THE DEVELOPMENT OF MOBILE ITINERARY PLANNER FOR KAMPAR TOURISM

BY

TONG GUO WEI

A REPORT

SUBMITTED TO

Universiti Tunku Abdul Rahman

in partial fulfillment of the requirements

for the degree of

BACHELOR OF COMPUTER SCIENCE (HONOURS)

Faculty of Information and Communication Technology
(Kampar Campus)

JAN 2021

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Date: 16/4/2021

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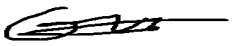
Signature : 

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Date : 14 APRIL 2021

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ABSTRACT

Itinerary planning is an important key to organizing a pleasant and smooth trip. It is a process that can be very complicated for a tourist to create an efficient trip. Travelling has become very common but important to people nowadays. Travelling can expand people's horizons and broaden their knowledge. In this age of advanced internet communication technology, tourists can easily obtain information about travel places on the internet. However, it is very difficult and time-consuming to plan a trip because it needs to do many kinds of research on the places to ensure the trip is unimpeded. To overcome these problems, this project proposes an Android mobile application of the itinerary planner to generate an itinerary plan for users. Since different users may have different tourist attraction preferences, the mobile application will auto-generate an itinerary plan that recommends a list of attractions based on the selection of user preference and the location of selected hotel. Also, it will arrange the best travel route for the user. The user can also modify the itinerary plan by adding places they are interested in or removing places they are not interested in. It will also provide some useful information about the attractions and also the nearby restaurant information to the user for reference. Since this mobile application is developed for Kampar tourism, so it will cover most of the tourist attractions and information around Kampar.

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LIST OF ABBREVIATIONS

APP	Application
API	Application Programming Interface
ETC	et cetera (and so on)
SDK	Software Development Kit
JDK	Java Development Kit
RAD	Rapid Application Development
IDE	Integrated Development Environment

CHAPTER 1: INTRODUCTION

1.1 Problem Statement

In recent years, many reasons attract many tourists to come to visit Kampar. Those reasons include natural attractions, historical and cultural heritage, and famous food. For example, West Lake, Kinta Tin Mining Museum, and some famous food restaurants located at Kampar. In addition to being able to better understand the history and culture of the area, tourists can also taste many delicious foods. This is because there is a lot of famous and tasty food that can be found at Kampar. However, there have some attractions that not easily find and did not promote by advertisement, so most tourists will miss these interesting attractions without a travel guide. Even though the network is very developed now, some places can be promoted through Facebook and other online platforms, but most places that can be found are only some modern tourist attractions, which causes tourists to miss some of the older tourist attractions with historical and cultural value. Also, some local hawkers may not do well on the advertising on social media compare with modern shops such as Sushi Mentai, bubble tea shop, steamboat shop, and others. Tourists are also hard to find the location if they do not know the shop name. Hence, this will cause tourists to lose the opportunity to try local traditional and delicious food.

Besides that, it is very difficult and time-consuming to plan the trip because they need to do many kinds of research of that places and for those who have only limited time for traveling such as a 1-Day trip. They may not know how far the distance is between the attractions and how much time is required to spend on the activity. Moreover, they may not know the business hour of visiting places including shops, hawker centre or tourist attractions. They might miss out on the opportunity to visit those places if they go at the wrong timing, they also need to readjust the trip plan and it will waste a lot of time to plan it again. Furthermore, some tourists may not have an idea about where to visit, where to eat, where to play, and where is a better place to take the photo and enjoy the trip. They can only visit the attractions like a headless fly when they see something there and eat and play. This may cause them to visit some places with bad reviews and make the whole trip unpleasant. In response to these problems, an Android mobile application of itinerary planner is proposed to develop in this proposal. This application will provide the user with an auto-generated itinerary plan based on user preference, nearby restaurant, some important information, and the best route of the trip to enjoy and complete the trip easily.

1.2 Background Information and Motivation

With the blooming of Internet Technology, mobile computing has already become a very common technology as it brings a lot of conveniences to people, and in the meantime the cost is continuously decreasing. Most people own a smart phone, and they use it to complete many things in life especially when it is not convenient to use a desktop computer and landline for internet access. For example, when a tourist is travelling and he/she would like to get some information or services to enhance his/her travelling experience, then a mobile application would be a much better choice compared with a web application. In other words, tourism has become one of the industry sectors that is most suitable for mobile technology and mobile application. There are a lot of service types that are provided by tourism applications and they can be classified into four categories, which are "Online booking", "Information Resource", "Location-based Services" and "Trip Journal" (Smirnov et al., 2014).

Most people use these types of mobile applications to plan their trip, and also get the useful information of travel places which they are not familiar with. Some travel apps provide users to write the review of the travel places to let other users know what the more interesting places/events are to visit/attend in the local area. Before the age of advanced network, if people want to travel to a place, apart from preparing a bunch of research materials, they also need a trusted tour guide to plan their trip to avoid unpleasant experiences. Hence, a travel app gives a lot of benefits and conveniences to people to enjoy and plan their trip nowadays because they can get any information of travel guide on internet when they are needed.

On the other hand, travel app can boost the tourism industry because some tourist attractions are rarely known to tourist will have the chance to get exposed to the tourists. Moreover, preparing a good travel plan is somehow a cumbersome and complicated process, this will cause many people to give up the idea of traveling. An itinerary travel app will be developed for solve this problem in this project and it makes people easy to get the plan of traveling. Itinerary app is a type of travel guide service that combine "Information Resource" and "Location-based Services" to recommend the tourist attractions around based on the user's preference and context in considered area (Smirnov et al., 2014). User also can readjust the itinerary of trip when they meet some delay. Itinerary app provides a lot of information and travel guide to tourist and help them to explore the tourist attractions.

Apart from this, Malaysia's tourism industry is growing rapidly because Malaysia has many natural attractions and historical heritage, especially in Perak state. For example, the capital city of Perak, which is Ipoh and the education city, which is Kampar, these two places have a lot of natural attractions and historical heritage to boost the tourism industry of Perak. According to The Star Online, there were a total of 7.6 million domestic tourists visited Perak in 2017, it was placing the state second after Pahang in a survey on local tourism that was carried out from the Statistic Department (KAUR, 2018). Tourists often visit Kampar for trips. Hence, we can see that Ipoh and Kampar occupy a very important position in Perak's tourism industry. Also, it is an opportunity to develop an itinerary planner mobile application to boost the tourism industry of Kampar and let tourists can be more familiar with the background information of this place.

1.3 Project Objective

The purpose of developing this mobile application is developed for the tourist that do not have an idea or time to plan the itinerary of the trip. Also, this mobile application is developed to improve the economy and tourism industry of Kampar. Hence, an Android mobile application of itinerary planner to provide travel guide service that combines with information resource and location-based service to solve the problems and helps to boost the tourism industry of Kampar.

The main objective of this project is aimed to assist the tourists to plan their trip efficiently. It recommends several attractions that provide useful information, travel route guide, and routes of the trip to save the tourist's planning time. This mobile application can help tourists that do not have an idea of planning a trip and reduce the time-consuming tourists in planning trips. Therefore, this project is mainly focusing on the recommendation system part.

The sub-objectives are as follow:

1. The recommendation system is expected to recommend a list of attractions to tourists according to the user preference, number of the travel day, and the location of the selected hotel.
2. Data can be connected to the Firebase; each user has a unique account to store their own itinerary plan. Users can view or delete the saved itinerary plan anytime.

3. The mobile application can provide useful information (location, route of trip, and place details), travel guides, and reviews of the attractions to tourists.
4. The system is expected to find the best travel route of the trip by calculating the distance between attractions.
5. The mobile application is expected to display the nearby restaurant (1/2/3 km radius) when the user needs to find a restaurant.

The itinerary planner mobile application of this project has covered the attractions of the Kampar area only. It is used to boost the economy and tourism industry. At the same time, this application makes tourists know more about Kampar.

1.4 Project Scope

This project is proposed to develop an Android mobile application that will generate an itinerary plan for the users. This is because the number of mobile phone users is growing rapidly nowadays due to the convenience of the mobile phone. On the other hand, this project is mainly focusing on tourism in Kampar. Therefore, the basic information, travel guide, and reviews of the attraction displayed in the itinerary planner app will cover most of the tourist attractions around Kampar. The mobile application will display useful information to the user such as attractions details, the routes of trip, plan details, and so on.

Besides that, users also can select the auto-generated itinerary plan for creating a list of recommended attractions from their chosen preference, the location of selected hotel, and the number of travel day, so the study in this project will focus on the recommendation system part of the app. The number of recommended attractions is based on the number of the travel day. Also, the location of selected hotel is a starting point that used to arrange the itinerary plan later. In addition, each category of attractions that choose by user will have an average number of recommended attractions to add in the list, this ensure that the selected category is not ignored. Furthermore, the user can modify their itinerary list by adding places they are interested in or removing places they are not interested in and can arrange the itinerary plan to a certain day. Lastly, users can create multiple itinerary plans, so they can choose new preferences when they want to visit other categories of attractions.

1.5 Proposed approach/study

First and foremost, the data of the attractions, hotel and restaurant need to be collected from internet resource. Then, the Google Firebase will be used to store the

user data and attractions data. The most important part in this project is the recommendation system. There are some important data that fill up by user to help the system generate the itinerary plan such as number of travel day, location of the selected hotel and the category of user preferences. Firstly, the system will filter the list of the attractions that store in database according to the selected category. Then, the system will add attractions in order in each selected category, so each selected category will have an average number of attractions. After the recommended list of attractions is generated, user can choose to add or delete the item of the list. The maximum number of the attractions in the itinerary plan is based on the number of travel day, there will be three attractions to visit every day. On the other hand, if the recommended list is not reach to the maximum number when user press to the next activity, the system will automatically add free slot to user, free slot means user plan do visit any place at that slot. After user finished to modify the recommended list, user press the next button to proceed to arrange the itinerary plan. The system will help user to arrange the itinerary plan by distance between location of selected hotel and location of attractions first, this feature is used to group the nearby attractions in every day. If users feel dissatisfied with the automatic arrangement, users can drag the item to arrange the plan by themselves. Finally, user can press the save button to save the itinerary plan to the Firebase. User can view back the itinerary plan that retrieve from the Firebase later.

1.6 Highlight of What Have Been Achieved

So far, there is no mobile application that can auto-generate and recommend an itinerary plan of Ipoh and Kampar to tourists. People need to plan the itinerary plan of the trip by themselves which is very time-consuming and difficult. This application allows users to choose their preferences of attractions to generate an itinerary plan of Kampar. Besides, to recommend by user preference, the itinerary plan will also generate a best route to user based on the distance between location of hotel and location of attractions. So, users do not need to spend a lot of time on planning and do research on attractions to get an itinerary plan, they use this mobile application auto-generate the plan and view the useful information of the attractions anytime.

On the other hand, user data such as user preference and behaviour of traveling can be collected for design a better recommendation system of attractions by the reviews and feedback of users about their traveling experiences. Also, the collected data can be used for future analysis trends on the area of the tourism industry to promote the economy and tourism of Kampar.

1.7 Report organization

There are 7 chapters in this report, chapter 1 is mainly describing the introduction of the project such as problem statement, objective, background and the highlighted achievement. In Chapter 2, there are some relevant existing solutions paper or app have been reviewed. Chapter 3 is explained the system design of the project in details, it has included the system architecture design, system flow chart, use case diagram and description. Chapter 4 is described about the methodology, tool to use and some requirement of this project. Then, chapter 5 and chapter 6 are mainly explained about the implementation of the prototype and testing of the application. Lastly, chapter 7 is the conclusion of the project and future work.

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CHAPTER 2: LITERATURE REVIEW

2.1 Review on Papers

There are some existing similar travel app solving tourists' problems in different situation. Those apps help users to get information of attractions, accommodation booking, ticket booking, itinerary plan, route map, etc. However, those service are only considering as the basic function of travel app and some of them have some flaws in function. If we can learn their strengths and fix their weaknesses in those apps, then a more completed travel app can be created.

2.1.1 Mobile Application for Guiding Tourist Activities: Tourist Assistant – TAIS

A mobile application for guiding tourist activities was proposed by the author which was "Tourist Assistant-TAIS". This paper also introduced that mobile travel application can classify four categories which were "Online booking", "Information Resource", "Location-based Services" and "Trip Journal" (Smirnov et al., 2014). The most interesting category in this paper was "Travel Guides" that combines the "Information Resource" and "Location-based Services" category. The mobile application "Tourist Assistant-TAIS" was related to the "Travel Guides" category and recommends the nearby tourist attraction.

TAIS has been developed based on the Smart-M3 platform, it greatly simplifies the further development of the system, including new information sources and services, and makes the system highly scalable. The key idea of this platform was formed smart space is a device, domain, and vendor-independent and assumed it can publish embedded information for other devices and software entities through simple, shared information brokers. TAIS was developed using Java KPI library and mobile clients were implemented using Android Java Development Kit. This application was provided a set of services such as recommendation service, attraction information service, region context service, ridesharing service, client application, and public transport service.

Tourists can interact with the clickable map of TAIS to find the best attractions around rank by the recommendation service. Also, TAIS have provided detailed information and image for each attraction, that information was extracted by the attraction information service. Other than that, Tourists can estimate the image of attractions to select "like image", "dislike image" or "image is not applicable" (Smirnov et al., 2014). The recommendation service will reorder images for tourists next time based on those estimations. Furthermore, tourists can browse the reaching path of the attractions in the context menu. After that, the routing service will calculate the distance

of reaching a path based on developed OpenStreetMap-based web mapping service. Moreover, Yandex Schedule API has been used for searching for public transport. To find the attractions reaching path by public transport, the routing service of the application was used two functions which were search nearest station and searching routes between stations. The first function will search station in the areas of the current location of tourists and the location of attraction when the server finds the request for transport search. The second function searches the transport threads between found stations. The result was sorting by the departure time and shows it to tourists. On the other hand, tourists can browse the information about the best attractions around that showed by the TAIS application. Also, TAIS will calculate the distance of every attraction, so tourist can estimate whether the attractions was interested through its name, description, and image.

The authors of this paper have implemented TAIS mobile application to evaluate the performance also. The response time of TAIS was not more than a few seconds for every operation. For instance, it was taken about 3 seconds for acquiring, ranking, and providing to the tourist up to 50 nearest attractions. Most of the time spent was acquiring a list of attractions that around tourist. Apart from this, the information source was getting from online Wikipedia, so the response time can be significantly decreased. Also, the author implements an experiment show that 1000 tourists use the Smart-M3 platform query response time is approximately 0.3 seconds (Smirnov et al., 2014). However, the query transaction execution time will increase when increasing the number of tourists. So, the more user accesses the application, the more query transaction execution time increase.

Strengths

One of the advantages of TAIS was its extraction of information about attractions that get from a different internet source that allows the tourist to get up-to-date information and does not require to download attraction database before the trip. Furthermore, this application consists of several services that can solve the tourist task. Moreover, smart space technology is used for interoperability support between those services, which allows providing for ontology-based information sharing between different devices. Also, the response time of TAIS is quite fast because it only uses 3 seconds to get up to 50 nearest attractions.

Weaknesses

Despite this mobile application has many advantages that provide to the user, it still has some insufficiency parts that need to be improved. First, the information description of the attractions that provide by Wikipedia might not true. This is because Wikipedia can edit by anyone, some of the information was not correct and not trusted. Other than that, the user interface design of the TAIS mobile application was not very good and neat, it might cause a dazzling user. Furthermore, TAIS did not give any user guide in the application, some users might not know how to use the mobile application. Lastly, there was no channel for user feedback. The user only can estimate the attractions by select "like image", "dislike image" or "image is not applicable". User did not know how to give feedback when there was some problem arises.

2.1.2 Kwan Phayao Tourism Promotion and Support Mobile and Web Application

There was a proposed tourism recommendation system in the platform of mobile and web application which was used to support and promote tourism of Kwan Phayao. This application mainly has three processes which were mobile application, web application, and backend user interface. This application conveniently connects tourists to the hotel, restaurant, attractions, and shop entrepreneurs via mobile and web applications (Chaiwongsai, Srisungsittisanti, and Rojanavasu, 2018). This application was available to recommend tourists as their different interest and the recommendation system was using two techniques which were collaborative filtering system and content-based system.

Collaborative filtering system helps to capture and analyzes user information that gains from many sources such as viewed items by users, rating item from a user, purchased an item from user or keyword from the user (Chaiwongsai, Srisungsittisanti and Rojanavasu, 2018). Then, the system will compare the history of the user called "user profile" with a list of items and recommend the result to the user. On the other hand, the content-based system recommends interesting information to the user based on the properties of the items without comparing user history. It makes the system can provide recommendation destinations immediately when user select their destination. The system will recommend a similar attraction using the k-NN algorithm when the tourist user browses an attraction based on four features: nature, adventure, activity, and culture. It will exploit four attractions that meet the properties of attractions and show more other two random attractions by using uniform random to explore other interesting attractions.

Also, this application has interacted between the local community and entrepreneurs to improve the economy and tourism of Kwan Phayao. In addition to this application was able to recommend users for attractions based on the character of user current content, it also provided update service to local community and entrepreneurs available to get up to date their tourism information. Authors provide individual usernames and passwords to the community agents and entrepreneurs to become trusted with confidential expectations. In the web application process, users can access the website and use the features of the application. The web application included 9 menus: tourist the attraction, restaurant, hotel, souvenir, places for taking a photo, bike route, boat trip, review, and map. Users can get information about tourism on the website to find the location place. Other than that, their mobile application was designed for IOS and Android platforms to make user easily to keep their history, review, and get a message and reminder when they are login by using the Facebook account (Chaiwongsai, Srisungsittisanti, and Rojanavasu, 2018). So that users also can use the navigation system to find their destination anytime. While the backend user interface was provided for entrepreneurs to register or login to update, edit, and delete the information of their attractions, souvenirs, hotel, and restaurant.

Lastly, authors have evaluated their application from 24 hotels, restaurants, and shop entrepreneurs through satisfaction scores that scaled into a 5-point rating scale. They have divided the scores into 3 areas which were system ability, design of the application, and benefits of the system to the business. They get an average of 4.35, 4.29, 4.40 respectively, this was a good result for the application.

Strengths

There are several strengths in this application, the greatest strength is it can support via mobile and web application. Also, it provides entrepreneurs and local communities an account to update their tourism information to improve the economy and tourism industry. Furthermore, the design of the application is clear and colourful. Moreover, the system of application can recommend route and place of attractions and search nearby hotels and restaurants.

Weaknesses

The application does not support English as it is developed in the Thailand language. So, it may cause some foreign tourists difficult to use it. Besides that, four attractions are not many in terms of recommending quantity. Also, the other two

random attractions may not come out with some attractions that users like since the result is got from uniform random.

