of the form, effectively forming an agenda for the session.
3. A log sheet is to be brought by the STUDENT to each supervisory session.
4. The actions by the student (and, perhaps the supervisor), which should be carried out before the next session should be noted briefly in the relevant section of the form.
5. The student should leave a copy (after the session) of the Project Log Sheet with the supervisor and to the administrator at the academic counter. A copy is retained by the student to be filed in the project file.
6. It is recommended that students bring along log sheets of previous meetings together with the project file during each supervisory session.
7. The log sheet is an important deliverable for the project and an important record of a student's organisation and learning experience. The student **must** hand in the log sheets as an appendix of the final year documentation, with sheets dated and numbered consecutively.

Student's name: TANG MING ZE**Date:** 8-August-2022 **Meeting No:** 3**Project title:** Cookit - An Intelligent Recipe Content Sharing Platform**Intake:** APU3F2205SE**Supervisor's name:** MR. AU YIT WAH**Supervisor's signature:****Items for discussion (noted by student before mandatory supervisory meeting):**

1. Present the survey questionnaire to the supervisor to check for appropriateness
2. Ask from supervisor on suggestions to know if the proposed solution requires any more additional features

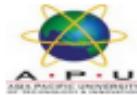
Record of discussion (noted by student during mandatory supervisory meeting):

1. Questionnaire questions are okay, however more questions can be asked to help validate the problem statement
2. Acquire more useful information from the participants to gather some useful features that might be missing out
3. Collect as many respondents to answer the questionnaire as possible to make the data collected to be more accurate

Action List (to be attempted or completed by student by the next mandatory supervisory meeting):

1. May proceed publishing the questionnaire to friends and families to start collecting responses once additional questions are added and sent to supervisor to check
2. Aim to increase the size of data sample to 100 for improving the data accuracy

Note: A student should make an appointment to meet his or her supervisor (via the consultation system) at least ONE (1) week prior to a mandatory supervisor session – please see document on project timelines. In the event a supervisor could not be booked for consultation, the project manager should be informed ONE (1) week prior to the session so that a meeting can be subsequently arranged.



(APU: Serial Number)

PLS V1.0

Project Log Sheet – Supervisory Session

Notes on use of the project log sheet:

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6. It is recommended that students bring along log sheets of previous meetings together with the project file during each supervisory session.
7. The log sheet is an important deliverable for the project and an important record of a student's organisation and learning experience. The student **must** hand in the log sheets as an appendix of the final year documentation, with sheets dated and numbered consecutively.

Student's name: TANG MING ZE**Date:** 17-October-2022 **Meeting No:** 4**Project title:** Cookit - An Intelligent Recipe Content Sharing Platform **Intake:** APUC3F2205SE**Supervisor's name:** MR. AU YIT WAH**Supervisor's signature:** **Items for discussion (noted by student before mandatory supervisory meeting):**

1. What it means to have good UX

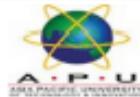
Record of discussion (noted by student during mandatory supervisory meeting):

1. Make app interactive, could possibly be a feature, video, image, or any media that shows up in the cooking app

Action List (to be attempted or completed by student by the next mandatory supervisory meeting):

1. Review for wireframe

Note: A student should make an appointment to meet his or her supervisor (via the consultation system) at least ONE (1) week prior to a mandatory supervisor session – please see document on project timelines. In the event a supervisor could not be booked for consultation, the project manager should be informed ONE (1) week prior to the session so that a meeting can be subsequently arranged.



(APU: Serial Number)

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Project Log Sheet – Supervisory Session

Notes on use of the project log sheet:

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6. It is recommended that students bring along log sheets of previous meetings together with the project file during each supervisory session.
7. The log sheet is an important deliverable for the project and an important record of a student's organisation and learning experience. The student **must** hand in the log sheets as an appendix of the final year documentation, with sheets dated and numbered consecutively.

Student's name: TANG MING ZE**Date:** 20-November-2022 **Meeting No:** 5**Project title:** Cookit - An Intelligent Recipe Content Sharing Platform **Intake:** APU3F2205SE**Supervisor's name:** MR. AU YIT WAH**Supervisor's signature:** **Items for discussion (noted by student before mandatory supervisory meeting):**

1. What could be my limitations
2. Demonstrate wireframe

Record of discussion (noted by student during mandatory supervisory meeting):

1. Avoid creating a cooking app that is too static, make the recipes updatable and manageable
2. Highlight on interactivity, make sure app can catch the interests needed from users to make them like about the app when compared with others.

Action List (to be attempted or completed by student by the next mandatory supervisory meeting):

1. Prototype review
2. Documentation review

Note: A student should make an appointment to meet his or her supervisor (via the consultation system) at least ONE (1) week prior to a mandatory supervisor session – please see document on project timelines. In the event a supervisor could not be booked for consultation, the project manager should be informed ONE (1) week prior to the session so that a meeting can be subsequently arranged.



(APU: Serial Number)

PLS V1.0

Project Log Sheet – Supervisory Session

Notes on use of the project log sheet:

1. This log sheet is designed for meetings of more than 15 minutes duration, of which there must be at minimum SIX (6) during the course of the project (SIX mandatory supervisory sessions).
2. The student should prepare for the supervisory sessions by deciding which question(s) he or she needs to ask the supervisor and what progress has been made (if any) since the last session, and noting these in the relevant sections of the form, effectively forming an agenda for the session.
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Student's name: TANG MING ZE**Date:** 10-December-2022 **Meeting No:** 6**Project title:** Cookit - An Intelligent Recipe Content Sharing Platform **Intake:** APU3F2205SE**Supervisor's name:** MR. AU YIT WAH**Supervisor's signature:** **Items for discussion (noted by student before mandatory supervisory meeting):**

1. Prototype review
2. Documentation review
3. Discussion on the presentation day

Record of discussion (noted by student during mandatory supervisory meeting):

1. Idea of including the use of sensor to control the page navigation in app
2. Never make all the cooking instructions all into one single read view to avoid app being too static

Action List (to be attempted or completed by student by the next mandatory supervisory meeting):

1. Start building schema for recipes

Note: A student should make an appointment to meet his or her supervisor (via the consultation system) at least ONE (1) week prior to a mandatory supervisor session – please see document on project timelines. In the event a supervisor could not be booked for consultation, the project manager should be informed ONE (1) week prior to the session so that a meeting can be subsequently arranged.

DECLARATION OF THESIS CONFIDENTIALITY

Author's full name: **TANG MING ZE**

IC No./Passport No.: **020507-14-0757**

Thesis/Project title: **COOKIT – AN INTELLIGENT RECIPE CONTENT SHARING PLATFORM**

I declare that this thesis is classified as:

- CONFIDENTIAL**
 RESTRICTED
 OPEN ACCESS

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Author's Signature: 

Date: 21 December 2022

Supervisor's Name: **MR. AU YIT WAH**

Date: 21 December 2022

Signature: 

Office Record	Receipt
Date Received: Received by whom:	Student name: Student number: Received by: Date:



DRAFT PROJECT PROPOSAL FORM

Proposal ID : _____

Name of Supervisors Proposed : 1. Ms. Mary Ting
 2. Mr. Au Yit Wah
 3. Assoc Prof Dr. Muhammad Ehsan Rana
 4. Mr. Lee Kim
 5. Ms. Chong

Student Name : MR. TANG MING ZE

Student No : TP054682

Email Address : tp054682@mail.apu.edu.my & mztang52@gmail.com

Programme Name : Software Engineering (SE)

Title of project : Enterprise Logistics Fleet Management System (ELFMS)

Please record which module(s) your topic is related to:

Introduction to Database (CT042-3-1-IDB)
Mobile App Engineering (CT124-3-2-MAE)
Software Architecture and Testing (CT059-3-2-SAT)

1. Introduction

Assume the reader has very little knowledge of the subject. Introduce the topic, the sector of business/industry concerned and how the project relates to it. Define the context of the problem and identify the research required to solve it.

As online business market grows over the course, many businesses have also experienced a sudden plunge of delivery volume where items delivery get busier and packed than never before. As part of the supply chain management in a company, one of the responsibilities is being able to effectively monitor their own delivery fleet to ensure that the delivery fleet is operating as expected, hence increasing in productivity and helps avoiding delivery downtime from unexpected circumstances. Poor management of delivering fleets could cause a disruptive impact towards business owners from running their day-to-day operations, making businesses

possessing a risk of possibly making loss due to poor delivery performance (altexsoft, 2019).

Customers of these online businesses are also heavily affected by the delays in delivery especially in the event of where they need the items to be handed to them urgently.

Though many enterprises have always aim to put in more effort to increase their delivery channel adapting to larger capacity, yet problems like some of which warehouses are overfilled and items left overhung in delivery for days still could not be solved effectively. With issues as such, we could see that there is a need for change, a change to help the delivery service to be managed better than before with electronic systems that allows customers and business owners to monitor the direction of all their deliveries. Not just there, digitalization of fleet management could also bring in more benefits such as evaluated driver productivity, effective supply chain management and easy traceability of deliveries as detailed delivery logs are stored in the system (Flowers, 2020).

Therefore in this project, the research is intended to explore further on the digitalization of logistics fleet management system with field of focus in providing a digital solution for managing, assigning and traceability of items for companies that aims on expanding their delivering fleet and migrate to a digitalized management system for logistics delivery matters.

2. Problem Statement

Identify past and current work in the subject area. Outline the key references to other people's work, indicate for the most pertinent of these how your proposal relates to the ideas they contain.

- **Many businesses do not have an efficient logistics delivery management**

Lots of business owners these days tend to move towards providing delivery service to their customers as people are starting to being more dependent on sticking with acquiring products that can offer them great convenience. However, not all business retailers are made the same to know how to manage their delivery fleets to get all the orders sorted out and delivered to the hands of customers. Therefore, with poor management of their delivery fleet may cause allocation of order to be unrealistic for drivers to get all the deliveries fulfilled.

- **Delivery data can be messy**

As a driver can be assigned with multiple orders in a day, the driver may have hard time in remembering all the assigned delivery tasks. This may make the driver to miss out some deliveries assigned and therefore cause a further delay on the missed out orders. Furthermore, the tasks assignment on the drivers can be unclear as task assignment to drivers through verbally means can ends up making the driver lost track of all the allocated delivery tasks.

- **Item traceability information not transparent**

Ideally, each driver should hold the responsibility to each and every assigned delivery tasks to them. In a case when the item is broken when delivered, this is a responsibility that every driver needs to hold accountable for. Therefore, a system is needed to help in logging down all the delivery information of every order, so that when the company needs to check back on the record at least they can easily find out who was the driver that was responsible for the delivery of a particular order. This can also further ensure

on product security in an event whereby if the order is lost and claimed not received by the customer, then the business owner knows who to find to ask for further clarification.

3. Project Aim and Objectives

Identify the AIM(s) of the project, i.e. what the overall achievement is intended to be, in terms of both academic and commercial/industrial advances. Identify the particular intellectual difficulties posed by the proposal, the problems to be addressed, and explain how these might be solved. Clearly list individual measurable OBJECTIVES which can be related to the workplan and deliverables.

Aims and objectives are subject to approval from supervisor and students are expected to revise them if deemed inappropriate for a Level 3 project.

The aims of this project are to help business owners and retailers to further enhance their delivery fleet management by providing a digital solution over managing the drivers to ensure the productivity of every driver are guaranteed.

The objectives of this project are:

- To determine how digital transformation on managing delivery fleets could be made possible.
- To provide convenience to business owners in managing and monitoring the performance of their drivers.
- To enable drivers to check on the assigned delivery orders every day.
- To allow drivers to mark and update the delivery status of each delivery orders assigned.
- To help business owners in track of each delivery order and keep them updated with status of each order.
- To enable transparency of information between business owners and driver employees, all records are recorded and can be backtracked, this could be useful especially in an event of disputes occur.