2.1.3 GO Holiday MY

GO Holiday MY is a travel app that provides the user the convenience to book local hotel deals, holiday packages, outbound packages easily in desktop and mobile. It is managed by AMK Holidays & Event Sdn Bhd, a registered local company, Tourism Malaysia & MATTA Certified. It can be downloaded on Google Play that uploads by eWallz Solutions.

Furthermore, GO Holiday MY also provides the service of booking flight tickets. User can enter their origin place, destination, departure and return data, and the number of passengers to search the suitable flight tickets (shown in *Figure 2-1 and Figure 2-2*). After selecting the destination, the system will provide the user with a list of flight tickets information.

Other than that, GO Holiday MY provides the "More Hotel" option to let the user find their favourites hotel (shown in *Figure 2-3*). Users can filter the hotel to make it easier to find a hotel they like. In addition, users can view the location of the hotel on the map, this will let them know which hotel is more suitable and nearby them (shown in *Figure 2-4*). Moreover, this application also provides another option to find the featured hotel (shown in *Figure 2-5*). Users can specify the features or facilities of the hotel to search their favourite featured hotel.

Lastly, GO Holiday MY can search and book the ticket of the theme park in Malaysia (shown in *Figure 2-6*). It also can book the hotel room in the theme park option. This application also provides some promotions packages to users. Furthermore, user can write a review to the hotel or theme park anytime, so the other users may know how the places whether is good or bad.

Strengths

GO Holiday MY provides very details information about booking hotel and flight tickets. Users can find important information about the hotel and flight tickets in the mobile application. Other than that, a function is very helpful in the mobile application which is users can view the location of the hotel on the map. So, they can find out which hotel is suitable and nearby them. Furthermore, the search filter function is very useful for this application. This is because this GO Holiday MY provides many hotels in Malaysia, the user may hard to find their interested hotel without this search filter function. Lastly, the design of the user interface is very good.

Weaknesses

Due to the GO Holiday MY stores a lot of information details in the database, sometimes it may take a longer time to load the information. This may cause some users to feel impatient or uncomfortable. Besides, there are too many information lists on the screen, making it difficult for users to find important travel information. Furthermore, there are many options on the menu bar that are not yet available. It is better to remove the unavailable option to make it easier for user use because the user may feel like this application is incomplete.

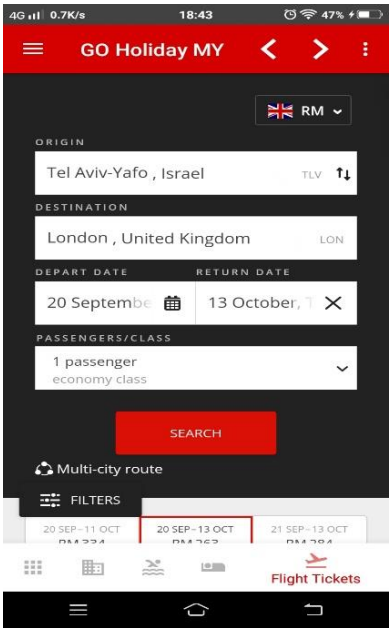


Figure 2-1 Flight Tickets Search Function

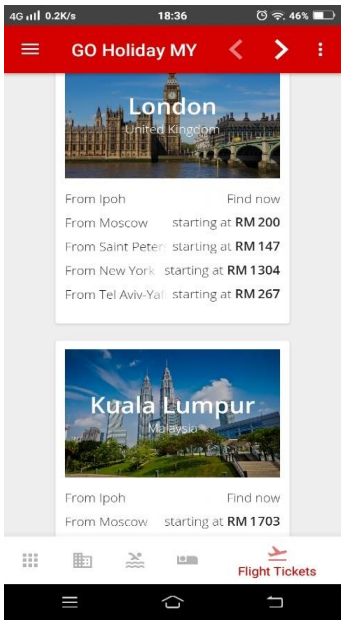


Figure 2-2 Flight Ticket

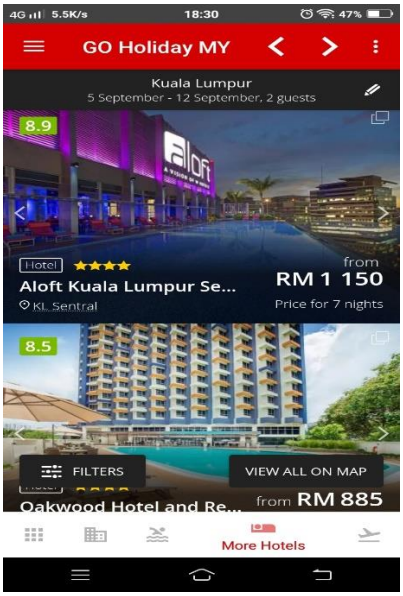


Figure 2-3 Interface of More Hotel

Figure 2-4 View Hotel in Map

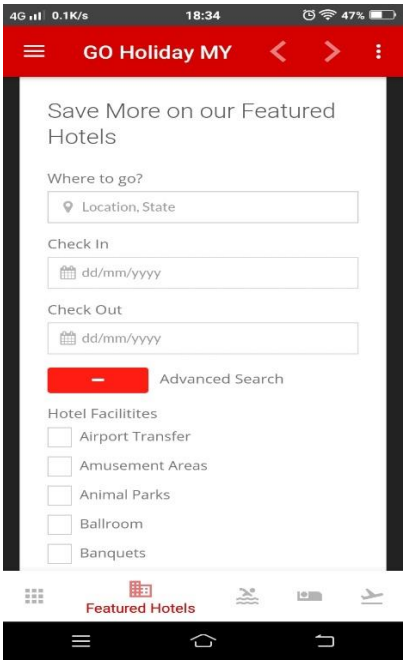


Figure 2-5 Interface of Featured Hotels

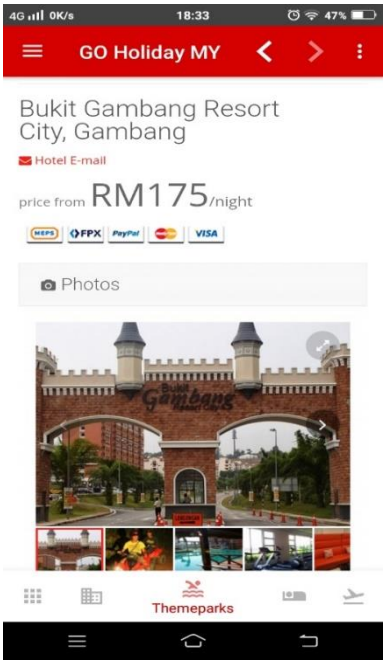


Figure 2-6 Interface of Theme parks

2.1.4 XTVT-Travel Malaysia

XTVT is a travel app that allows users to find activities and places to visit and travel to Malaysia. XTVT is developed and provided by the CiEdge company, it can be downloaded on Google Play. It allows users to plan the journey based on their geographical location, it will first explore the travel destination closest to the users.

The app categorises searches based on popularity including food, outdoor activities, places of visit, and cultural experience. On the homepage of the XTVT, users can find the place they want to go by selecting the category of attractions (shown in *Figure 2-7*). Also, the homepage also provides users the personalised attractions and nearby attractions to give users more choices. When a category is selected by users, it will list out a list of relevant attractions according to the distance between attractions and the user's geographical location (shown in *Figure 2-8*). Each attraction will provide users the basic information about the attractions. Users can click the button to open the google map service to view the location on the map or get the route of the destination (shown in *Figure 2-9*).

On the other hand, users can select the "Explore" button on the menu bar to view all the attractions of Malaysia on the google map (shown in *Figure 2-10*). All the attractions have an icon that is classified according to the categories of attractions. This makes it easier for users to find and distinguish attractions.

Besides that, XTVT has provided the featured experience of attractions to users (shown in *Figure 2-11*). Users also can view the information on the featured attractions. Moreover, users can find accommodation from the mobile application and go to the website for booking accommodation (shown in *Figure 2-12*). Also, users can add their interesting attractions to "Favourites", it will save the attractions to let users easily find it for next time (shown in *Figure 2-13*).

Lastly, the setting of the XTVT can let users submit their activity to share the experiences to the development company (shown in *Figure 2-14*). Also, users can rate or give feedback to the development company to let them have more room for improvement.

Strengths

The user interface design of XTVT is very good, it makes users can use it comfortably. Also, it will explore the nearby attractions first through the user's geographical location. So, users know which attractions are close and look interesting. Furthermore, users can select the categories of attractions to find the type of attractions

they want to go to. This can make users feel convenient and not messy unlike some applications just show all the attractions to users only. In addition, users can view the basic information about the attractions and get the route of the attractions on XTVT. It makes users who travel to Malaysia for the first time to familiar with and reach their destination easily. Users also can view all the attractions on the map, the icon of attractions are classified by categories, it makes user easier to distinguish the attractions. The add favourites is also a good function that helps users can store their interesting attractions, so they can find it easily for next time. Other than that, the submit activity and feedback service let development company can have more interaction with users, so the developer can know the user experience easily.

Weaknesses

Although XTVT has many strengths, it still has some weaknesses. One of the weaknesses is it will wrong detect the geographical location of the user. So, it may have some wrong calculation on the distance between users and attractions. The other weakness is XTVT do not provide the user preference setting, it just provides all the attractions according to the distance between user and attractions. Also, it does not have the filter functions, users cannot filter in the list of attractions.

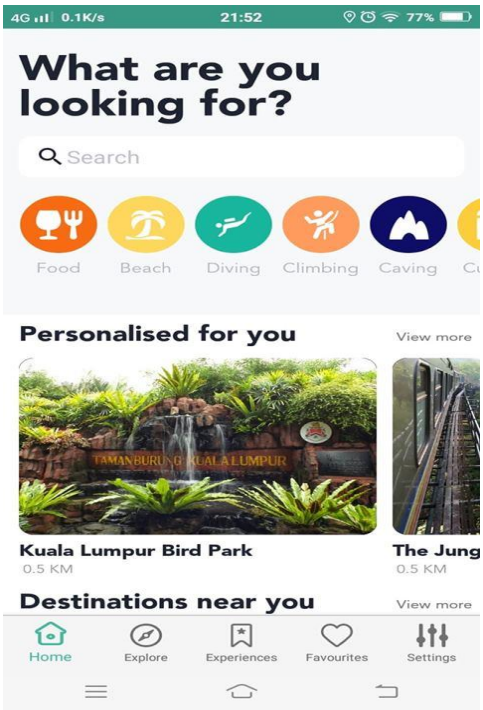


Figure 2-7 Home page of XTVT

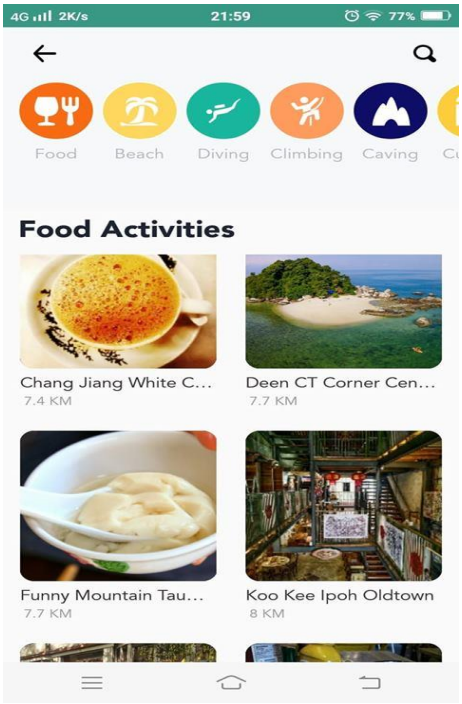


Figure 2-8 Activities Separated by Category

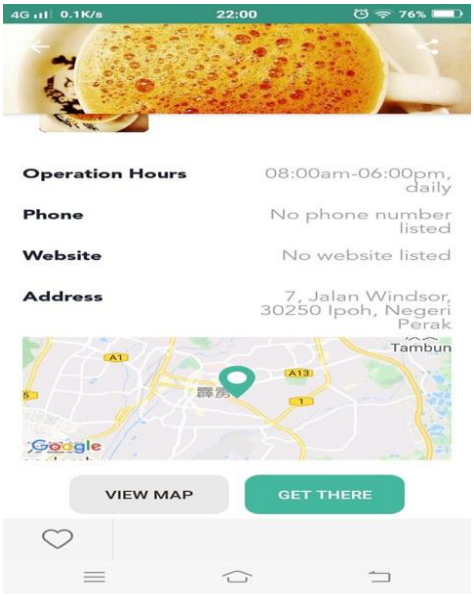


Figure 2-9 Information of Attractions

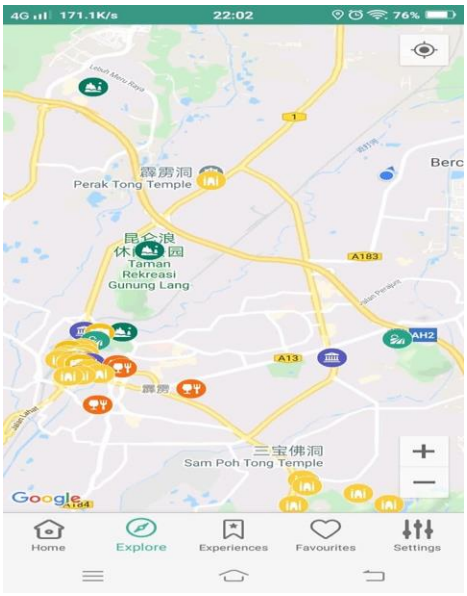


Figure 2-10 Explore Attractions on Map

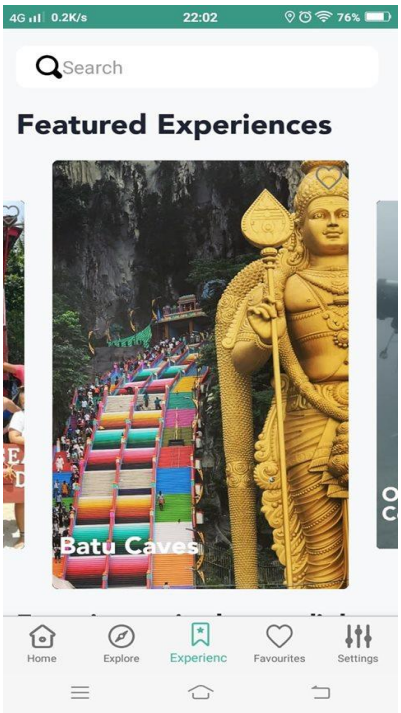


Figure 2-11 Featured Experience

Figure 2-12 Information and Accommodation

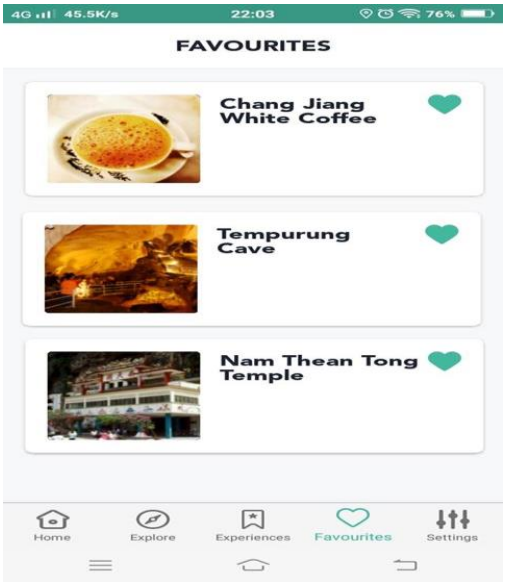


Figure2-13 Favourites Attractions

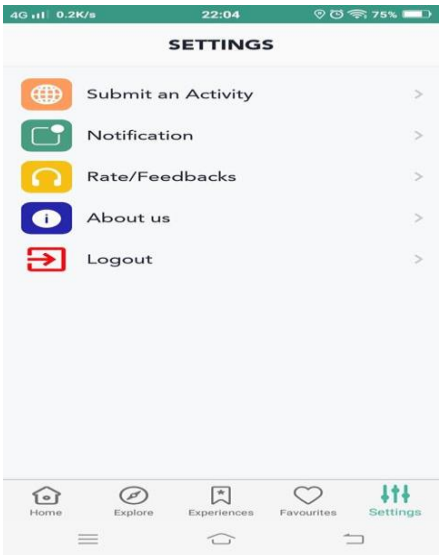


Figure 2-14 Setting Interface

2.1.5 Sygic Travel Maps Offline & Trip Planner

Sygic Travel is a worldwide offline travel map with a travel guide and a built-in trip planner. It collects 50 million places such as hotels, restaurants, shops, museums, and more. Users can choose where they want to go, and the application will plan a detailed trip itinerary. Sygic Travel is offered by Sygic company, it can be downloaded on Google Play.

On the homepage of the Sygic Travel App, users can create several scheduled trips or move the scheduled trip to the "TRASH" list. If the scheduled trip is completed, the trip itinerary will move to the "PAST" list, so the users can refer the schedule anytime (shown in *Figure 2-15*). To create the new trip, users need to enter the date of travel, place of arrival, and accommodation (shown in *Figure 2-16*).

After creating the scheduled trip, there is a tool interface and users can choose to unlock the premium version to get more features on their devices (shown in *Figure 2-17*). The premium version of Sygic Travel provides many useful features such as places information, walking guidance, able to download the offline maps, and no advertising on the app (shown in *Figure 2-18*). On the other hand, users can add the place to the itinerary plan via searching place function (shown in *Figure 2-19*). The searching interface has a filter function to search and filter the places. Also, users can explore the map and add the places to the itinerary plan by click on the icon of places (shown in *Figure 2-20*).

When the places are added by users, the Sygic Travel app will automatically put the closest places together so that the users have a smooth itinerary plan (shown in *Figure 2-21*). Of course, users may also edit the itinerary by themselves. Furthermore, users can view the route of the whole day trip on the map so that the users can get their travel routes visually (shown in *Figure 2-22*).

Strengths

One of the strengths of the Sygic Travel app is its design of user interface, it makes it easy for users to get started. Also, it supports offline travel maps so that the users can use the app when they have no internet connection. Besides, it provides users the estimated time of travel, distance, and driving time between the places. Furthermore, it can check the weather of the place, rent a car, as well as book hotel rooms through the app.

Weaknesses

However, users need to buy the Sygic Travel Premium version for more useful features such as worldwide offline maps, details of places, and the walking guidance. In addition, there is a bug when removing a place from the trip. It does not update the itinerary plan at the same time, users need to quit the plan and enter again to see the updated plan.

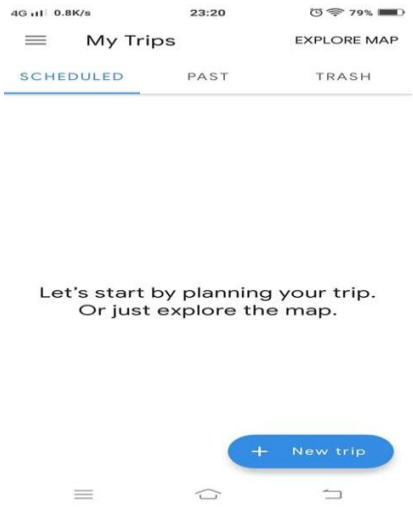


Figure 2-15 Home Page

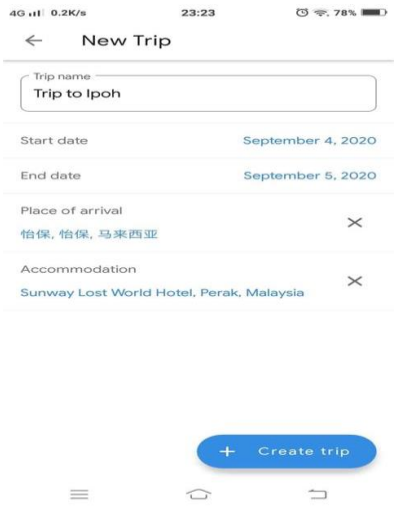


Figure 2-16 Create Trip

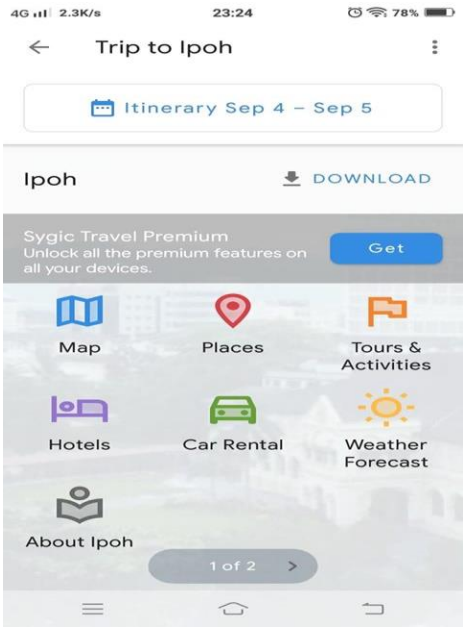


Figure 2-17 Features Interface

Figure 2-18 Premium Features

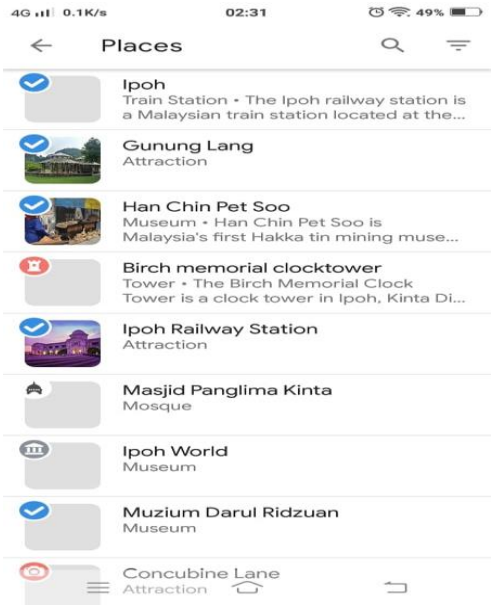


Figure 2-19 Search Place Interface

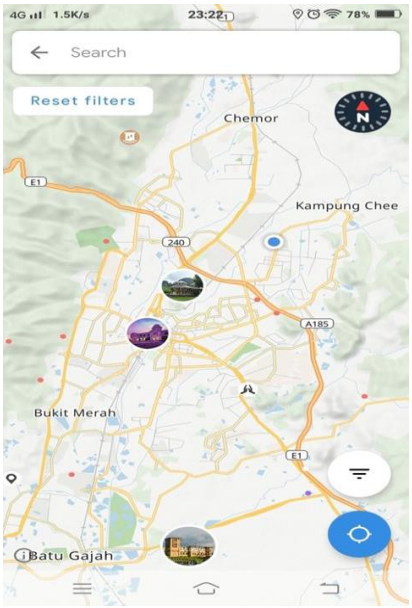


Figure 2-20 Explore on Map

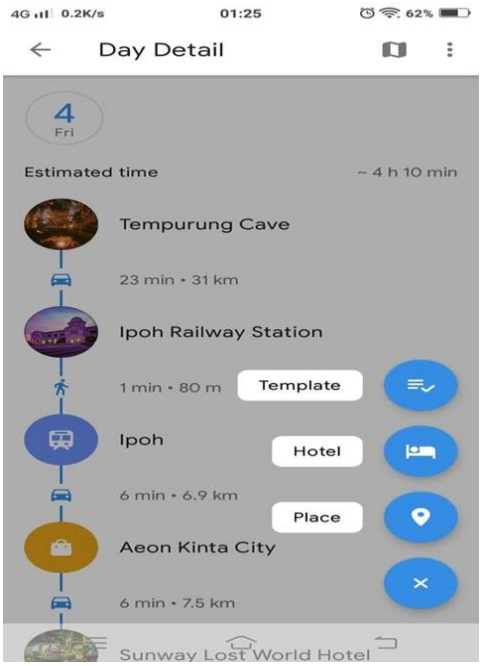


Figure 2-21 Itinerary Plan

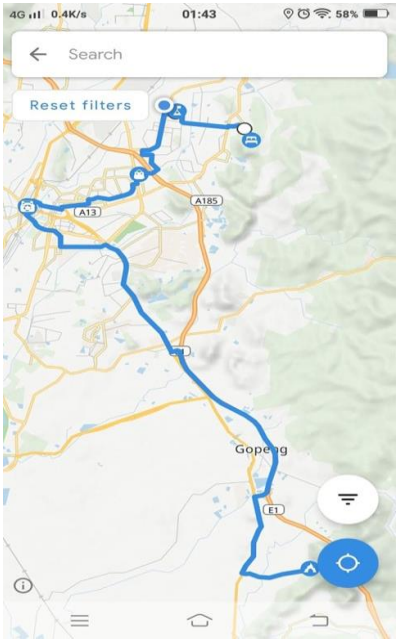


Figure 2-22 Route of Trip

2.1.6 TripIt: Travel Planner

TripIt is a travel planner app that can download from the google play store. It is developed by TripIt company, it has a lot of useful features provide to user to plan a trip. TripIt include a details information of each travel place so that user can be familiar with that place. User can plan a trip and schedule the itinerary manually; user can choose the type of activity and get the place from Google. In addition, user can upgrade the application to TripIT Pro to unlock more features such as send real-time flight status alert, monitor for flight refunds, and provide interactive airport and terminal maps.

Strengths

One of the strengths of TripIT is its user interface design, it let user feel comfortable to use it. Besides that, there are a lot useful information of travel such as booking info, contact number and the place info. Also, it can check the transportation options between the starting point and destination. The other strengths is it can check the nearby place of the location like nearby hospital, pharmacies, café and so on.

Weaknesses

There is very less weakness in TripIt, which is too much information in the application. Users need to spend some time to familiar with app to use it. Too much information makes the application become complex. Also, the free version of TripIt did not provide too many important features to user, user need to pay expensive fee to upgrade their app to TripIt Pro to unlock more features.

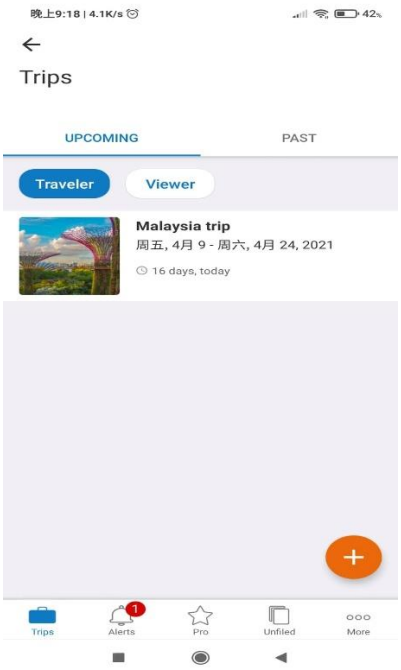


Figure 2-23 View Trip

Figure 2-24 Itinerary Plan

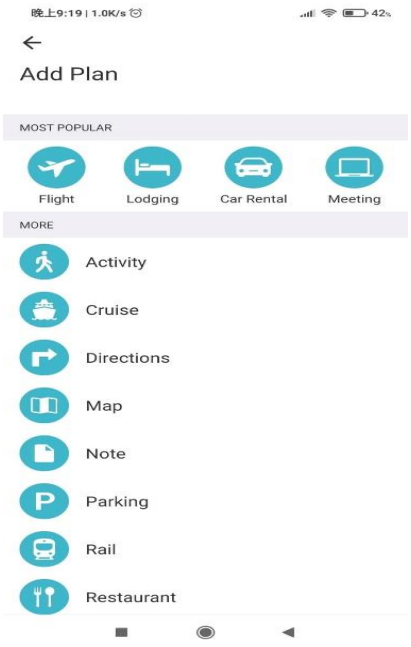


Figure 2-25 Choose Activity

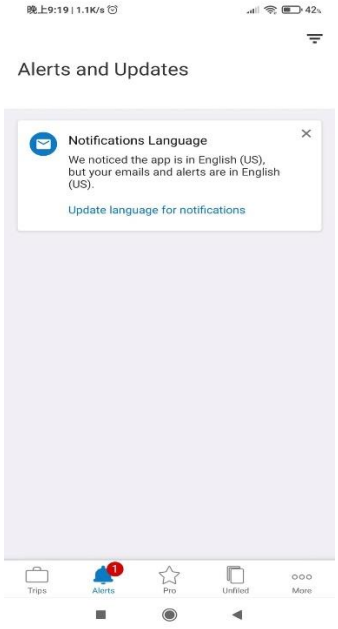


Figure 2-26 Alert Message

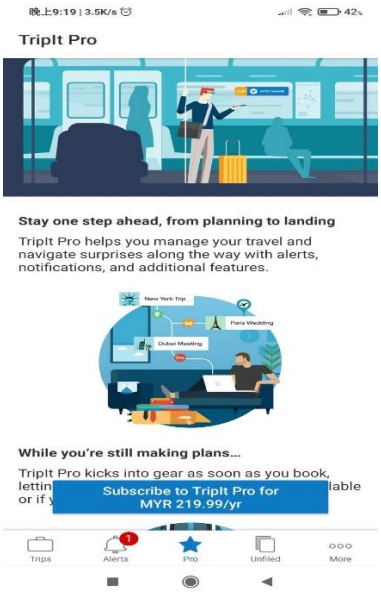


Figure 2-27 Subscribe Pro Version

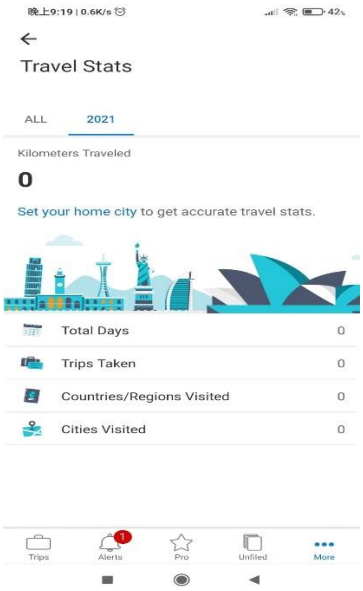


Figure 2-28 Travel Stats Details

2.1.7 Roadtrippers-Trip Planner

Roadtrippers is a trip planner that only map built for travelers. User can plan their road trip with friends or find some amazing place nearby that never knew existed. This application can be downloaded from Google Play Store and it discover millions of places such as local diners and quirky roadside attractions and so on. Roadtrippers is free to find places and plotting route with up to 7 waypoints. However, user need to upgrade to Roadtrippers Plus if user plan to go more than 7 waypoints. Roadtrippers Plus will allow user route up to 150 waypoints per trip and more including collaborating with friends, exclusive offers, custom map styles and offline maps.

Strengths

The strength of Roadtrippers is very convenient for user to plan a trip. User can find any nearby place that never knew before. Also, this application included a lot of information of the place such as details, reviews, photo, and nearby hotel. User also can share their travel guide to each other. User can plot route to create a trip with up to 7 waypoints.

Weaknesses

One of the weaknesses of this application is it only can route to 7 waypoints. User must upgrade to the plus version to unlock further functions. In addition, the content of Roadtrippers is mainly focusing on USA, Canada, Australia and New Zealand only. Also, use of GPS running in the background can decrease user's phone battery life.

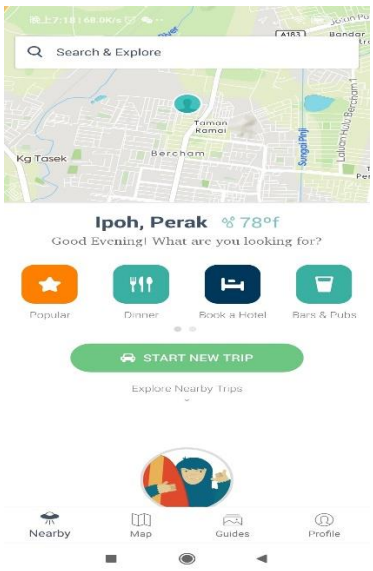


Figure 2-29 Main Page

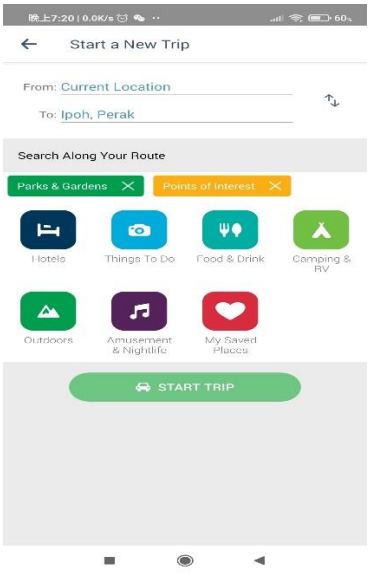


Figure 2-30 Create Trip

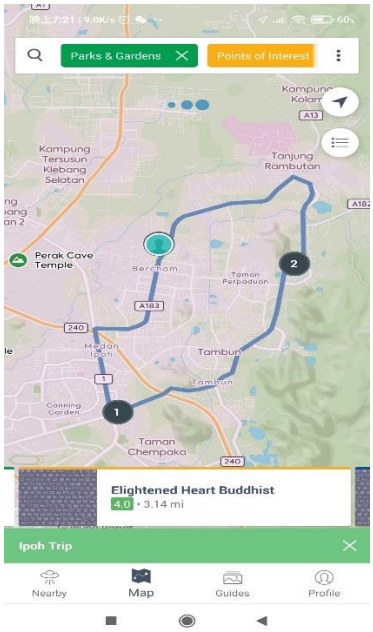


Figure 2-31 Map Route

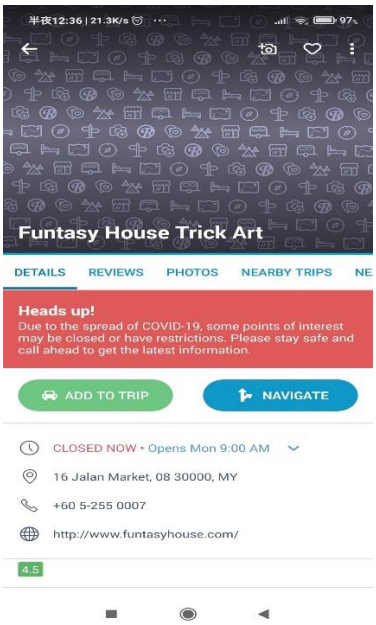


Figure 2-32 Place Details

Figure 2-33 Nearby Hotel

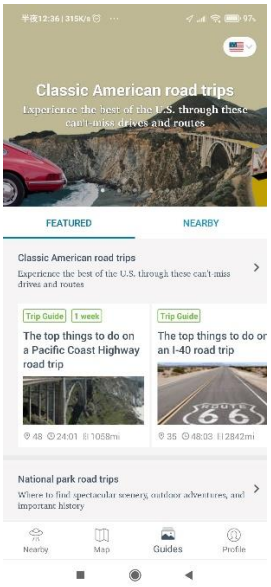


Figure 2-34 Travel Guides

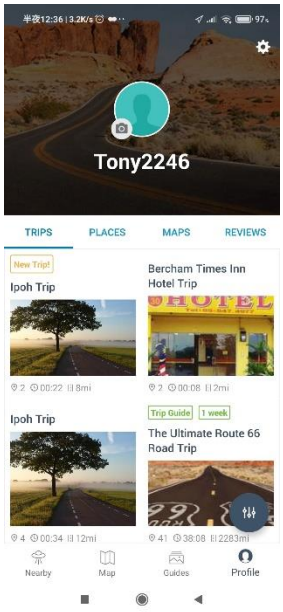


Figure 2-35 Saved Plan

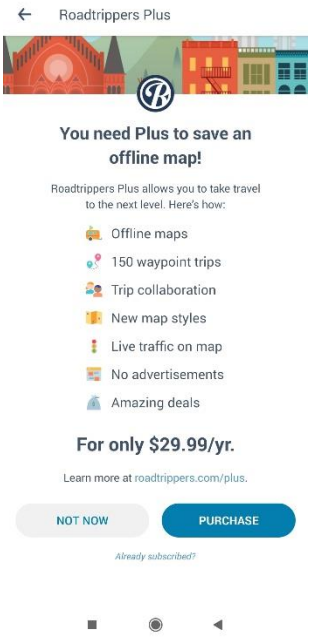


Figure 2-36 Purchase Plus Version

2.1.8 Circuit Route Planner

Circuit Route Planner is an application that used to create the quickest delivery route to save the user time. It uses advanced technology that combines the current condition of traffic with the most up to date data to plan and optimize the shortest and fastest route to user. Circuit is very easy to add, delete or optimize multiple stops when plan a route, it can track user progress to save common routes. In circuit, user can link to other map service to turn on the navigation system.

Strengths

Circuit is a user-friendly application; it will prompt out a new user tutorial to user to teach them how to use Circuit. It is very easy to use for creating and optimize a route. Also, it includes help and support feature to help user solve some common issue in the application. User can create a new route anytime. Last but not least, it can link to other map service to turn on the navigation system.

Weaknesses

The only limitation of Circuit is less information of the place. It only developed for user to create a route that add the stop is user must know before. It is very useful for user that want to schedule the delivery route with multiple stops. It is not suitable for user that use in unfamiliar area.