4. Literature Review

As most of the business owners know, logistics supply chain management is the core competence of many enterprises especially for those who do online businesses due to reason that logistics is one of the most underlying services in many businesses that helps them in getting the orders delivered to the hands their customers (Liu, 2011). However in most cases, delivery performance is always below expectation and this always been a hassle to many entrepreneurs. Mainly, the issue behind all these is that the driver fulfillment performance has never been too much highlighted by many (**Johnson et al., 2021**). Therefore, a digital centralized system to manage the delivery fleet is definitely needed to help in elevating business productivity. According to (Liu, 2011), having a centralized control can be helpful in situations to make a good supply chain management. Only with a good supply chain management, best coordination and efficiency for the logistics activities in a business will be achieved (Liu, 2011).

With a delivery fleet management system, it can greatly ease businesses in making better management of resources such as human resource, time and fuel and all these resources ultimately links up to one source, which is the money that will be spent (**Ahmad et al., 2021**). Asides from facilitating in resource management for businesses, one of the stands that why a digitized fleet management system can be useful for companies is due to the reason that technology has been proven to be beneficial for businesses from running day-to-day business operations. As mentioned by **Ahmad et al. (2021)**, emerging technologies can be used in assist monitoring operational process and providing necessary information to increase productivity and efficiency. This is very well backed by **Ahmad et al. (2021)** which states that ICT application in logistics related matters and industry can lead to highly automated process. Thus, with a digitized delivery fleet management system, these operational processes can be very well automated such as providing tracking and tracing features, which can be recognized and applied as an automated shipment information documentary system.

Though with many advantages mentioned above, a digitized solution to replace over a traditional management system also has its drawbacks. These drawbacks could include concerns like data security, privacy and network maintenance cost (**Ahmad et al.2021**). Hence, the delivery fleet management system in this project also has to be concerned on some of these highlighted issues.

5. Deliverables / Functionalities of the proposed system

Provide a clear list of the outputs from the project.

Target users of the system

- Delivery Fleer Manager
- Driver

Enterprise Logistics Fleet Management System allows Delivery Fleet Manager,

- Track driver's location from time to time
- Assign delivery orders to drivers
- Reassign an already assigned delivery order to another driver if unable to be fulfilled
- Clear view of all delivery assignments and track on the previous records with history information logged
- Manager can view the delivery status of all orders

Enterprise Logistics Fleet Management System allows Driver,

- Keep track of daily assigned deliveries
- All delivery information for assigned delivery orders can be found from the system directly
- Driver can update the delivery status of each delivery orders

6. References

- Ahmad, R. W., Hasan, H., Jayaraman, R., Salah, K., & Omar, M. (2021). Blockchain applications and architectures for port operations and. *Research in Transportation Business & Management*.
- altexsoft*. (2019, May 31). Retrieved from Logistics Management Systems: How Warehouse, Transportation, and Distribution Software Work:
<https://www.altexsoft.com/blog/business/logistics-management-systems-how-warehouse-transportation-and-distribution-software-work/>
- Flowers, L. (2020, May 21). *Fleetio*. Retrieved from 5 Best Practices for Delivery Fleet Management: <https://www.fleetio.com/blog/5-best-practices-for-delivery-fleet-management>
- Johnson, A., Garnovale, S., Song, J. M., & Zhao, Y. (2021). Drivers of fulfillment performance in mission critical logistics systems: An. *International Journal of Production Economics*.
- Liu, L. (2011). Research on the Management System of enterprises using. *2011 International Conference on Advances in Engineering*.

STUDENT ID : TP054682
INTAKE ID : APU3F2205SE
STUDENT NAME : Tang Ming Ze

Project Title

Cookit – An All-In-One Mobile Cooking Toolkit

Project Background

Problem Context

Food is something that everyone has to deal with every day and mostly people generally can never escape from the process of preparing food themselves in life. It is common that people do plan for their next meals, with thought like what do I eat for lunch or tomorrow but never has people ever actually execute it with reasons being they don't know where to get the food. Naturally, when one does not know where to get it, we always proceed to the second option which is to "do it your own". In this days, concept of preparing own food is widely common as prices of buying well prepared cooked dishes are quite high. However, most of the newer generations these days are not equipped with the skill to cook well, come to worse some may not know how to actually prepare some simple dishes.

As social media being one of our daily life necessity, people do source for online cooking recipes from there and try to replicate their method to prepare their wanted dishes. Yet, one of the drawbacks doing so is that social medias can't provide well guided cooking information given that they were not meant to be a platform for culinary guidance. This may cause confusion for many people as they could not get a clear step by step guide to learn how to cook.

As for that, many businesses have seen this opportunity and made an online version of cooking recipe e-book. Though they are much more convenient than old days bulky printed recipe books, but the fact that they are still not the best choices for many. This is mainly due to that they have much less flexibility option as not all ingredients are made commonly available in different regional countries. The recipe book may be suitable for certain regions

as they have better access to source them but indefinitely, it may be different for other places. Asides, as each region have been heavily influenced by their cultural dish taste, hence what may seem a perfect recipe might not fit the taste bud of the people from other regions. Taking an example, chili padi may be a common ingredients to be sourced in the Southern Asia countries for making chili paste, however to make chili paste in the western regions are completely different and we cannot expect people from the western world to source chili padi as according to the recipe menu that suits our taste preference, chili paste with chili padi will be deemed too spicy for them as well. Hence, a need for Cookit is definitely necessary in order to tackle all the problems as mentioned above to allow users to share cooking recipe together as a community.

Rationale

With this mobile cooking toolkit, it can provide so much convenience for the new mothers especially the younger generations by learning how to cook through step-by-step guidance that covers a vast varieties of cuisine options that are shared. Not only it benefits the ladies in kitchen, but users regardless of their genders and age groups can as well be benefited from this application to learn culinary arts pleasurable and cook any of their wanted dishes at their own comfort. Asides, this application does also have a grocery list that users can use to add in the ingredients that they do not have for making the food and be used as a grocery checklist so that users can always refer on what to buy without the need to write them down on other places. This certainly would ease further on the whole culinary experience as it could offer an extent of expediency for many house cooks. Apart, users could as well post their recipe to help in building the recipe app as a part of sharing their recipe creations, helping the others to learn and innovate better quality food together as a community.

Tangible Benefits

- As the application has extensive coverage of cuisines, looking for recipes for other cultural cookeries will be much easier and effortless
- Time saving as users can know beforehand on what they have to prepare for their cooking the meal
- Efficiency for users is greatly advanced as it offers multiple functionalities that could help the users in find, learn and improve the cooking recipe as a hamlet group

Intangible Benefits

- Hassle-free experience as the required ingredients for specific dish are clearly listed out so that users can know what to prepare beforehand
- Could potentially attract interest from more people trying out culinary and improve their cooking skills
- Make cooking experience more enjoyable for families, hence foster better family relationships

Nature of Challenge

As this application tends to achieve multiple functionalities within a system, hence the difficulty to develop of the application is also exponentially high. With its goal to deliver conveniences to house cooks and provide a better daily meal preparation experience, multiple considerations have to be drawn to attention while considering the product to assess how will the application actually benefits the primary targeted users. Asides, given that the time assigned for completing such a hefty project and limited manpower resources involved, it is also one huge challenge that has to be stridden to accomplish the final product. With that being said, system errors and bugs have to be captured and deterred once found throughout the lifecycle of this project as spending too much time on fixing bugs might affect the viability for system delivery.

Project Objectives

Aim

The aim of this project is to enhance the general experience of kitchen cooking at home by providing a comprehensive assistance for the users from planning, preparing and actual cooking of the meals. This application is aimed to improve the culinary skills of many house cooks especially for the first timers or new people who wish to learn on how to cook for themselves and their family.

Objectives

1. To offer convenience for house cooks in planning and preparing dishes
2. To provide better hands on experience for young people first time trying on learning to cook

3. To enable younger generations in enhancing their culinary skills by learning more about cuisines from other cultures
4. To entice interests from the public to get more people involved into cooking by making cooking experience more enjoyable
5. To allow users to make and keep their own exclusive recipes together in the application so that kitchen and recipe access can be made available from their fingertips

Target Users

- House Cooks

Deliverables

Cookit is an all-in-one mobile cooking toolkit that helps its users especially for the house cooks who cook regularly in the kitchen to handle their kitchen matters from the initial process of planning to actually making the food. Ideally, it acts as a toolkit that people can use to learn how to cook as well as other cultural cuisines that they wish to try on. However, being an all-in-one toolkit, it also tends to offer convenience such as making a checklist for users on what are the required groceries that they need to buy so that they can get it recorded down and not to miss out on the necessary ingredients that they are looking for when shop for groceries. With following is the list of the expected functions that the system has to deliver to achieve the ultimate goal.

Cookit allows House Cooks:

- Search for recipes and follow the guide step-by-step
- Add the required ingredients to grocery list if they do not have the required ingredients
- Save their own exclusive recipes into the application
- Share recipes with others on public to help others better in improving culinary skills together
- Ability to view on what they have cooked and kept as a cooking diary

Resources Needed by the Proposal

Hardware

The minimum hardware requirements needed to support the development of this project are as according:

- 8GB RAM Memory
- 20GB Storage Space
- Intel Core i5 8th Gen CPU
- Keyboard and Mouse

Software

The minimum software requirements for the development of the project are stated as follows:

Code Editor and Database Management System (DBMS)

- Visual Studio Code Community Edition 2019
- Android Studio
- SQLite

Server-Side Scripting, Web Server and File Transfer Protocol (FTP) Software

- Spring Boot

Documentation and Planning

- Microsoft Word 2019
- Microsoft Project 2019
- Microsoft Visio Professional 2019

Access to Information / Expertise

With the intention of building this mobile cooking toolkit, consultation from supervisor is necessary as he plays a vital role in making sure that my idea for this project is a viable approach and aligned my ideas to right on track. Apart from that, further angles of opinions and information may also be attained through online questionnaires and compiled later to analyze for more useful information to support the development of the application.

User Involvement

The targeted user of this system would be housewives, house cooks as well as other general public users that may need this system to learn on cooking. These users primarily the housewives and ladies who love to cook are to be assessed through online questionnaires to retrieve their honest viewpoints on the system.

Academic research being carried out and other information, techniques being learnt

In order to carry out the deliverables, the preliminary list of books and web pages the developer will study are as follows.

Books

- Name: Flutter Cookbook

Author: Simone Alessandria and Brian Kayfitz

Publisher: Packt Publishing

<https://freecomputerbooks.com/Flutter-Cookbook-by-Simone-Alessandria.html>

- Name: Practical Guide to Building an API Back End with Spring Boot

Author: Wim Deblauwe

Publisher: InfoQ

<https://freecomputerbooks.com/Practical-Guide-to-Building-an-API-Back-End-with-Spring-Boot.html> (Backend with Spring Boot)

- Name: Google Maps API Succinctly

Author: Mark Lewin

Publisher: Syncfusion Inc.

<https://freecomputerbooks.com/Google-Maps-API-Succinctly.html> (Google Maps API)

- Name: Android Development Tutorials

Author: Vogella, TutorialsPoint and Google

Publisher: Vogella.com; TutorialsPoint.com, etc.

<https://freecomputerbooks.com/Android-Development-Tutorials.html> (Android development tutorial)

- Name: Flutter UI Succinctly
Author: Ed Freitas
Publisher: Syncfusion Inc.
<https://freecomputerbooks.com/Flutter-UI-Succinctly.html> (Flutter UI)

Online Resources

Acharya, D. P. (2022, March 23). *11 Best Food API Solutions for Nutrition and Recipe*. From GEEKFLARE: <https://geekflare.com/food-api-solutions/>

Carr, K. (2017, August 16). *knowledgehut*. From Agile Project Management Vs. Traditional Project Management: <https://www.knowledgehut.com/blog/agile/agile-project-management-vs-traditional-project-management>

Cox, T. (2022, January 14). *What Is Rapid Application Development (RAD)?* From Capterra: <https://blog.capterra.com/what-is-rapid-application-development/>

Flutter, M. w. (2020, October 25). *Recipe Flutter App UI Kit - Speed Code Tutorial*. From Youtube: <https://youtu.be/3g5fi65U7ag>