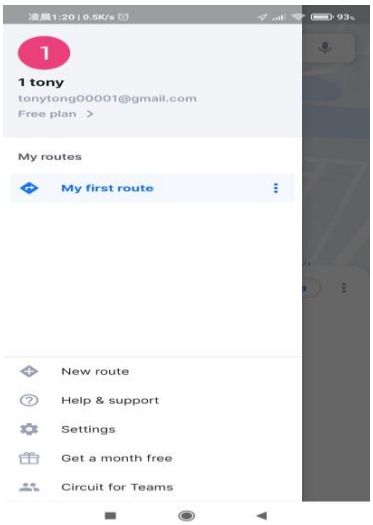


Figure 23 Features Bar

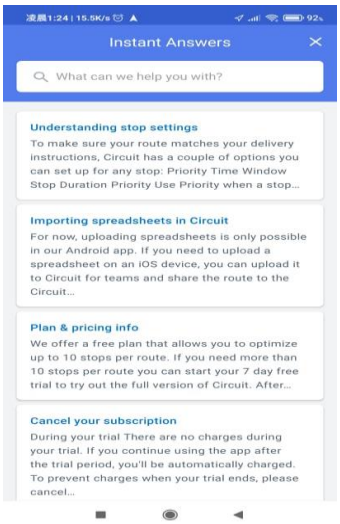


Figure 2-24 Instant Answer of App

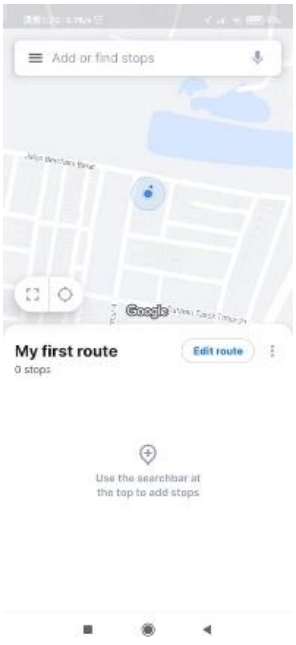


Figure 2-25 Main Page

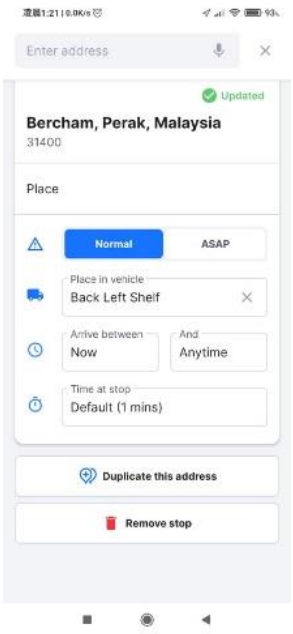


Figure 2-26 Create Route

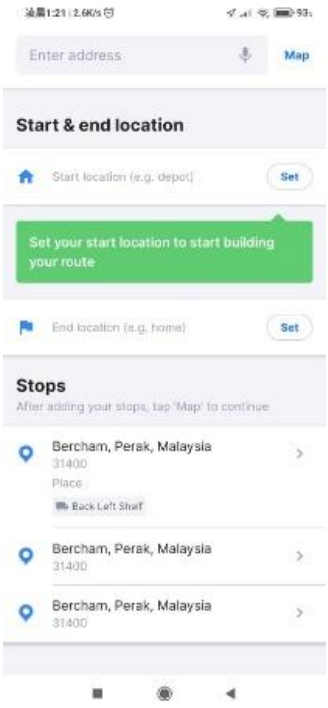


Figure 2-27 Edit Start and End Location

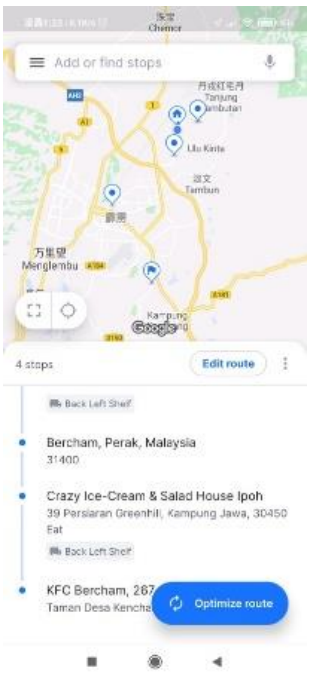


Figure 2-28 Route Details

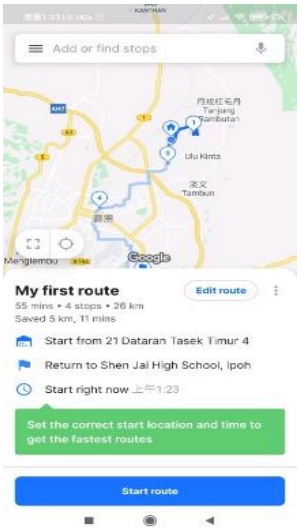


Figure 2-29 Start Route

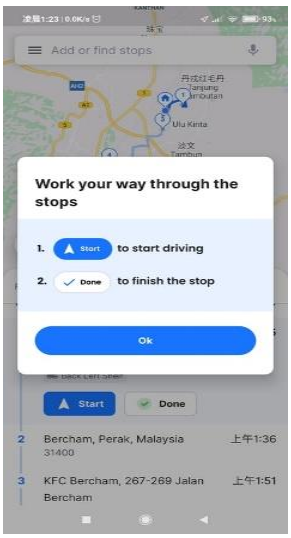


Figure 2-30 Start or Finish Stop

Figure 2-31 Link to GPS

Figure 2-32 Create New Route

2.1.9 NextTripPlan- Trip Planner

NextTripPlan is a trip planner application that can be downloaded from Google Play store. It is used for organizing and planning an upcoming trip. This application allow user to customize and personalize the trip. User can customize the itinerary, packing list and to do list for prepare their trip. In addition, user can record and organize the bookings info, transit details and document in this application.

Strengths

One of the strengths in NextTripPlan is good user interface design. Also, it allows user to record down every detail's information in this application for a trip. User can customize anything that related to their trip.

Weaknesses

It is no existing information about the place of trip, this application is more like a sticky note that allow user to record and customize the note. Users need to enter the details in detail from beginning to end. It just like a normal note with good user interface design.

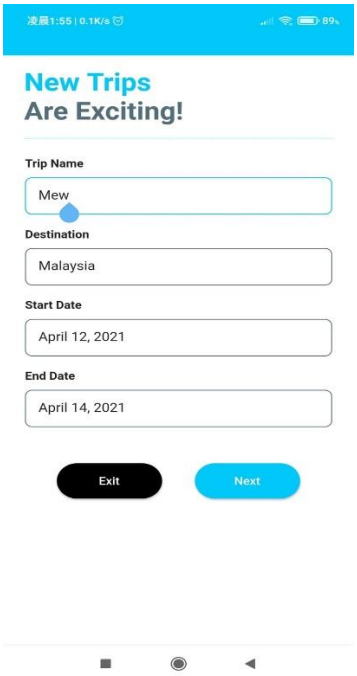


Figure 2-33 Trip Details

Figure 2-34 Select Trip Image

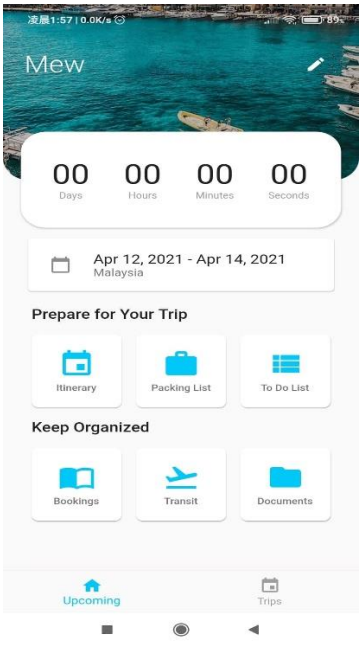


Figure 2-35 Main Page

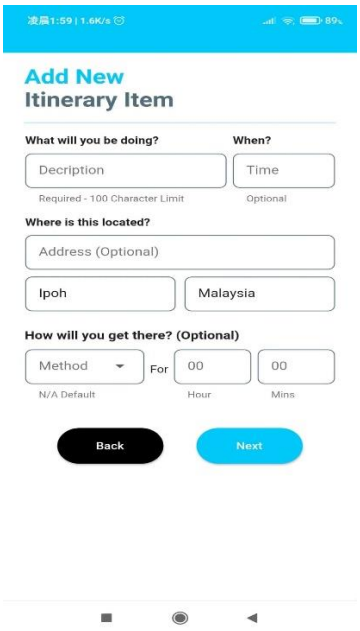


Figure 2-36 Customize Itinerary

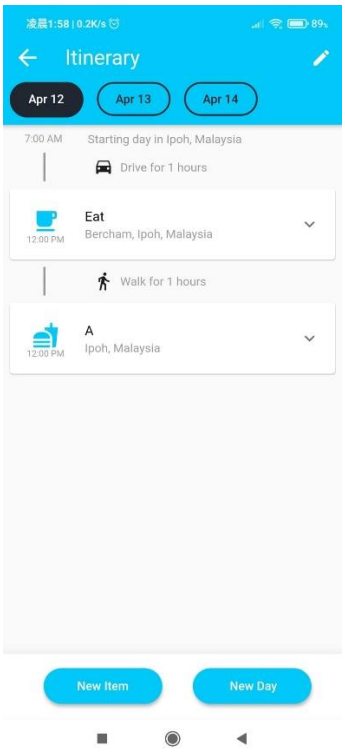


Figure 2-37 Itinerary Item

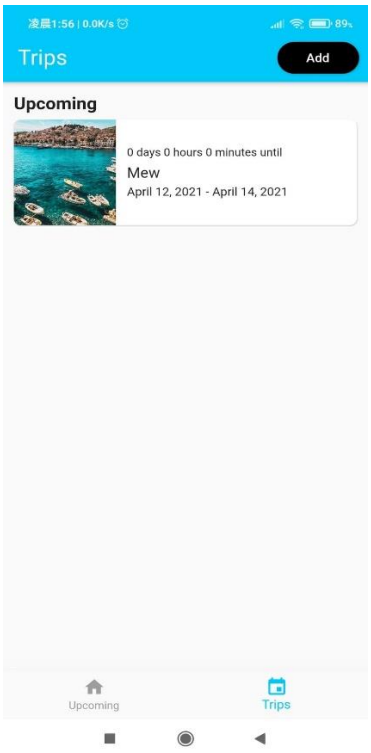


Figure 2-38 Saved Trip

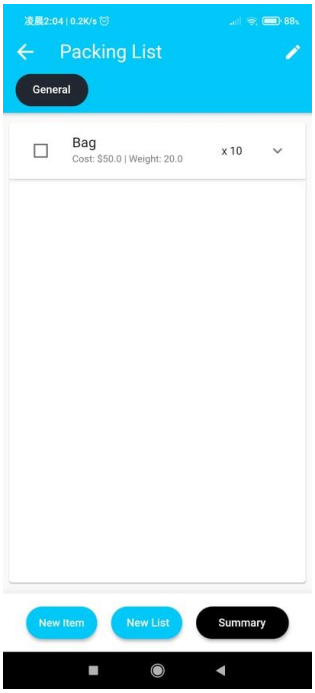


Figure 2-39 Packing List

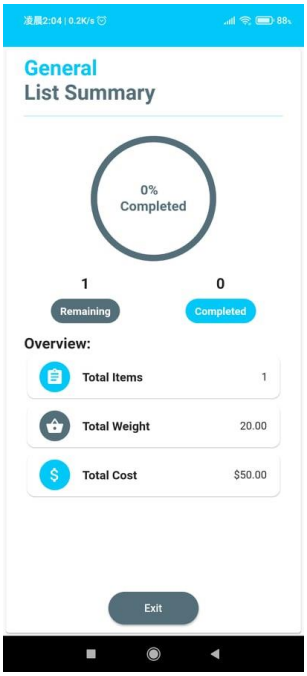


Figure 2-40 Summary of List

2.1.10 Trip.com

Trip.com is an application that very useful for traveller, it can be downloaded from the Google Play store. It has a lot of functions such as checking flights, hotel, train, ticket and tours, rental cars, airport transfers, and travel guide in this application. Trip.com makes user easy to book hotel and flights at a great price. It also can find the cheaper hotel within minutes; the application has the information of around 1.4 million hotels.

Strengths

Trip.com has included a lot of useful information to traveller such as flights details, hotels details, trains details and others. User can check the information and book the flights or hotels anytime. Also, it supports different language in the application, user can use their mother language as the language of the application. User can manage the trip easily.

Weaknesses

The only limitation of the Trip.com is it has many complex messages in the application. It did not provide the tutorial to teach user to use the application. However, it has customer service to make up this problem. This application is completed so it has few limitations only.

Figure 2-41 Main Page

Figure 2-42 Flights Details

Figure 2-43 Hotels Details

Figure 2-44 Trip Plan

Figure 2-45 Promotions Details

Figure 2-46 Search Place Details

2.2 Summary of Critical Remarks of Previous Works

Table 2-1 Comparison of The Travel App

	Strengths	Weaknesses
Tourist Assistant – TAIS	• Allows the tourist to get up-to-date information and does not require to download the attraction database before the trip. • Consists of several services that can solve the tourist task. • Using smart space technology for interoperability support and providing for ontology-based information sharing between different devices. • Fast response time.	• Information that provides by Wikipedia might not true. • Poor user interface design. • No user guide provided. • No user feedback channel provided.
Kwan Phayao Tourism Mobile and Web Application	• Support via mobile and web application. • Provides entrepreneurs and local communities an account to update their tourism information. • Good user interface design. • Provides navigation service and nearby hotels and restaurants recommendation.	• Does not support bilanguage. • Less quantity of recommended attractions. • Display random attractions.
GO Holiday MY	• Provides details information of booking hotel and flight tickets.	• Long loading time.

	• Users can view the location of the hotel on map. • Provides search filter function. • Good user interface design.	• Complex information on the same screen. • Many unavailable options.
XTVT-Travel Malaysia	• Good user interface design. • Explore the nearby attractions first. • Users can find attractions by category. • Provides information and route of the attractions. • Users can view all attractions on the map and display icon by category. • Users can add attractions to favourites. • Provides sharing experience and feedback service.	• May wrong detect the geographic location of the user. • May have a wrong calculation on the distance between users and attractions. • No user preferences provided. • No filter function provided.
Sygic Travel	• Good user interface design. • Support offline travel maps. • Provides users the estimated time of travel, distance, and driving time between the places • Users can check the weather of the place, rent a car, and booking accommodation.	• Need to buy the premium version to unlock more useful features. • The itinerary plan will not be updated when removing a place.

TripIt	• Good user interface design. • Provides a lot of useful information. • View different type of transportation option between the starting point and destination. • View nearby place of the location.	• Complex information on the same screen. • Need to buy the premium version to unlock more useful features.
Roadtrippers	• Very convenient for user to plan a trip. • Able to find nearby place that never knew before • Include a lot of useful information of place. • User can share travel guide to other. • Plot route to create trip with up to 7 waypoints.	• User must upgrade to the plus version to unlock further functions • Content only focusing on some country. • Use of GPS running decrease user's phone battery life.
Circuit	• User-friendly application • Provide user tutorial • Easy to use for creating and optimize a route. • Includes help and support feature to help user solve problem • Can link to other map service to turn on the navigation system.	• Lack of information of the place • Not suitable for user travel to unfamiliar area.

NextTripPlan	• Good user interface design. • Allows user to record down every detail's information. • User can customize anything that related to their trip.	• No existing information about the place of trip. • Users need to enter the details in detail from beginning to end.
Trip.com	• Included a lot of useful information. • Supports different language in the application. • User can manage the trip easily.	• Complex messages in the application. • No user tutorial provided.

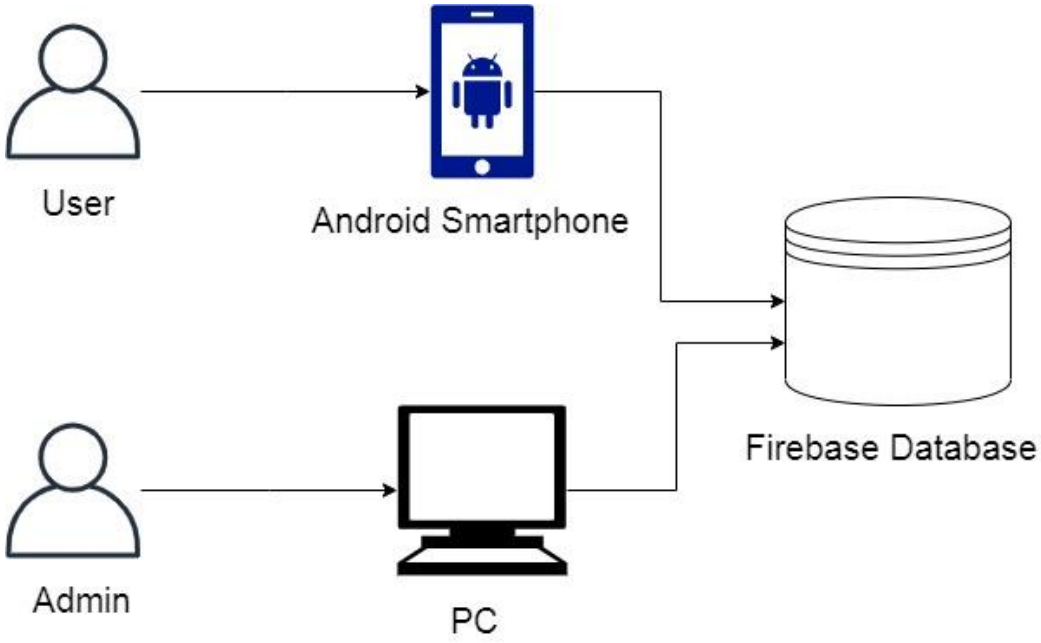
According to Table 2-1, a good travel app should have consisted of several services that can solve the tourist task. Moreover, the good design of the user interface and fast response time will make users feel comfortable. Furthermore, it should be provided some useful information about the attractions to the user such as the estimated time of travel, distance, and the driving time to the attractions. In addition, users should be able to view and find attractions on the map. Other than that, the user's preference setting, and filter function is needed to improve the user experience. Also, the feedback channel is needed to get user feedback to improve the application. Users can share information that is needed so that users can obtain more effective information. Last, it should allow the people who manage the attractions to have update functions.

However, there are some weaknesses of the travel app that the developer should have to avoid it. The first and most important thing to avoid is poor user interface design. Users may give up using the application when the design of the user interface is bad. Next, do not provide the wrong information in the travel app or show complex information on the same screen. Also, it will cause confusion for users when the travel app does not provide the user guide and feedback channel. In addition, display random attractions and long loading time will make users feel irritable. Next, do not add the

unavailable option to application because it may make users feel that the application is incomplete. Last, minimize the chance of vulnerabilities otherwise users will file many complaints.

CHAPTER 3: SYSTEM DESIGN

3.1 System Architecture Design



3-47System Architecture of Itinerary Planner Mobile Application

The system architecture design of this project is a client-server architecture. Firebase will be used as a database server in this project. After users edit their itinerary plan, the data will save and upload to store in firebase. The data can be retrieved from firebase so that user can view back their itinerary plan. Users also can delete their plan anytime and the data will also be deleted on firebase. Furthermore, the admin can view the usage of the app and inspect the plan details of the user. In addition, the Firebase also provides the authentication service, user can only save and view their own itinerary plan when login their account.

3.2 System Flow Chart

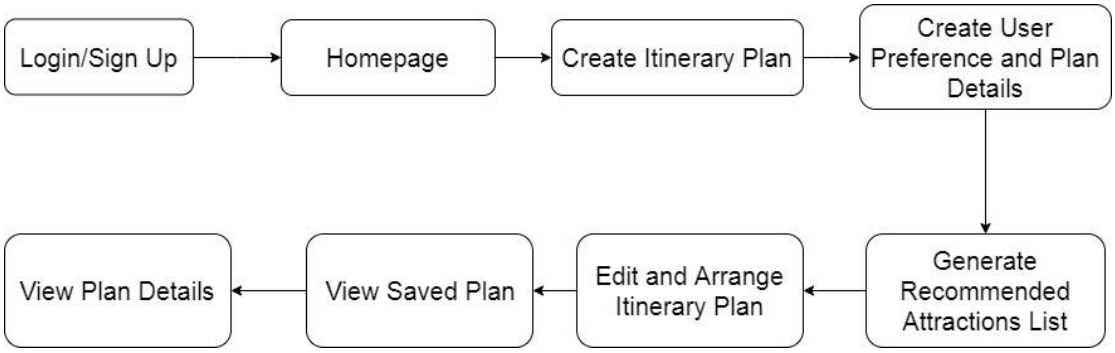


Figure 3-48 System Flow Chart of Itinerary Planner Mobile Application

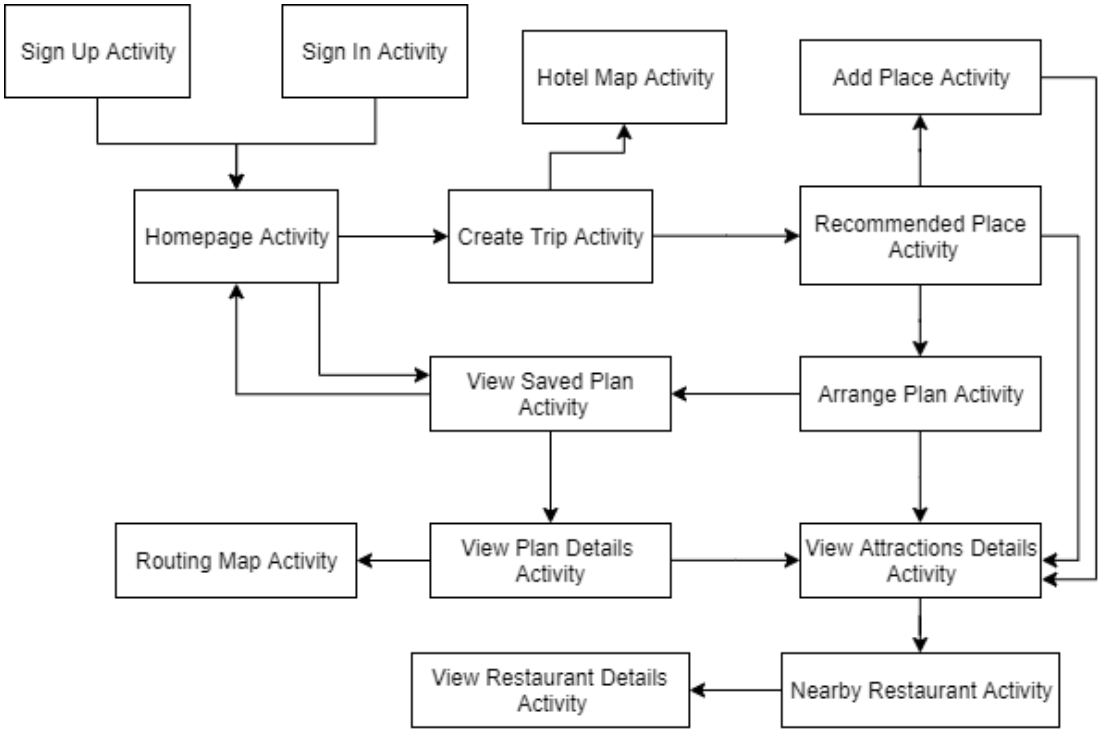


Figure 3-49 Activity Screen of Itinerary Planner Mobile Application

Login/Sign up

First, users need to sign up for an account to the system by email and pass when they are new. After users sign up for an account, the data will be validated and sent to the Firebase Authentication Service. Users can log in to their account when they have registered account anytime, the Firebase will validate the existing account when users key in their login email and password.

Homepage

After users log in to their account, the homepage screen of the application will be displayed. In addition, there are three buttons on the homepage screen which are "Create Trip", "View Trip" and "Log Out" button. Users can press the "Create Trip" button to create a trip. The "View Trip" button can let users view back their saved trip anytime. Lastly, the "Log Out" button is used to log out of the account.

Create User Preference and Itinerary plan

After user press the "Create Trip" button, users are required to fill up the user preference details of the plan such as trip name, start date, number of the travel day, category of attractions and choose a hotel.

Generate Recommended Attractions List

When users fill up all the user preference details, the system will filter the attraction list according to the chosen category of attractions. The number of recommended

attractions is based on the number of the travel day. For example, user choose 3 travel day in a trip, the system will recommend 9 places to the user. The filter attractions list is generated by filtering the chosen category of user preference. In order to avoid the situation that user select many categories of attractions but only a single category appears when the category covers many high-rating attractions than other categories, the system will filter the list to make sure attractions of each selected category will appear at least once. Therefore, a certain number of attractions can be displayed in each selected category.

Edit and Arrange Itinerary Plan

Users can edit the recommended attractions list by adding places or removing places. After the user edits the attractions list, the system will help the user arrange the plan automatically by the distance between attractions, location of the chosen hotel. Users are also allowed to rearrange the itinerary plan by themselves. Then, users can press the "Save" button to save the itinerary plan to view trip screen and firebase database.

View Saved Plan

Users can view the saved plan after they save the itinerary plan or press the "View Trip" button on the homepage screen. The list of saved plans is retrieved from Firebase when the user has saved the plan. Each user can only save their own plan to their account and view their own created itinerary. Also, users are allowed to view the detail of the saved plan by pressing the "View" button.

View Plan Details

Users can view back the details of the itinerary plan. The user also can click each attraction to view its information. The information includes background information, review, and rating of the attractions. Users also can press the "route" button to see the route that generate on the google map. Also, user can view the nearby restaurant in each selected place on the google map.

3.3 Use Case Diagram

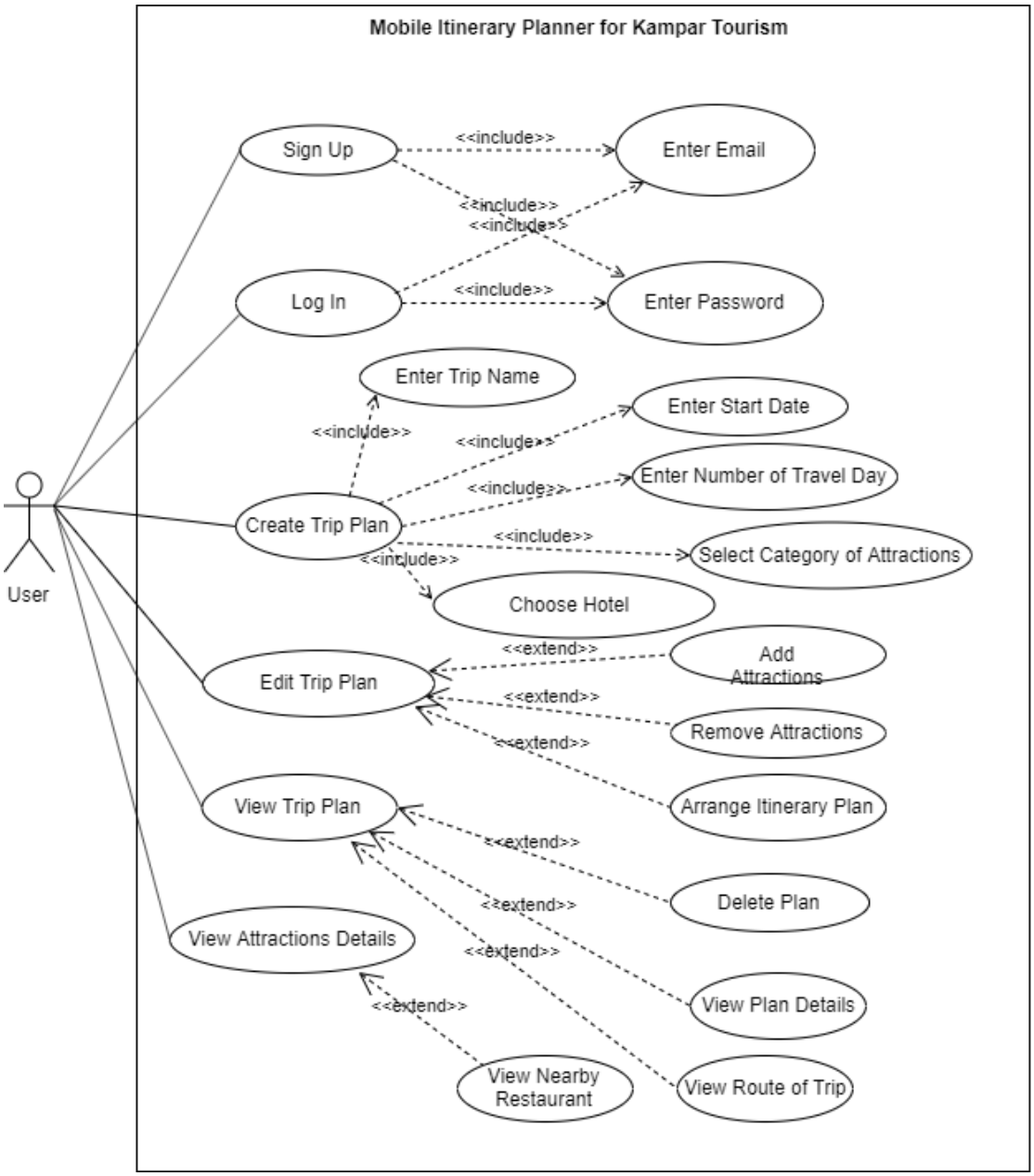


Figure 3-50 Use Case Diagram of Itinerary Planner Mobile Application

3.4 Use Case Description

Table 3-1 Sign Up Use Case

Use Case ID	UC001
Use Case Name	Sign Up
Description	To allow user sign up an account for Itinerary Planner Mobile Application.
Actor	User
Trigger	Users click “Register” button.

Include Use Cases	Enter Email, Enter Password
Extend Use Cases	-
Preconditions	User in Sign Up Screen
Postconditions	Users create an account and proceed to Homepage Screen
Main Flow	1. User want to sign up an account. 2. System request user to enter the email. 3. System request user to enter the password. 4. User press “Register” button to create an account. 5. System verify the email and password from database 6. System display a message “Register is successful”. 7. System direct user to Homepage Screen.
Alternative Flow	4a. System display a message “Email is Required” if user enter an empty email. 4b. System display a message “Error! The email address is badly formatted.” if user enter an invalid email. 4c. System display a message “Password is Required” if user enter an empty password. 4d. System display a message “Password must be more than 6 characters” if user enter a password that less than 6 characters. 5a. System display a message “Error! The email address is already in use by another account” when the input email has registered by other user.

Table 3-2 Sign In Use Case

Use Case ID	UC002
Use Case Name	Sign In
Description	To allow user sign into the Itinerary Planner Mobile Application when user has registered an account.
Actor	User
Trigger	Users click “Login” button.
Include Use Cases	Enter Email, Enter Password
Extend Use Cases	-
Preconditions	User in Sign In Screen
Postconditions	Users sign into the application and proceed to Homepage Screen
Main Flow	1. User want to login to the account. 2. System request user to enter the email. 3. System request user to enter the password.

	4. User press “Login” button to create an account. 5. System verifies the email and password from database 6. System display a message “Login successfully”. 7. System direct user to Homepage Screen.
Alternative Flow	4a. System display a message “Email is Required” if user enter an empty email. 4b. System display a message “Error! The email address is badly formatted.” if user enter an invalid email. 4c. System display a message “Password is Required” if user enter an empty password. 4d. System display a message “Password must be more than 6 characters” if user enter a password that less than 6 characters. 4e. System display a message “Error! The password is invalid, or the user does not have the password” when user enter a wrong password of registered account. 5a. System display a message “Error! There is no user record corresponding to this identifier. The user may have been deleted.” when the input email has not been registered or has been deleted.

Table 3-3 Create Trip Plan Use Case

Use Case ID	UC003
Use Case Name	Create Trip Plan
Description	To allow user to create a trip plan, input the information detail of the plan and select the user preference.
Actor	User
Trigger	Users click “CREATE TRIP” button.
Include Use Cases	Enter Trip Name, Enter Start Date, Enter Number of Travel Day, Select Category of Attractions, Choose Hotel.
Extend Use Cases	-
Preconditions	User press “CREATE TRIP” button which is located in Homepage Screen
Postconditions	Users save the trip name, start date, number of travel day and the user preferred category of attractions to the system
Main Flow	1. User press “CREATE TRIP” button direct the Create Trip Screen to input and create information detail of a trip plan. 2. System request user to enter the trip name. 3. System request user to enter the start date.

	4. System request user to enter the number of travel day. 5. System request user to choose the favourite category of attractions. 6. System direct user to the map hotel activity to choose hotel. 7. User press "NEXT" button after user input all the information. 8. System save the information and user preference and pass the data to next activity screen. 9. System direct user to Recommended Place Screen to view the recommended attractions list.
Alternative Flow	7a. System display a message "Please Enter the Name of Trip!" if user enter an empty trip name. 7b. System display a message "Please Enter the Start Date of Trip!" if user enter an empty start date. 7c. System display a message "Please Enter the Number of Travel Day!" if user enter an empty number of travel day. 7d. System display a message "The Number of Travel Day Must be in 1 to 7 Days" if user enter an number of travel day that not in range of 1 to 7. 7e. System display a message "Please Choose Your Favourite Category!" if user does not check any category of attractions checkbox. 7f. System display a message "Please Choose Your Hotel Location!" if user does not choose any hotel location.

Table 3-4 Edit Trip Plan Use Case

Use Case ID	UC004
Use Case Name	Edit Trip Plan
Description	To allow user to edit the recommended attraction list of the trip plan.
Actor	User
Trigger	User will be directed to Recommended Place Screen to view the recommended attractions list after the click "NEXT" button of Create Trip Screen.
Include Use Cases	-
Extend Use Cases	Add Attractions, Remove Attractions, Arrange Itinerary Plan
Preconditions	User press "NEXT" button of Create Trip Screen after input all the information details of the trip plan.

Postconditions	Save the itinerary plan and user preference information details to Firebase database.
Main Flow	1. User press “NEXT” button direct to the Recommended Place Screen to view and edit the recommended attractions list. 2. System recommend a list of attractions based on the chosen category of user preference, number of travel day and weather of the date. 3. User edit the recommended attractions list. 4. User press “SAVE” button to save the recommended attractions list. 5. System direct user to Arrange Plan Screen to view and arrange to trip plan.
Alternative Flow	2a. The number of attractions is based on the number of travel day, 3 attractions will be recommended per day. 4a. System will add the “free time slot” to the attractions list if user’s edited attractions list has not been reached the maximum number of recommended attractions.

Table 3-5 Add Attractions Use Case

Use Case ID	UC005
Use Case Name	Add Attractions
Description	User can add the other attractions to the recommended attractions list.
Actor	User
Trigger	Users press the “ADD” button which is located in Recommended Place Screen.
Include Use Cases	-
Extend Use Cases	-
Preconditions	User press “ADD” button of Recommended Place Screen to direct to Add Place Screen
Postconditions	Selected attractions will be added into the recommended attractions list of Recommended Place Screen.
Main Flow	1. User press “ADD” button direct to the Add Place Screen to select the attractions. 2. User long click the selected place to add the place to the recommended attractions list.

	3. System display a dialog message to ask user to confirm the added place. 4. System display a message “Place added” if successful to add the place. 5. System direct user go back to Recommended Place Screen to edit the trip plan.
Alternative Flow	2a. System display a message “The number of places cannot more than N. (You can select N places per day only)” if the recommended attractions list is full.

Table 3-6 Remove Attractions Use Case

Use Case ID	UC006
Use Case Name	Remove Attractions
Description	To allow user to remove the attractions of recommended attractions list.
Actor	User
Trigger	User long click the selected attractions to delete the place which is located in Recommended Place Screen.
Include Use Cases	-
Extend Use Cases	-
Preconditions	User long click the selected attractions to remove the attractions from the recommended attractions list.
Postconditions	Selected attractions will be removed from the recommended attractions list of Recommended Place Screen.
Main Flow	1. User long click the selected attractions to remove the attractions. 2. System display a dialog message to ask user to confirm delete the place. 3. System display a message “Item deleted” after successful to remove the place. 4. User continue to edit the trip plan in Recommended Place Screen.
Alternative Flow	-

Table 3-7 Arrange Itinerary Plan Use Case

Use Case ID	UC007
Use Case Name	Arrange Itinerary Plan
Description	To allow user to rearrange the plan that auto arranged by system.

Actor	User
Trigger	Users press the “SAVE” button which is located in Recommended Place Screen.
Include Use Cases	-
Extend Use Cases	-
Preconditions	Users save recommended attractions list in Recommended Place Screen.
Postconditions	The arranged plan and the attractions list details will be saved to Firebase database.
Main Flow	1. User press the “SAVE” button of Recommended Place Screen direct to Arrange Plan Screen. 2. User drag and drop the attractions list to arrange the trip plan. 3. User press the “SAVE” button of Arrange Plan Screen to save the itinerary plan. 4. System direct user to View Saved Plan Screen.
Alternative Flow	3a. System request user to enable network if user has closed the internet.

Table 3-8 View Trip Plan Use Case

Use Case ID	UC008
Use Case Name	Arrange Itinerary Plan
Description	To allow user to view or delete the saved plan
Actor	User
Trigger	User press the “SAVE” button which is located in Recommended Place Screen.
Include Use Cases	-
Extend Use Cases	Delete Plan, View Plan Details, View Route of Trip.
Preconditions	-
Postconditions	-
Main Flow	1. User will be directed to View Saved Plan Screen after save the itinerary plan in Arrange Plan Screen or press the “VIEW TRIP” button which is located in Homepage screen. 2. System display the list of saved plans to user. 3. User view or delete the saved plan.