IVASHYNA, A. (2022, January 31). *DOIT Software*. From Software Development Plan: How to Build One in 2022: <https://doit.software/blog/software-development-plan#screen1>

Kapoor, A. (2021, September 22). *Why Flutter Is the Best Option for Developing Mobile Applications*. From Medium: <https://medium.datadriveninvestor.com/why-flutter-is-the-best-option-for-developing-mobile-applications-75f9124deb24>

Konijn Design Studio. (2019, April 1). From What is RAD (Rapid Application Development): <https://blog.konijnstudio.com/2019/04/rapid-application-development.html>

RapidAPI. (2022, January 24). *Top 9 Best Recipe APIs (for Developers) [in 2022]*. From The RapidAPI Blog: <https://rapidapi.com/blog/recipe-apis/>

Skuza, B., Mroczkowska, A., & Włodarczyk, D. (2021, May 10). *Flutter vs. React Native – What to Choose in 2022?* From Droids on Roids: <https://www.thedroidsonroids.com/blog/flutter-vs-react-native-what-to-choose-in-2022>

Tiwari, S. (2020, March 24). *Build a Recipe App with Flutter | Flutter Tutorial For Beginners*. From Youtube: <https://youtu.be/VTR5HpRfS0A>

Development Plan for the Proposed Project

System Development Methodology

In a software development plan, it describes all the necessary periods and processes needed for bringing a project to life by covering from the very beginning phase such as planning till one project is instigated and eventually implemented (IVASHYNA, 2022).

To build this mobile cooking toolkit application, I have taken a few crucial criteria into consideration to decide between whether to follow a rigid developmental approach or an agile system methodology. To put them both in equal line of comparison, agile methodology is a better pick over a traditional due to the reason being that with agile approach, a project can still be resumed even when the previous stage was not perfected, this is mainly contributed from the characteristic of agile methodology of allowing flexible changes at any time (Carr, 2017). As concerned that this project is slightly complicated for the developer, therefore with best bet, an agile type of methodology needs to be chosen in this project.

As a final decision over which development methodology to pick, Rapid Application Development (RAD) is selected in this project due to some of the characteristics that made it deem as the most suitable approach to be chosen. One of the feature that RAD offers is that it can speed up the delivery of final product by making quick iterations in the middle of the process which refines the product until best quality is produced (Cox, 2022). Taking into note that this project only has limited time to be completed, therefore with such trait presented by RAD it proves that picking RAD as the developmental approach would be more suitable than others. Asides, efficiency is promoted in RAD as most of the functionalities are taken from previous prototypes, which make the entire development process to be shortened by reusing what was already tested in earlier prototypes. Figure attached in below section demonstrates the overall phases of RAD in detailed.

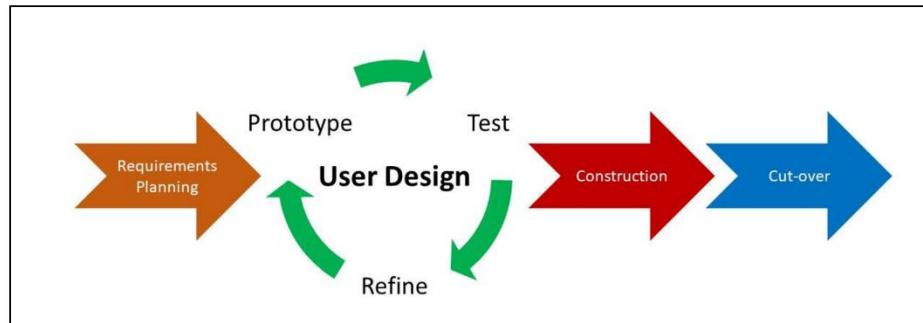


Figure 1 - Rapid Application Development Phases (Konijn Design Studio, 2019)

Evaluation and Test Plan for the Proposed Project

Success Criteria

The success factor of this system relies on the user involvement from the aspect of public users who have interest in learning on how to cook. With features of allowing users to execute actions from planning, preparing and to food making, this makes it being to be labelled as an all-in-one application that combines multiple features and functionalities all managed in only one system. To prepare a fully well-functioning system, the users will be required for conducting system testing as listed below.

Unit Testing

Unit testing is needed to be conducted to assess the functionality of each individual component in the system to ensure that every component is working as intended. In unit testing, each unit in the system is tested separately before they are to be integrated together so that future fixes of the system can easily be deterred if each unit has been tested to be working properly with zero issues on their own, hence saving lots of time and cost. For example, adding some grocery items with dummy data into the checklist to test out if the checklist can display the added items properly.

Integration Testing

As what may be mentioned earlier, integration testing is a test to be carried out when two or more unit components are fused to work concurrently to perform a specific task. To make an exemplary assumption, this can be demonstrated by typing some food names and observe if the grid table can display any relevant recipe search results.

Usability Testing

Usability testing in general terms of understanding is known as user acceptance test. It is to define how the users feel about the system after using it and identify from their opinions what can be improved and what other opinions can be collected from them. This is one crucial step as it helps finding out if the system is actually useful for the users that might be using the system and how user friendly the system is. In an example, when the user wants to look for recipe of a food dish, are the steps for the user to execute the task practical, otherwise what should be improved and what can be suggested or removed from the system to enrich the system usability.