	4. User press the “HOME PAGE” button to go back to Homepage Screen. 5. User can press “route” button to view the route of the travel day.
Alternative Flow	2a. System will display an empty screen if the user does not save any plan before. 3a. User press the “VIEW” button of the selected plan to view the plan details 3b. User press the “DELETE” button of the selected plan to delete the plan. 3b.1 The data of the saved plan will be removed from the application and Firebase. 5a. System display the route on Google Map to user.

Table 3-9 View Attractions Detail Use Case

Use Case ID	UC009
Use Case Name	View Attractions Detail
Description	To allow user to view the information details of place
Actor	User
Trigger	Users click on any item from the list of attractions.
Include Use Cases	-
Extend Use Cases	View Nearby Restaurant
Preconditions	-
Postconditions	-
Main Flow	1. User will be directed to View Attractions Details Activity to view the information. 2. System display the information to the user 3. User press “Nearby” button to view the nearby restaurant
Alternative Flow	3a. System display all the nearby restaurant within 2km radius of the selected attractions location. 3a1. Users click “3km” button to show all nearby restaurant within 3km radius of the selected attractions location. 3a2. Users click “1km” button to show all nearby restaurant within 1km radius of the selected attractions location.

3.5 Implementation Issues and Challenges

In this project, the mobile itinerary planner application for Kampar tourism has some implementation issues and challenges. One of the difficult issues is to collect information about attractions such as its background information and travel guide. It needs a lot of time to collect the data because of the number of attractions very large. Furthermore, the algorithm of the filter and recommend attractions is very complex. This is because the recommended attractions are filtered based on the user preference, number of travel days, and location of the chosen hotel. Also, the plan for each travel day is group by the distance between attractions, location of chosen hotel, it is not easy to develop the algorithm to the system.

Besides that, the application is implemented with third party API, such as Google Place API and Firebase API to improve the user interaction and functionality. This is because the API version may be incompatible with the application when developing. It is very time-consuming to search for a suitable version of API to make sure the application can run in different Android Version of smartphones. The design of UI also is challenging because the UI needs to be concise and user friendly to let the user feel smooth and better when using the application.

CHAPTER 4 METHODOLOGY

4.1 Methodologies and General Work Procedures

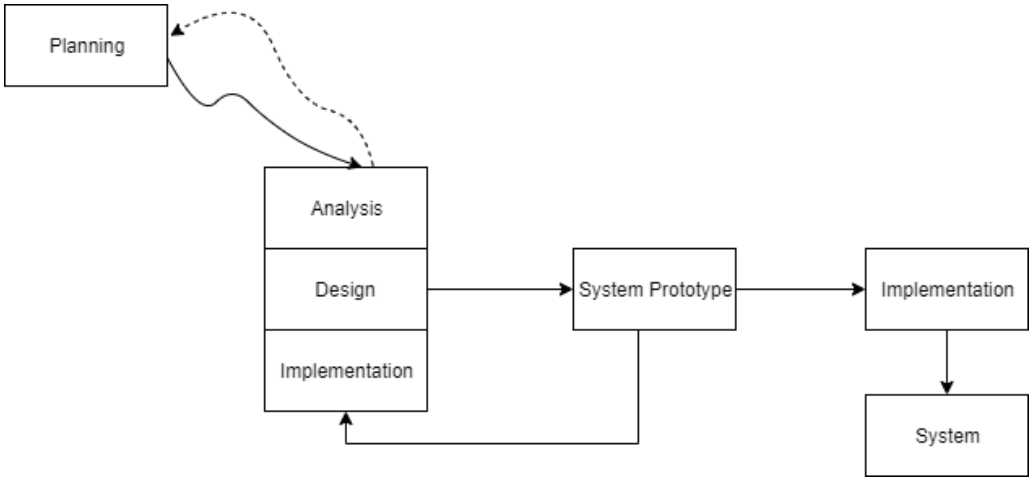


Figure 4-1 Prototyping-base Methodology

Due to the development duration of this project is short, the methodology used in this project is RAD (Rapid Application Development)'s Prototyping-based Methodology. It is quite popular in developing software development or application development. The major advantage of this methodology is faster developing some parts of the system to the user. Users can be familiar with the system and know what is needed so that it is easy to get the user feedback to improve the system design. A prototyping-based methodology performs the analysis, design, and implementation phases concurrently, and all three phases are performed repeatedly in a cycle until the system is completed.

Planning:

During the planning phase, an initiated project by identifying the problem and define the requirements of the project to resolve the problem. Other than that, have a basic understanding of background information and system application. Define the project scope and objectives of the project, set up the work plan to reach the goal. Define the required tools and techniques to control and manage the execution of the project.

Analysis:

During the analysis phase, reviewed and analysed the existing systems to get the strengths and limitations of the system. Analysed and summarised the strengths and limitations to define the improvement and solve the weaknesses of the existing systems. Investigated and Defined the basic user requirements of the itinerary planner system and defined the functionalities of the system.

Design:

During the design phase, the physical design, architectural design, and user interface design of the prototype will be created. After presented to get the feedback and evaluation of the user, the necessary and important improvements are collected to reanalysed, redesign, and reimplement to construct the second prototype. The analysis, design and implementation phases are repeatedly in a cycle until the final prototype which is the final product is completed.

Implementation:

During the implementation phase, programmed the coding part to build the mobile application. The code will be written in Java programming languages in Android Studio. Each prototype of the mobile application will be implemented to evaluate the functionalities until the final prototype complete as a system.

4.2 Tools to use

Hardware Specifications

The hardware that requires for developing this system is:

1) Laptop

Table 4-1 Laptop Hardware Specification

Operating System	Windows 8.1
Processor	Intel® Core™ i7-4710HQ CPU @ 2.50GHz 2.50GHz
GPU	Nvidia GeForce 840M
RAM	8.00GB DDR Memory
Hard Disk Space	750GB
System Type	64-bit Operating System, x64-based processor

Software Specifications

The software that has been chosen for developing this system are:

1. Android Studio

It is an Integrated Development Environment (IDE) for Google's Android operating system and design specifically for Android development.

The benefits from Android are as follow:

- Faster Deployment of Fresh Builds
- More Accurate Programming
- Faster Programming and Testing
- Inclusive App Development
- Better App Indexing

2. Android SDK and JDK

Android Software Development Kit and Java Development Kit provide the necessary tools to create, compile, and run the system.

3. Firebase

It is a platform developed by Google for creating mobile and web applications. It is suitable to implement a database in this application because it supports the real-time database and Cloud Firestore.

4. Google Cloud Technology

Google Direction API and Google Map will be used in this project. The Google Direction can show the shortest route direction to user while the information of the attraction can be displayed on Google Map.

4.3 System Performance Definition

The system performance requires to recommend the attractions list based on the user preference, start date, number of the travel day. Also, the chosen hotel of user is a starting point to let the system arrange a better route plan to user. In addition, the user can modify the recommended attractions list by adding a place or removing a place. After that, the system should arrange the plan automatically based on the distance between attractions and the location of chosen hotel. Users also able to rearrange the plan of the trip by themselves. After setting all the options, the trip plan will save and upload to firebase. Users can view back their trip plan anytime and the data are fetched from the firebase. Users also can view the nearby restaurant in every details activity page of the attractions.

4.4 System Requirements

4.4.1 Functional Requirements

Log in:

- User can register an account
- User can login to the app with the created account

Homepage

- User can create a trip
- User can view back the trip plan
- User can log out from the account

Itinerary Plan Generation

- User can key in the trip information for system recommendation.

- User can choose a hotel as a starting point of the trip.
- User can choose number of categories of the attraction as user preference.
- System will filter different category of place in a list to recommend to user.
- User can view the list of recommended attractions.
- User can modify the recommended list of attractions.
- System can arrange a better route trip plan to user.
- User can arrange the plan of trip.

Details of Itinerary Plan

- User can view each travel day's route trip on Google Map.
- User can view the nearby restaurant on Google Map.
- User can view the information details of each attractions.

4.4.2 Non-Functional Requirements

Accuracy and Precision

- System shall be able to display the correct data from database.

Reliability

- System shall be able to run correctly without occur failure.

Usability

- System shall be able to easy install and run in the android smartphone.
- Application shall be user friendly to user.

Performance

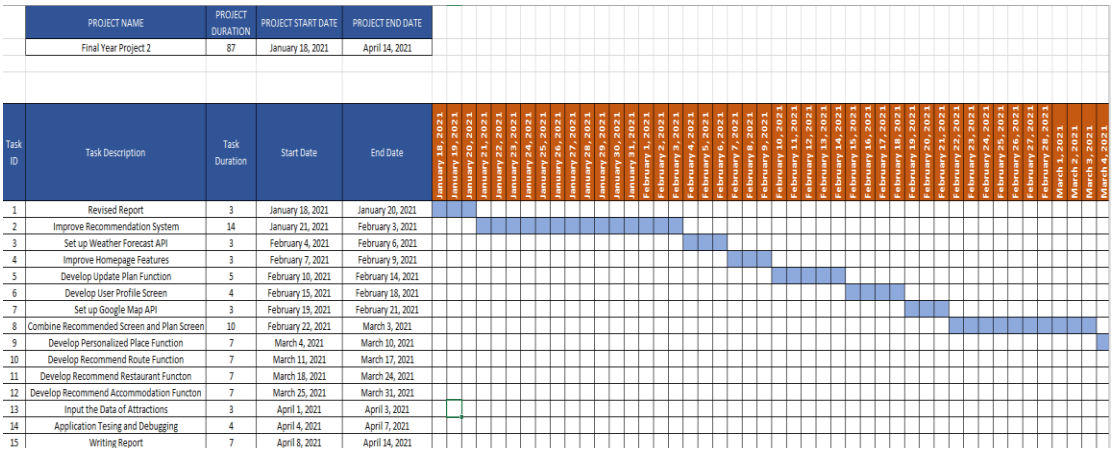
- Each functions of the application shall be run correctly and give an effective performance to user.

4.5 Timeline

PROJECT NAME	PROJECT DURATION	PROJECT START DATE	PROJECT END DATE
Final Year Project 1	37	October 26, 2020	December 2, 2020

Task ID	Task Description	Task Duration	Start Date	End Date
1	Revised Proposal Report	2	October 26, 2020	October 27, 2020
2	Collect Attractions Data	3	October 28, 2020	October 30, 2020
3	Design System Flowchart	2	October 31, 2020	November 1, 2020
4	Set Up Firebase Database	2	November 2, 2020	November 3, 2020
5	Develop Login/Register Screen	3	November 4, 2020	November 6, 2020
6	Develop Homepage Screen	2	November 7, 2020	November 8, 2020
7	Develop Create Trip Screen	4	November 9, 2020	November 12, 2020
8	Develop Recommended Place Screen	3	November 13, 2020	November 15, 2020
9	Develop Add Place Screen	3	November 16, 2020	November 18, 2020
10	Develop Arrange Plan Screen	2	November 19, 2020	November 20, 2020
11	Develop Attractions Detail Screen	1	November 21, 2020	November 21, 2020
12	Develop Saved Plan Screen	2	November 22, 2020	November 23, 2020
13	Develop Plan Details Screen	2	November 24, 2020	November 25, 2020
14	Application Tesing and Debugging	2	November 26, 2020	November 27, 2020
15	Writing Report	5	November 28, 2020	December 2, 2020

Figure 4-2 Gannt Chart for FYP 1



PROJECT NAME	PROJECT DURATION	PROJECT START DATE	PROJECT END DATE
Final Year Project 2	87	January 18, 2021	April 14, 2021

Task ID	Task Description	Task Duration	Start Date	End Date
1	Revised Report	3	January 18, 2021	January 20, 2021
2	Improve Recommendation System	14	January 21, 2021	February 3, 2021
3	Set up Weather Forecast API	3	February 4, 2021	February 6, 2021
4	Improve Homepage Features	3	February 7, 2021	February 9, 2021
5	Develop Update Plan Function	5	February 10, 2021	February 14, 2021
6	Develop User Profile Screen	4	February 15, 2021	February 18, 2021
7	Set up Google Map API	3	February 19, 2021	February 21, 2021
8	Combine Recommended Screen and Plan Screen	10	February 22, 2021	March 3, 2021
9	Develop Personalized Place Function	7	March 4, 2021	March 10, 2021
10	Develop Recommend Route Function	7	March 11, 2021	March 17, 2021
11	Develop Recommend Restaurant Functon	7	March 18, 2021	March 24, 2021
12	Develop Recommend Accommodation Functon	7	March 25, 2021	March 31, 2021
13	Input the Data of Attractions	3	April 1, 2021	April 3, 2021
14	Application Tesing and Debugging	4	April 4, 2021	April 7, 2021
15	Writing Report	7	April 8, 2021	April 14, 2021

Figure 4-3 Gannt Chart for FYP

CHAPTER 5: IMPLEMENTATION AND PROTOTYPING OF SYSTEM

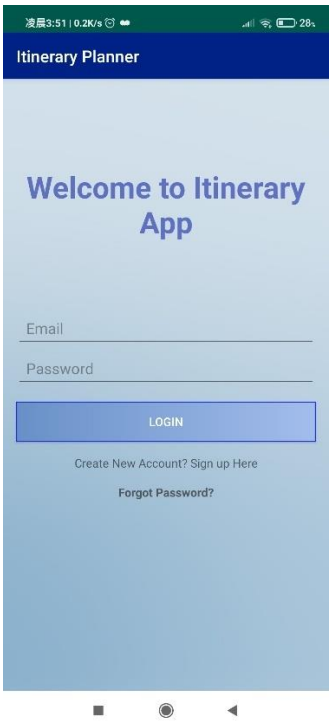


Figure 5-1 Sign Up Screen of Mobile Itinerary Planner App

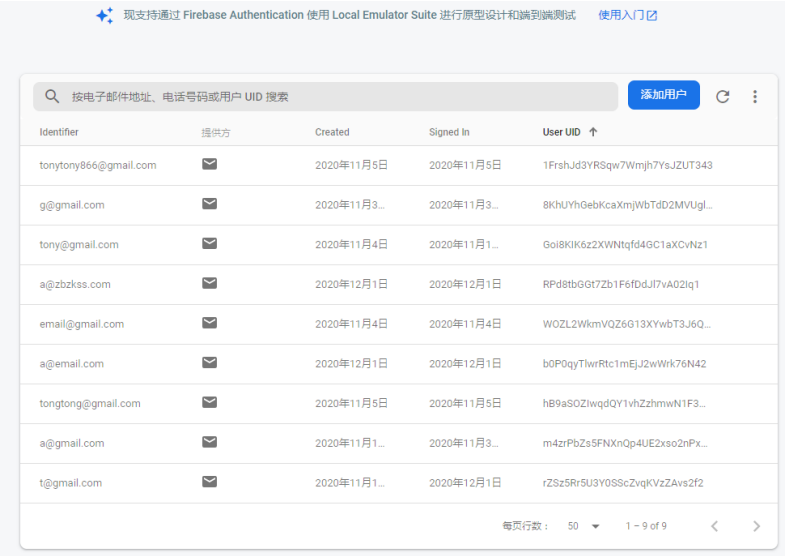


Figure 5-2 Registered User in Firebase Database

After the user input the valid email and password, the system will verify the account from the database (*Figure 5-1, Figure 5-2*). If the input email is an existing account, the user will be failed to register the account. Also, the email should be in good format and the character of the password should not be less than 6. After verifying from the database, the user will create an account successfully and proceed to the Homepage Screen.

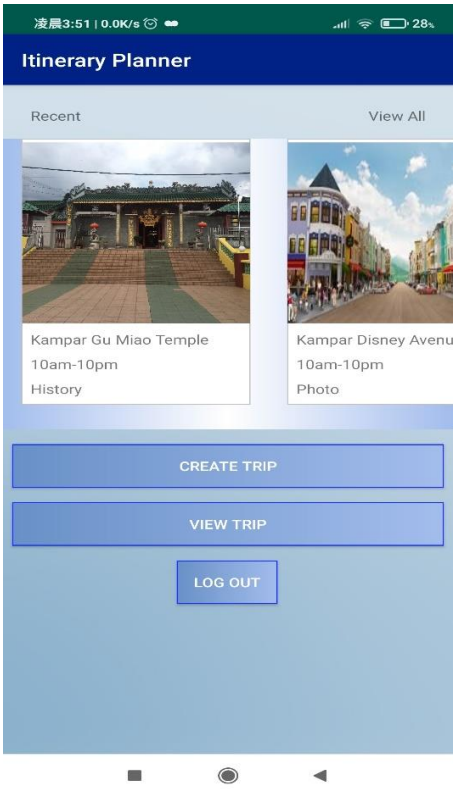


Figure 5-3 Homepage Screen of Mobile Itinerary Planner App

If the user has been login into the account and does not log out before, the user will stay in the Homepage Screen *(Figure 5-3)* when the user opens the app next time. The Homepage Screen has three buttons which represent three functions. The "CREATE TRIP" button is used to create a trip plan for the user; the user will be directed to Create Trip Screen the input the information details of the plan and select the user preference. The "VIEW TRIP" button is used to view the trip plan saved by the user before, the trip plans are store in the Firebase database. The "LOG OUT" button is used to log out of the current account. The above attractions are store in a Recycler View of the application; it can be improved in the future that has more function like view popular attractions.

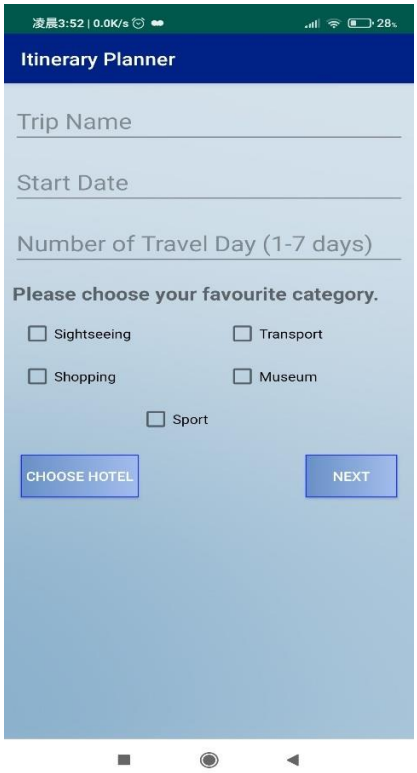


Figure 5-4 Create Trip Screen of Mobile Itinerary Planner App

In the Create Trip Screen (*Figure 5-4*), the user must input all the information about the trip plan to create an itinerary plan. The number of travel days will influence the number of recommended attractions list which in the range of 1 to 7 days. Besides, the user can select at least one favorite category to generate the recommended attractions list. In addition, user need to choose a hotel as a starting point of the travel trip. The system will filter the whole attractions list based on the number of the travel day, chosen category, chosen hotel to display to the user. The start date will be used for detecting the weather of the travel day in the future. After the user finish input the information and user preference, the user can click the "NEXT" button to proceed to Edit Plan.

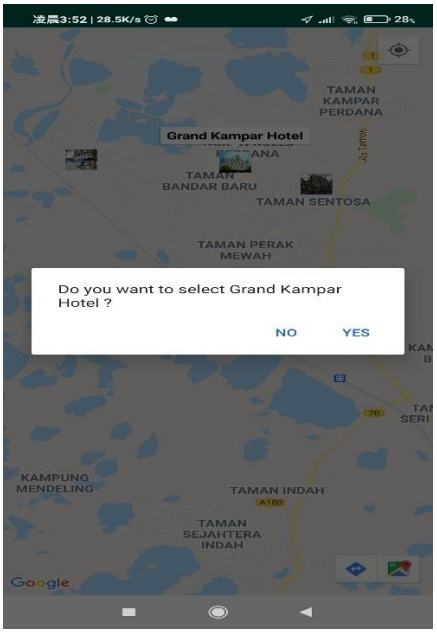


Figure 5-5 Choose Hotel Map Screen

In Choose Hotel Map Screen (*Figure 5-5*), the hotel location that save in firebase will be retrieved and displayed on the Google Map. User can view and select the hotel be the starting point of the trip. The chosen hotel will be used for the system recommendation later.

Figure 5-7 Recommended Place Screen of Mobile Itinerary Planner App

Figure 5-8 Add Place Screen of Mobile Itinerary Planner App

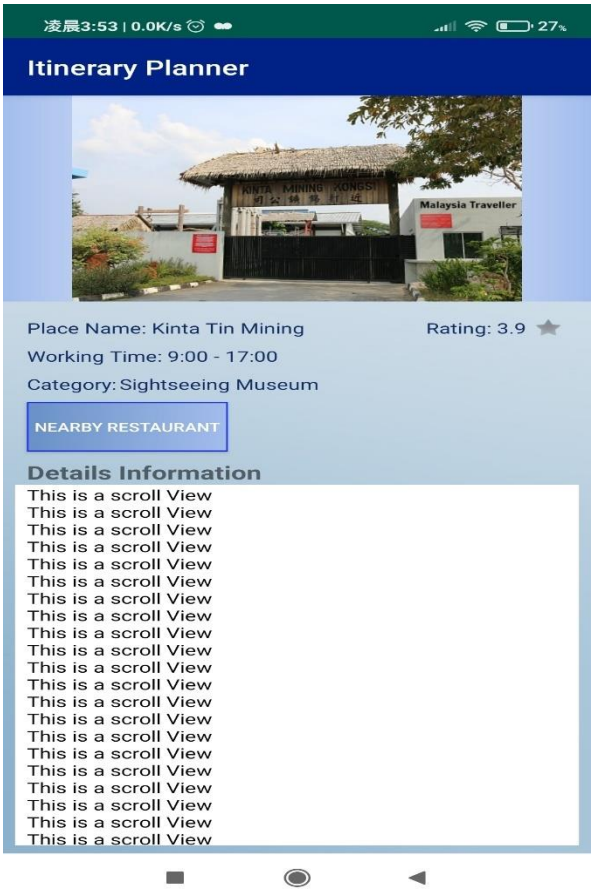


Figure 5-9 Attractions Detail Screen

After the user input the information and user preference of the trip plan, the system will display a list of recommended attractions (*Figure 5-6*). The number of attractions is

derived based on the number of the travel day. It is a minimum of 1 travel day 3 recommended attractions and a maximum of 7 travel days 21 recommended attractions. The recommended attractions are generated based on the chosen category of user preference, and a self-created algorithm to avoid the situation of only a single category that queuing in front of the attractions filter list recommend to the user. Users can press the "ADD" button to add the attractions that do not include in the recommended attractions list (*Figure 5-7*). Also, users can long click the attractions to remove the attractions in the recommended attractions list. User can choose any number of attractions and the remaining slot will be replaced by a free time slot. Also, the user can click on each attraction of the recommended attractions list to view the information details of the selected attractions (*Figure 5-8*).

Figure 5-9 Nearby Restaurant Map Screen

User can press the "Nearby Restaurant" button in the attractions details screen to view the nearby restaurant map screen (*Figure 5-9*). Those restaurant data are saved in the database and display on the Google Map. The red marker on the map is the current selected place location, User can press on the three button "1km", "2km" and "3km" to filter the restaurant list and display all the restaurant within selected km radius of the current selected place location.

Figure 5-10 Arrange Plan Screen of Mobile Itinerary Planner App

In the Arrange Plan Screen (*Figure 5-10)*, the system will output the auto-generated plan to the user. The system will auto generate the plan based on the distance between attractions and chosen hotel location. So, a group of close attractions will be group by the system into a travel day. Also, the user can rearrange the plan by drag and drop the item of the attractions plan list. After arranging the trip plan, the user can press the "SAVE" button to save the trip plan to the View Saved Plan Screen and upload it to the Firebase.

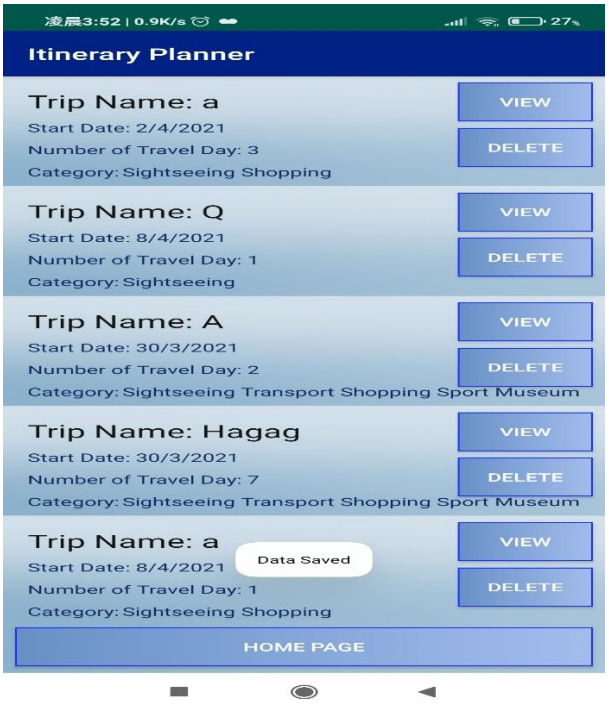


Figure 5-11 View Saved Plan Screen of Mobile Itinerary Planner App

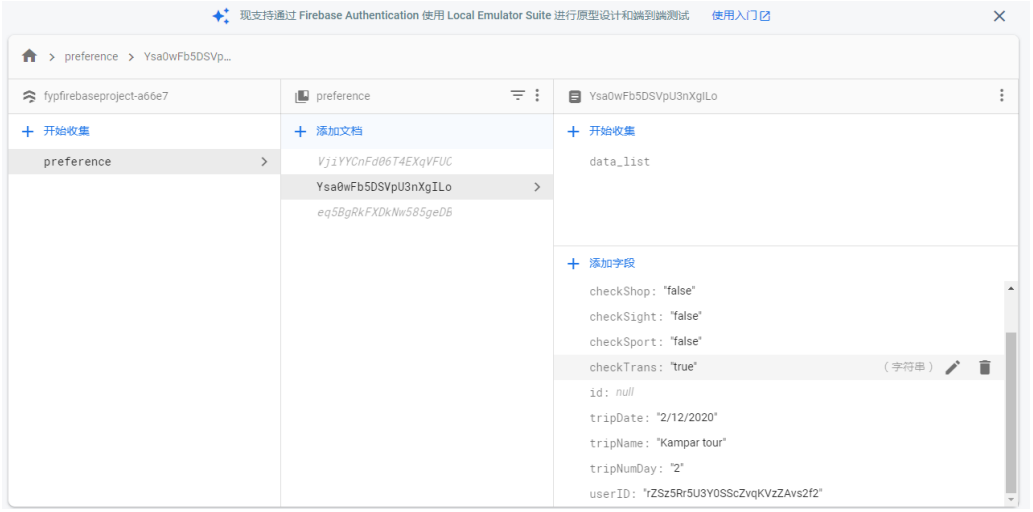


Figure 5-12 User Preference of Saved Plan and Recommended Attractions List in Firebase

The View Saved Plan Screen (*Figure 5-11)* can let the user view back their trip plan that was saved before. The saved plan is retrieved from the firebase (*Figure 5-12*), the user also can delete the saved plan and the data that store in Firebase will be deleted at the same time. Each user only can view and delete their own saved plan. The data of each user is stored independently in Firebase. The “Homepage” button can direct the user back to the homepage screen to do other actions.

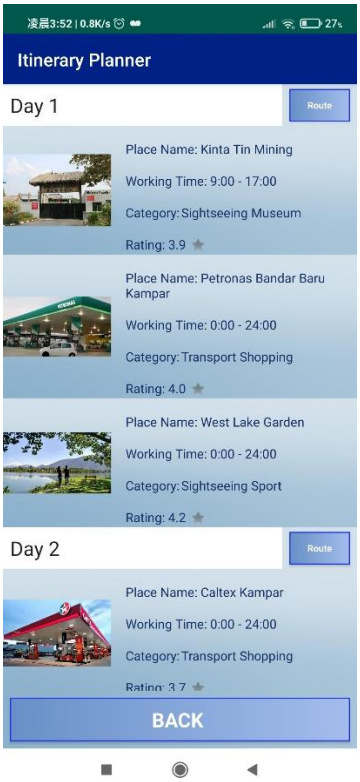


Figure 5-13 View Plan Details Screen of Mobile Itinerary Planner App

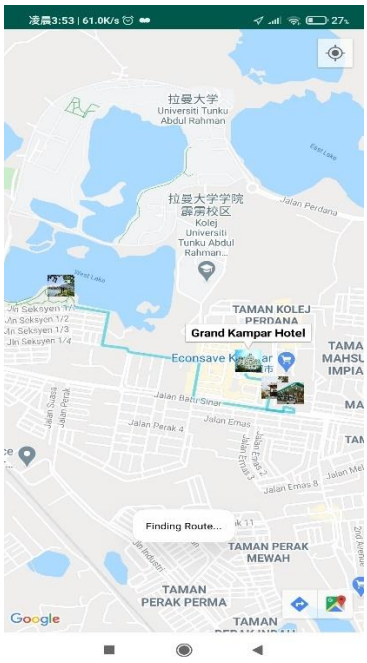


Figure 5-14 Route Map Screen

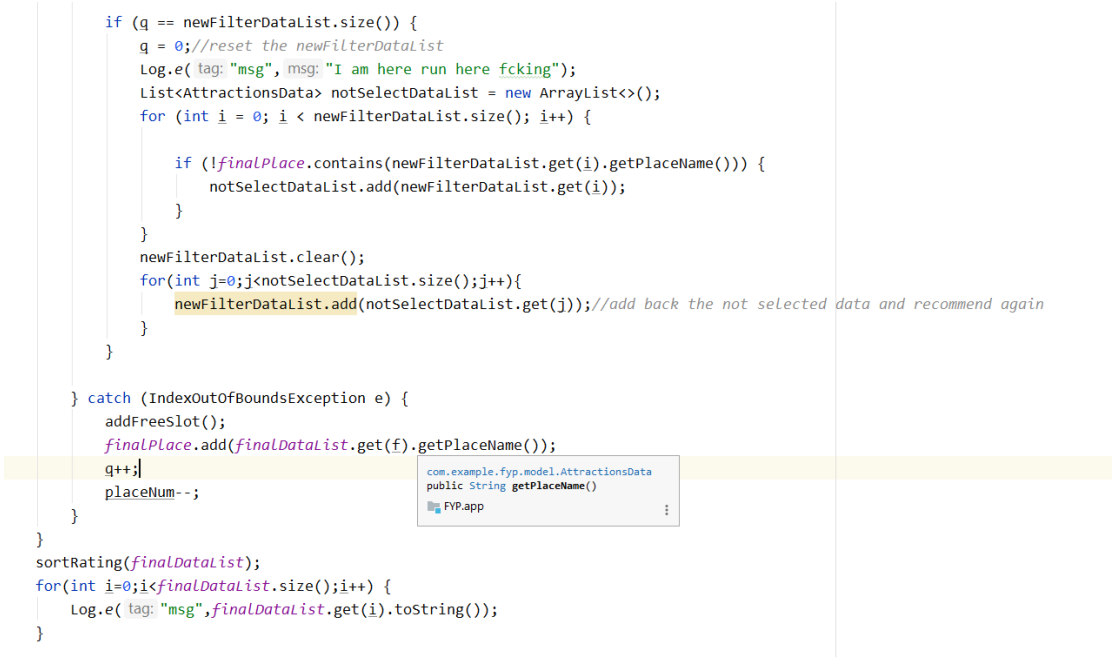
The user will be directed to the View Plan Details Screen (*Figure 5-13)* after the user click the "VIEW" button of the selected saved plan located in the View Save Plan Screen. User also can press the "Route" button to view the route of the travel day on the Google Map (*Figure 5-14*). The route is start from the chosen hotel, then followed by the nearest place and so on.

```
while (placeNum != 0) {
    try {
        if (newFilterDataList.get(q).getIsSight().equals("true") && rCheckSight.equals("true") && !isSightTake) {
            finalDataList.add(newFilterDataList.get(q));
            finalPlace.add(newFilterDataList.get(q).getPlaceName());
            isSightTake = true;
            q++;//next newFilterDataList item
            f++;//added finaldatalist item, to fill up next finaldatalist item
            RNoC--;
            placeNum--;
        } else if (newFilterDataList.get(q).getIsTrans().equals("true") && rCheckTrans.equals("true") && !isTransTake) {
            finalDataList.add(newFilterDataList.get(q));
            finalPlace.add(newFilterDataList.get(q).getPlaceName());
            isTransTake = true;
            q++;
            f++;
            RNoC--;
            placeNum--;
        } else if (newFilterDataList.get(q).getIsShop().equals("true") && rCheckShop.equals("true") && !isShopTake) {
            finalDataList.add(newFilterDataList.get(q));
            finalPlace.add(newFilterDataList.get(q).getPlaceName());
            isShopTake = true;
            q++;
            f++;
            RNoC--;
            placeNum--;
        } else if (newFilterDataList.get(q).getIsRes().equals("true") && rCheckRes.equals("true") && !isResTake) {
            finalDataList.add(newFilterDataList.get(q));
            finalPlace.add(newFilterDataList.get(q).getPlaceName());
            isResTake = true;
            q++;
            f++;
```

Figure 5-15 Recommendation System Algorithm Part 1

```
            q++;
            f++;
            RNoC--;
            placeNum--;
        } else if (newFilterDataList.get(q).getIsSport().equals("true") && rCheckSport.equals("true") && !isSportTake) {
            finalDataList.add(newFilterDataList.get(q));
            finalPlace.add(newFilterDataList.get(q).getPlaceName());
            isSportTake = true;
            q++;
            f++;
            RNoC--;
            placeNum--;
        } else if (newFilterDataList.get(q).getIsMs().equals("true") && rCheckMs.equals("true") && !isMsTake) {
            finalDataList.add(newFilterDataList.get(q));
            finalPlace.add(newFilterDataList.get(q).getPlaceName());
            isMsTake = true;
            q++;
            f++;
            RNoC--;
            placeNum--;
        } else if (RNoC == 0) {//After all category have been selected
            isSightTake = false;
            isTransTake = false;
            isShopTake = false;
            isResTake = false;
            isSportTake = false;
            isMsTake = false;
            RNoC = NoC;
        } else {//the current item category has taken and should add other category and does not meet the requirement
            q++;// next new filter data item
        }
```

Figure 5-16 Recommendation System Algorithm Part 2



```
        if (q == newFilterDataList.size()) {
            q = 0;//reset the newFilterDataList
            Log.e( tag: "msg", msg: "I am here run here fcking");
            List<AttractionsData> notSelectDataList = new ArrayList<>();
            for (int i = 0; i < newFilterDataList.size(); i++) {

                if (!finalPlace.contains(newFilterDataList.get(i).getPlaceName())) {
                    notSelectDataList.add(newFilterDataList.get(i));
                }
            }
            newFilterDataList.clear();
            for(int j=0;j<notSelectDataList.size();j++){
                newFilterDataList.add(notSelectDataList.get(j));//add back the not selected data and recommend again
            }
        }

    } catch (IndexOutOfBoundsException e) {
        addFreeSlot();
        finalPlace.add(finalDataList.get(f).getPlaceName());
        q++;
        placeNum--;
    }
}
sortRating(finalDataList);
for(int i=0;i<finalDataList.size();i++) {
    Log.e( tag: "msg",finalDataList.get(i).toString());
}
```

com.example.fyp.model.AttractionsData
public String getPlaceName()
FYP.app

Figure 52 Recommendation System Algorithm Part 3

The above coding part is the self-created recommendation system algorithm. First, the number of places is defined by the number of travel day (*placeNum variable in the coding*), while the number of places has not filled finish, the code will keep running to add the place until it reaches the maximum number of places in the recommendation list (*FinalDataList variable in the coding*). Then inside the while loop, if the category of the current place in the filtered list (*newFilterDataList variable in the coding*) is match with the chosen category of user preference and the category has not yet take in the recommendation list, then the place will be added into the recommendation list. Then switch to the next item of the filtered list, also set the added category is taken and decrease the number of categories of user preference (*RNoC variable in the coding*). If the next item is also the same category of previous item, it means the category has been taken and skip this item to find the other different category of item to add in the recommendation list. After the number of categories of user preference decrease to zero which mean all the item of chosen category has been added to the recommendation list, then set all the taken category become false to tell system the category has not been selected to continue add again the other item from the filter list. Also, if all the item of filter list has been scanned but the number of places of recommendation list has not reach the maximum number, the q variable will reset to 0 to scan again the filter list. This is allow the system to add the item that meet the user preference requirement before but skipped because of category has taken. So, it will run until it reaches the

maximum number of recommendation list. This self-created algorithm may not be perfect, but it meets the requirements of display the average number of places in each category. It avoids the situation that only display the front queueing item that has same category of place.

```
LatLng cur_point=(new LatLng(pHotelLocation.getGeo_point().getLatitude(), pHotelLocation.getGeo_point().getLongitude()));
LatLng new_point=null;
int counter=0;double new_dist=0.0,shortest_dist=0.0;
AttractionsData nearestPlace=null;
LatLng nearestPoint=null;
ArrayList<String> finalPlace = new ArrayList<>();

while(placeNum!=0) {
    for (int i = 0; i < oriDataList.size(); i++) {
        if (!finalPlace.contains(oriDataList.get(i).getPlaceName())) {
            Log.e(TAG,oriDataList.get(i).getPlaceName());
            new_point = (new LatLng(oriDataList.get(i).getGeo_point().getLatitude(), oriDataList.get(i).getGeo_point().getLongitude()));
            new_dist = meterDistanceBetweenPoints(cur_point.lat,cur_point.lng, new_point.lat,new_point.lng); //cal the distance between cur point and new point

            if (new_dist <= shortest_dist || shortest_dist == 0.0) {
                shortest_dist = new_dist;
                Log.e(TAG, msg: "shortest distance:" + shortest_dist);
                nearestPlace = oriDataList.get(i);
                Log.e(TAG, msg: "nearestPlace:" + nearestPlace.toString());
                nearestPoint = new_point;
                Log.e(TAG, msg: "nearestPoint:" + nearestPoint);
            } else {

                Log.e(TAG, msg: "No changes:" + shortest_dist);
            }

        }
        else{

        }
    }
```

Figure 5-18 Arrange Plan Algorithm Part 1

```
        else{

        }
    }
    finalDataList.add(nearestPlace);
    finalPlace.add(nearestPlace.getPlaceName());
    Log.e(TAG, msg: "Final nearestPlace:" + nearestPlace.toString());
    cur_point=nearestPoint;
    Log.e(TAG, msg: "Final nearestPoint:" + nearestPoint);
    shortest_dist =0.0;
    placeNum--;
    counter++;//if counter =3
    if(counter==3){
        cur_point=(new LatLng(pHotelLocation.getGeo_point().getLatitude(), pHotelLocation.getGeo_point().getLongitude()));
        Log.e(TAG, msg: "Next Day");
        counter=0;
        shortest_dist=0.0;
    }
}


Log.e( tag: "ori:",oriDataList.toString());
Log.e( tag: "final:",finalDataList.toString());
}
```

Figure 5-19 Arrange Plan Algorithm Part 2

The above coding part is the arrange plan algorithm that used to group the closest place into a travel day. First, declare all the needed variable and use a while loop to run until it reaches the maximum number of recommendation list. Then, scan all the item of the recommendation list. The current point is the hotel location, and the new point is the new item of the recommendation list. Then, the system will calculate the distance

between the hotel location and the place location by the meterDistanceBetweenPoints function. If the new distance is shorter than the shortest distance, then it will replace it and become the new shortest distance. After scan all the item of the recommendation list in the for loop, the item that has the shortest distance will become the nearest place and add to the plan list. Then the nearest place become the current point and go back to the first step to find the next nearest place. Because of each travel day has three places to visit, so it will reset all the variable and the current point become the hotel location when the counter number equal to 3. Which mean the system start to arrange plan for the next travel day and group the remaining item of the recommendation list together. This algorithm will keep running until the number of places has reach the maximum number of recommendation list. This algorithm can group the close location together, but it still has more to improve in the future.