Gantt Chart

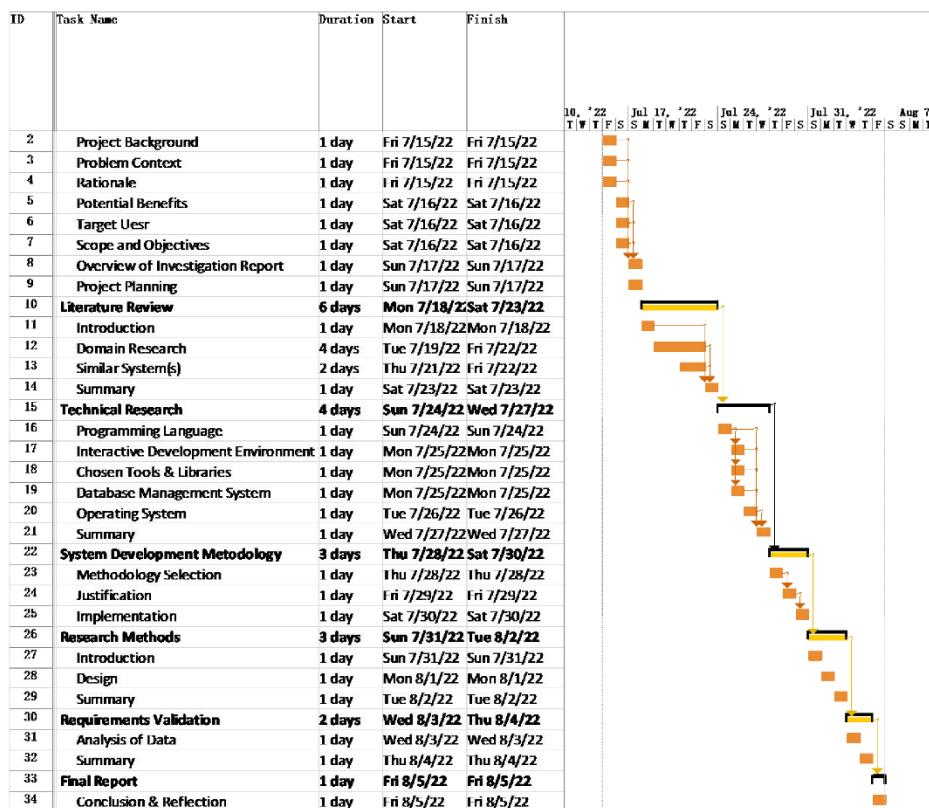


Figure 2 - Gantt Chart Diagram

Office Record	Receipt – Fast-Track Ethical Approval
Date Received:	Student name: TANG MING ZE Student number: TP054682
Received by whom:	Received by: MR. AU YIT WAH Date: 22-JULY-2022

APU / APIIT FAST-TRACK ETHICAL APPROVAL FORM (STUDENTS)

Tick one box (level of study):

- POSTGRADUATE (PhD / MPhil / Masters)
- UNDERGRADUATE (Bachelors degree)
- FOUNDATION / DIPLOMA / Other categories

Tick one box (purpose of approval):

- Thesis / Dissertation / FYP project
- Module assignment
- Other: _____

Title of Programme on which enrolled : SOFTWARE ENGINEERING

Tick one box: Full-Time Study or Part-Time Study

Title of project / assignment : Tracezily – A Business Logistics Fleet Management System

Name of student researcher : TANG MING ZE

Name of supervisor / lecturer : MR. AU YIT WAH

Student Researchers- please note that certain professional organisations have ethical guidelines that you may need to consult when completing this form.

Supervisors/Module Lecturers - please seek guidance from the Chair of the APU Research Ethics Committee if you are uncertain about any ethical issue arising from this application.

		YES	NO	N/A
1	Will you describe the main procedures to participants in advance, so that they are informed about what to expect?	✓		
2	Will you tell participants that their participation is voluntary?	✓		
3	Will you obtain written consent for participation?	✓		
4	If the research is observational, will you ask participants for their consent to being observed?	✓		
5	Will you tell participants that they may withdraw from the research at any time and for any reason?	✓		
6	With questionnaires and interviews will you give participants the option of omitting questions they do not want to answer?	✓		
7	Will you tell participants that their data will be treated with full confidentiality and that, if published, it will not be identifiable as theirs?	✓		
8	Will you give participants the opportunity to be debriefed i.e. to find out more about the study and its results?	✓		

If you have ticked **No** to any of Q1-8 you should complete the full Ethics Approval Form.

		YES	NO	N/A
9	Will your project/assignment deliberately mislead participants in any way?		✓	
10	Is there any realistic risk of any participants experiencing either physical or psychological distress or discomfort?		✓	
11	Is the nature of the research such that contentious or sensitive issues might be involved?		✓	

If you have ticked **Yes** to 9, 10 or 11 you should complete the full Ethics Approval Form. In relation to question 10 this should include details of what you will tell participants to do if they should experience any problems (e.g. who they can contact for help). You may also need to consider risk assessment issues.

		YES	NO	N/A
12	Does your project/assignment involve work with animals?		✓	
13	Do participants fall into any of the following special groups? Note that you may also need to obtain satisfactory clearance from the relevant authorities	Children (under 18 years of age) People with communication or learning difficulties Patients People in custody People who could be regarded as vulnerable People engaged in illegal activities (eg drug taking)	✓	
14	Does the project/assignment involve external funding or external collaboration where the funding body or external collaborative partner requires the University to provide evidence that the project/assignment had been subject to ethical scrutiny?		✓	

If you have ticked **Yes** to 12, 13 or 14 you should complete the full Ethics Approval Form. There is an obligation on student and supervisor to bring to the attention of the APU Research Ethics Committee any issues with ethical implications not clearly covered by the above checklist.

STUDENT RESEARCHER

Provide in the boxes below (plus any other appended details) information required in support of your application, THEN SIGN THE FORM.

Please Tick Boxes

I consider that this project/assignment has no significant ethical implications requiring a full ethics submission to the APU Research Ethics Committee.	✓
Give a brief description of participants and procedure (methods, tests used etc) in up to 150 words.	
The participants that would be involved would be fleet manager, driver as well as customer that may need this system to perform delivery tracking. These users are to be assessed through online questionnaires to retrieve their honest viewpoints on the how this system should be built. Ideally the minimum number of responses is set at 30 responses.	
I also confirm that: i) All key documents e.g. consent form, information sheet, questionnaire/interview are appended to this application. Or ii) Any key documents e.g. consent form, information sheet, questionnaire/interview schedules which need to be finalised following initial investigations will be submitted for approval by the project/assignment supervisor/module lecturer before they are used in primary data collection.	

E-signature..... Print Name : TANG MING ZE Date : 22-July-2022
(Student Researcher) 

Please note that any variation to that contained within this document that in any way affects ethical issues of the stated research requires the appending of new ethical details. New ethical consent may need to be sought.

The completed form (and any attachments) should be submitted for consideration by your Supervisor/Module Lecturer

**SUPERVISOR/MODULE LECTURER
PLEASE CONFIRM THE FOLLOWING:**

Please Tick Box	
I consider that this project/assignment has no significant ethical implications requiring a full ethics submission to the APU Research Ethics Committee	<input checked="" type="checkbox"/>
i) I have checked and approved the key documents required for this proposal (e.g. consent form, information sheet, questionnaire, interview schedule) Or ii) I have checked and approved draft documents required for this proposal which provide a basis for the preliminary investigations which will inform the main research study. I have informed the student researcher that finalised and additional documents (e.g. consent form, information sheet, questionnaire, interview schedule) must be submitted for approval by me before they are used for primary data collection.	<input type="checkbox"/>
	<input checked="" type="checkbox"/>

SUPERVISOR AND SECOND ACADEMIC SIGNATORY

STATEMENT OF ETHICAL APPROVAL (please delete as appropriate)

- 1) **THIS PROJECT/ASSIGNMENT HAS BEEN CONSIDERED USING AGREED APU/SU PROCEDURES AND IS NOW APPROVED**
- 2) **THIS PROJECT/ASSIGNMENT HAS BEEN APPROVED IN PRINCIPLE AS INVOLVING NO SIGNIFICANT ETHICAL IMPLICATIONS, BUT FINAL APPROVAL FOR DATA COLLECTION IS SUBJECT TO THE SUBMISSION OF KEY DOCUMENTS FOR APPROVAL BY SUPERVISOR (see Appendix A)**

E-signature.....  Print Name : MR. AU YIT WAH
(Supervisor/Lecturer)

Date: 1/8/2022

E-signature..... Print Name: DR. MURUGANANTHAN VELAYUTHAM Date.....
(Second Academic Signatory)

Cookit – An All-In-One Mobile Cooking Toolkit

Investigation Report Consent Form

Title of the Final Year Project: Cookit – An All-In-One Mobile Cooking Toolkit

SECTION A (To be filled by Participant)

Please read the Information Sheet very carefully before filling up the Consent Form. You may withdraw your participation anytime during the study without question. Any questions you have can be kindly asked to the researcher of the project.

Name of Participant: Teng Yun (You can choose not to fill this.)

Age: 21

Gender: Female

Please tick the following boxes to ensure you have been well-informed about the project study that you are going to undertake.

I have read and understood the Information Sheet and am well informed that I will give my truthful, honest and faithful response during the study.

SECTION B (Signature and Agreement)

Date of Participation: 15/08/2022

Signature of Participant:  .

Signature of Parent / or Supervisory Guardian (Optional): 

Signature of Researcher: 

Cookit – An All-In-One Mobile Cooking Toolkit

Investigation Report Consent Form

Title of the Final Year Project: Cookit – An All-In-One Mobile Cooking Toolkit

SECTION A (To be filled by Participant)

Please read the Information Sheet very carefully before filling up the Consent Form. You may withdraw your participation anytime during the study without question. Any questions you have can be kindly asked to the researcher of the project.

Name of Participant: Chee Min Ann (You can choose not to fill this.)

Age: 21

Gender: Female

Please tick the following boxes to ensure you have been well-informed about the project study that you are going to undertake.

I have read and understood the Information Sheet and am well informed that I will give my truthful, honest and faithful response during the study.

SECTION B (Signature and Agreement)

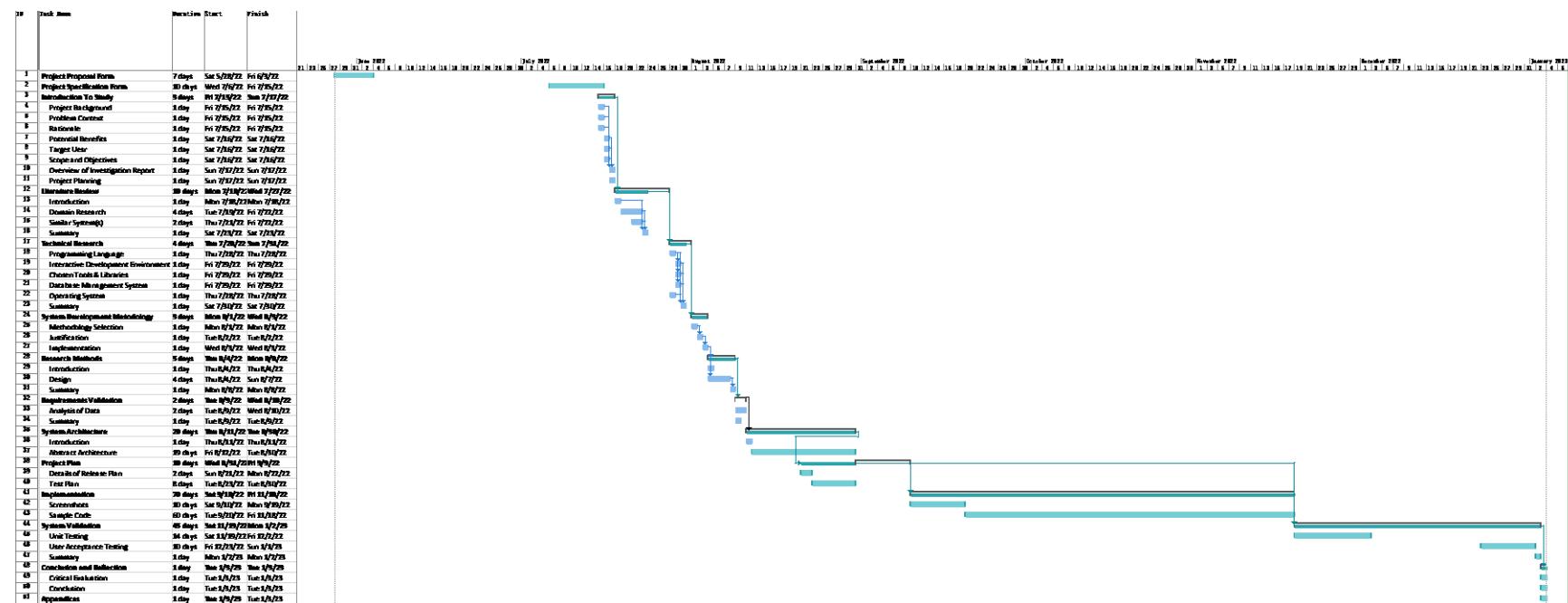
Date of Participation: 15/08/2022

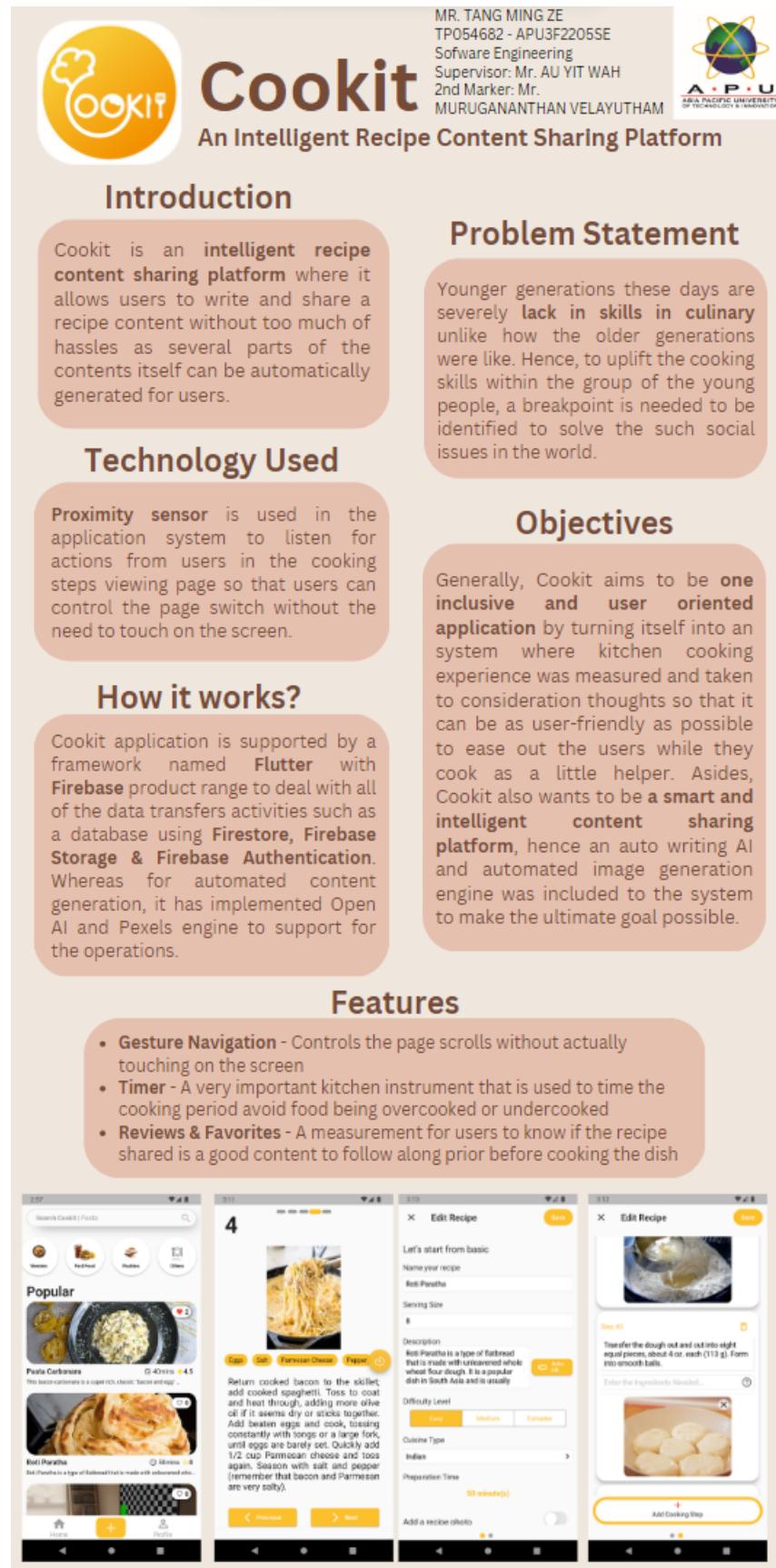
Signature of Participant: 

Signature of Parent / or Supervisory Guardian (Optional): 

Signature of Researcher: 

Gantt Chart





Cookit
An Intelligent Recipe Content Sharing Platform

Introduction

Cookit is an intelligent recipe content sharing platform where it allows users to write and share a recipe content without too much of hassles as several parts of the contents itself can be automatically generated for users.

Technology Used

Proximity sensor is used in the application system to listen for actions from users in the cooking steps viewing page so that users can control the page switch without the need to touch on the screen.

How it works?

Cookit application is supported by a framework named **Flutter** with **Firebase** product range to deal with all of the data transfers activities such as a database using **Firebase Storage & Firebase Authentication**. Whereas for automated content generation, it has implemented Open AI and Pexels engine to support for the operations.

Problem Statement

Younger generations these days are severely lack in skills in culinary unlike how the older generations were like. Hence, to uplift the cooking skills within the group of the young people, a breakpoint is needed to be identified to solve the such social issues in the world.

Objectives

Generally, Cookit aims to be one inclusive and user oriented application by turning itself into an system where kitchen cooking experience was measured and taken to consideration thoughts so that it can be as user-friendly as possible to ease out the users while they cook as a little helper. Asides, Cookit also wants to be a smart and intelligent content sharing platform, hence an auto writing AI and automated image generation engine was included to the system to make the ultimate goal possible.

Features

- **Gesture Navigation** - Controls the page scrolls without actually touching on the screen
- **Timer** - A very important kitchen instrument that is used to time the cooking period avoid food being overcooked or undercooked
- **Reviews & Favorites** - A measurement for users to know if the recipe shared is a good content to follow along prior before cooking the dish