CHAPTER 6 IMPLEMENTATION AND TESTING

6.1 System Implementation

The application name of this project is Itinerary Planner App, it is developed and generated by using Android Studio. The apk file can send to other people to install into their android phone.

6.1.1 Implementation

Table 6-1 Implementation Table

Best Practice	Poco X3	Vivo V7
Install Successfully	Pass	Pass
Able to run the application	Pass	Pass
Proper and good UI position	Pass	Pass
All functions running without error	Pass	Pass

6.2 Testing Technique

6.2.1 Use Case Testing

Table 6-2 Sign Up Use Case Testing Table

Test Item	Test Condition	Test Data	Expected Outcome	Actual Outcome	Result (Pass/Fail)
Sign Up	Main Flow	-Email Address: t@gmail.com -Password: 123456	Direct user to Homepage	Direct user to Homepage	Pass
	Alternative Flow-Invalid Email address	-Email Address: tasasasw -Password: 123456	Display an error message	Display an error message	Pass
	Alternative Flow-Empty Email address	-Email Address: -Password: 123456	Display an error message	Display an error message	Pass
	Alternative Flow-Invalid Password	-Email Address: t@gmail.com -Password: 123	Display an error message	Display an error message	Pass
	Alternative Flow-Empty Password	-Email Address: t@gmail.com -Password:	Display an error message	Display an error message	Pass

	Alternative Flow-Sign up with registered account	-Email Address: t@gmail.com -Password:123456	Display an error message	Display an error message	Pass

Table 6-3 Sign In Use Case Testing Table

Test Item	Test Condition	Test Data	Expected Outcome	Actual Outcome	Result (Pass/Fail)
Sign In	Main Flow	-Email Address: t@gmail.com -Password: 123456	Direct user to Homepage	Direct user to Homepage	Pass
	Alternative Flow-Invalid Email address	-Email Address: tasasasw -Password: 123456	Display an error message	Display an error message	Pass
	Alternative Flow-Empty Email address	-Email Address: -Password: 123456	Display an error message	Display an error message	Pass
	Alternative Flow-Invalid Password	-Email Address: t@gmail.com -Password: 123	Display an error message	Display an error message	Pass
	Alternative Flow-Empty Password	-Email Address: t@gmail.com -Password:	Display an error message	Display an error message	Pass
	Alternative Flow-Wrong Password	-Email Address: t@gmail.com -Password:1234567	Display an error message	Display an error message	Pass
	Alternative Flow-Non-existent user account	-Email Address: testtedt@gmail.com -Password:1234567	Display an error message	Display an error message	Pass

Table 6-4 Create Trip Plan Use Case Testing Table

Test Item	Test Condition	Test Data	Expected Outcome	Actual Outcome	Result (Pass/Fail)
Create Trip	Main Flow	-Trip Name: Trip -Start Date: 12/4/2021 -Number of Travel Day: 7 -Checkbox Category: Check Sport, Check Transportation -Hotel: Grand Kampar Hotel	Direct user to Recommended Place Screen	Direct user Recommended Place Screen	Pass
	Alternative Flow-Empty Trip Name	-Trip Name:	Display an error message	Display an error message	Pass
	Alternative Flow-Empty Start Date	-Start Date:	Display an error message	Display an error message	Pass
	Alternative Flow-Empty Number of Travel Day	-Number of Travel Day:	Display an error message	Display an error message	Pass
	Alternative Flow-Number of Travel Day not in 1-7 number	-Number of Travel: 8	Display an error message	Display an error message	Pass
	Alternative Flow-Check empty box	-Check Box:	Display an error message	Display an error message	Pass
	Alternative Flow- Does	-Hotel:	Display an error message	Display an error message	Pass

	not Choose Hotel				

Table 6-5 Edit Trip Plan Use Case Testing Table

Test Item	Test Condition	Test Data	Expected Outcome	Actual Outcome	Result (Pass/Fail)
Edit Trip	Main Flow	-Users press save button	Save user itinerary plan to Firebase database	Save user itinerary plan to Firebase database	Pass
	Alternative Flow- based on number of travel day	-Number of travel day: 7	Display 21 recommended place to user	Display 21 recommended place to user	Pass
	Alternative Flow- Number of recommended lists does not reach the maximum number	-Number of recommended places:19 -Maximum number of recommended places: 21	Add free time slot to the list	Add free time slot to the list	Pass

Table 6-6 Add Attractions Use Case Testing Table

Test Item	Test Condition	Test Data	Expected Outcome	Actual Outcome	Result (Pass/Fail)
Add Attractions	Main Flow	-Long click any item and add to recommended list attractions.	New place added into the recommended list.	New place added into the recommended list.	Pass
	Alternative Flow- Recommended	-Long click any item and add to the	Display Error Message	Display Error Message	Pass

	list has reached the maximum number of places.	recommended list attractions.			

Table 6-7 Remove Attractions Use Case Testing Table

Test Item	Test Condition	Test Data	Expected Outcome	Actual Outcome	Result (Pass/Fail)
Remove Attractions	Main Flow	-Long click any item on the recommended list attractions to remove item.	Selected item removed from the list.	Selected item removed from the list.	Pass

Table 6-8 Arrange Itinerary Plan Use Case Testing Table

Test Item	Test Condition	Test Data	Expected Outcome	Actual Outcome	Result (Pass/Fail)
Arrange Itinerary Plan	Main Flow	-Users drag and arrange the plan and press the save button to save the plan to the Firebase Database	Data save into the Firebase database.	Data save into the Firebase database.	Pass
	Alternative Flow- User does not enable internet when press the save button.	-Users press the save button in an environment without internet.	Request user to enable the internet access.	Request user to enable the internet access.	Pass

Table 6-9 View Trip Pan Use Case Testing Table

Test Item	Test Condition	Test Data	Expected Outcome	Actual Outcome	Result (Pass/Fail)
View Trip Plan	Main Flow	-Users go to View Trip Plan Screen to view all saved plan.	All itinerary plans retrieve from Firebase database and display on the view trip screen.	Itinerary plans retrieve from Firebase database and display on the view trip screen.	Pass
	Alternative Flow-No created plan	- Users go to View Trip Plan Screen to view all saved plan.	No data retrieve from the Firebase database and display an empty screen.	No data retrieve from the Firebase database and display an empty screen.	Pass
	Alternative Flow-View certain plan	-Select Plan and press view button.	Display a list of attractions that save in the itinerary plan before.	Display a list of attractions that save in the itinerary plan before.	Pass
	Alternative Flow-Delete certain plan	-Select Plan and press delete button.	Selected plan delete from the application and Firebase database	Selected plan delete from the application and Firebase database	Pass
	Alternative Flow-View route	-After user view a certain plan and press	Display the optimize route on the	Display the optimize	Pass

		the route button.	Google Map	route on the Google Map	

Table 6-10 View Attractions Detail Use Case Testing Table

Test Item	Test Condition	Test Data	Expected Outcome	Actual Outcome	Result (Pass/Fail)
View Attractions Detail	Main Flow	-Users click on any item of the attractions list to view the information details of attractions.	User direct to attractions details screen and display the information details.	User direct to attractions details screen and display the information details.	Pass
	Alternative Flow- View Nearby Restaurant	- Users press nearby restaurant button.	The filtered restaurant list of 2km radius distance between current item location and restaurant location display on the Google Map.	The filtered restaurant list of 2km radius distance between current item location and restaurant location display on the Google Map.	Pass
	Alternative Flow- View 1km radius of nearby restaurant.	-User press 1km button on the google map.	The filtered restaurant list of 1km radius distance between current item location and restaurant	The filtered restaurant list of 1km radius distance between current item location and	Pass

			location display on the Google Map.	restaurant location display on the Google Map.	
	Alternative Flow- View 3km radius of nearby restaurant	- User press 3km button on the google map.	The filtered restaurant list of 3km radius distance between current item location and restaurant location display on the Google Map.	The filtered restaurant list of 3km radius distance between current item location and restaurant location display on the Google Map.	Pass

CHAPTER 7 CONCLUSION

7.1 Project Review, Discussion and Conclusion

In conclusion, this project is developed to solve the problems that tourists encountered in tourism. Most of the problem is the tourist do not have an idea to plan the trip. This is because they need to do many kinds of research on the attractions and may not be familiar with the information about the attractions. Also, it is very time-consuming and difficult to plan the trip efficiently. This is because tourist does not know the exact distance between attractions and spending time of the attractions, so they may be unexpected circumstances that may cause part of the itinerary to be cancelled. Besides, some attractions and famous food are only known by local people, tourist may miss out on the interesting attractions since they are not familiar with the place. Therefore, the mobile itinerary planner app with a list of functions that include generating an itinerary plan, recommend attractions and travel guide services will be developed to overcome the above problems. Other than that, the other purpose of this mobile application is used to improve the tourism industry and economy of Kampar. Kampar is a very promising tourist destination because it has a lot of different categories of attractions. So, the mobile itinerary planner app of this project will be mainly focusing on creating an itinerary plan based on a recommendation system.

In the final delivery product of this project, Itinerary Planner App can be solved most of the problem that mentioned from the above. Itinerary Planner App is able to recommend a list of attractions based on the user preference, number of travel day and chosen hotel and favourite category. On the other hand, the recommendation system of the Itinerary Planner App can recommend an average number of attractions in each selected category of attractions. Of course, the recommendation system still has the capability to be improved in the future. Also, user can modify the recommended attractions list manually, the application is flexible to let user modify their plan. In addition, the Itinerary Planner App can help user arrange the plan automatically by group a group of closest places into a travel day. Users are also allowing to rearrange the itinerary plan manually. Furthermore, user can click on any item of the attractions list to view the information details of the attractions. User also can press the nearby restaurant button to view the nearby restaurant from the selected location. The nearby restaurant can choose to filter 1km, 2km or 3km radius distance between the selected attractions location and the list of restaurant location. Finally, user can save their itinerary plan to the Firebase database and view or delete the plan at any time.

7.2 Future Work

Due to the time constraint, the Itinerary Planner App still has many features can be improved. For future improvement, it can add the weather forecast function to detect the weather of the travel data. The weather forecast function can improve the recommendation system to recommend the suitable attractions at suitable weather travel day. This will make the recommendation system completer and more perfect. Besides, it also can add the friend features like travel version of Facebook to let the user of Itinerary Planner app can chat together or share their travel guide to each other. Lastly, the help and support channel also can add into apps to help user when they face some problem in the application.

Bibliography

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POSTER

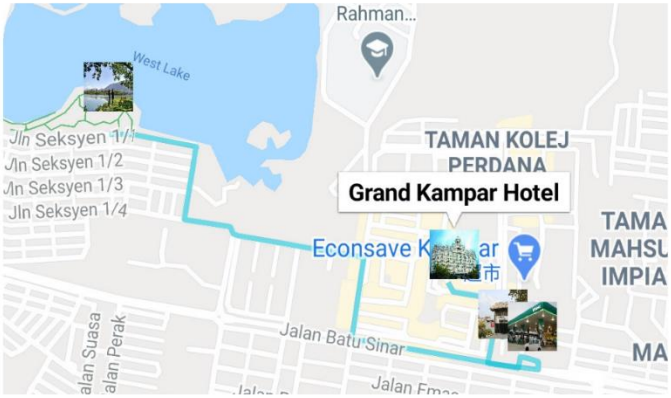
UTAR KAMPAR

THE DEVELOPMENT OF MOBILE ITINERARY APPLICATION FOR KAMPAR TOURISM

BY TONG GUO WEI

INTRODUCTION

An mobile itinerary planner application that help user to generate an itinerary plan of Kampar Trip. This application is cover the attractions of Kampar. User can get the useful information and recommended attractions from this application to enjoy the trip of Kampar. The list of recommended attractions will display to user and arrange a trip plan within minutes.



MAIN FUNCTION

Auto generate an itinerary plan to user. The list of recommended attractions is derived from the user preference, number of travel day and chosen hotel. User also can modify the recommended trip plan and save their own plan to the firebase and application.

METHODOLOGY

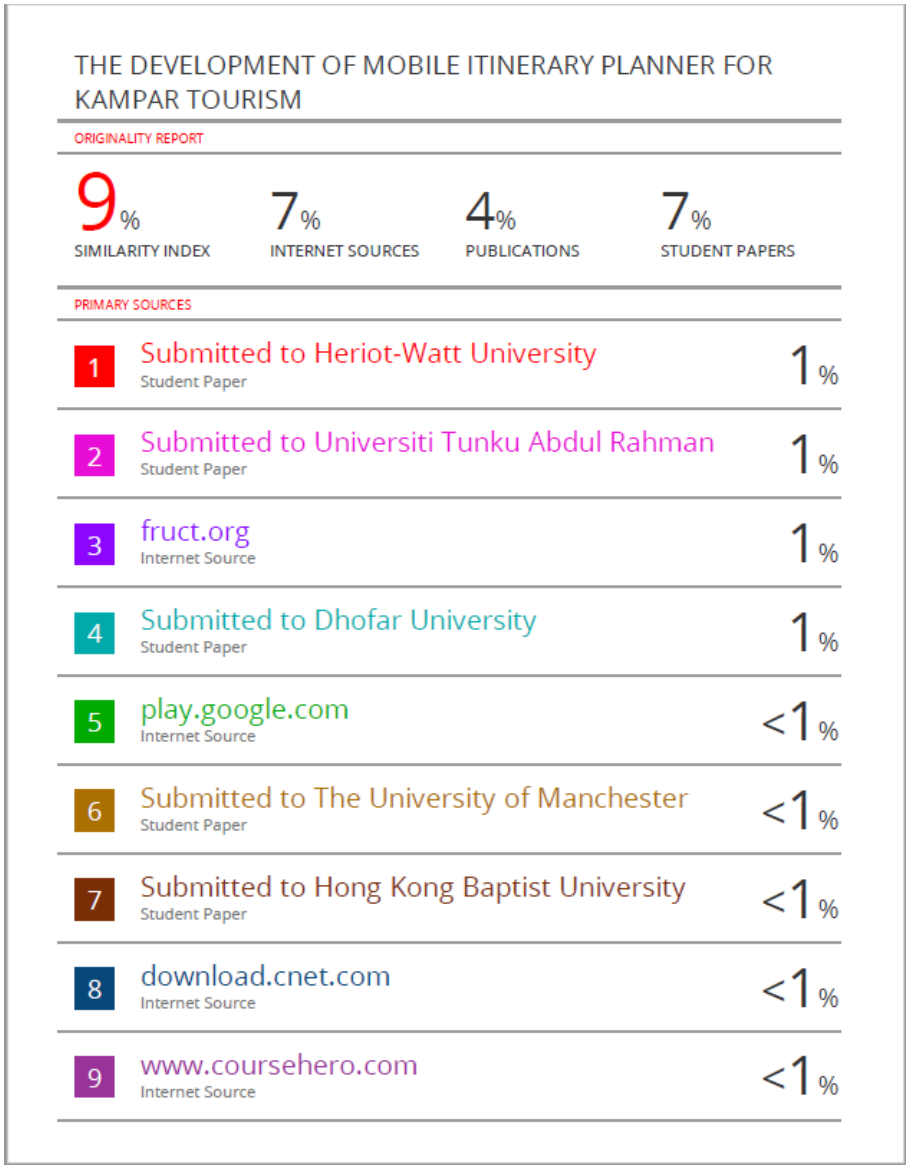
i) Prototyping-based Methodology
ii) Android platform application which is developed in Android Studio
iii)Data link with Firebase, Google Map API

CONCLUSION & DISCUSSION

The mobile itinerary planner is a very potential application. It can help the tourist who does not have an idea to planning a trip to generate a itinerary plan in a short time. This application can promote and improve the tourism industry of Kampar because it recommends a lot of attractions of Kampar. Also, it still has many space to improve the functions and features to make more benefit to user.

By Tong Guo Wei
Supervisor: DR. Liew Soung Yue

PLAGIARISM CHECK RESULT



THE DEVELOPMENT OF MOBILE ITINERARY PLANNER FOR KAMPAR TOURISM

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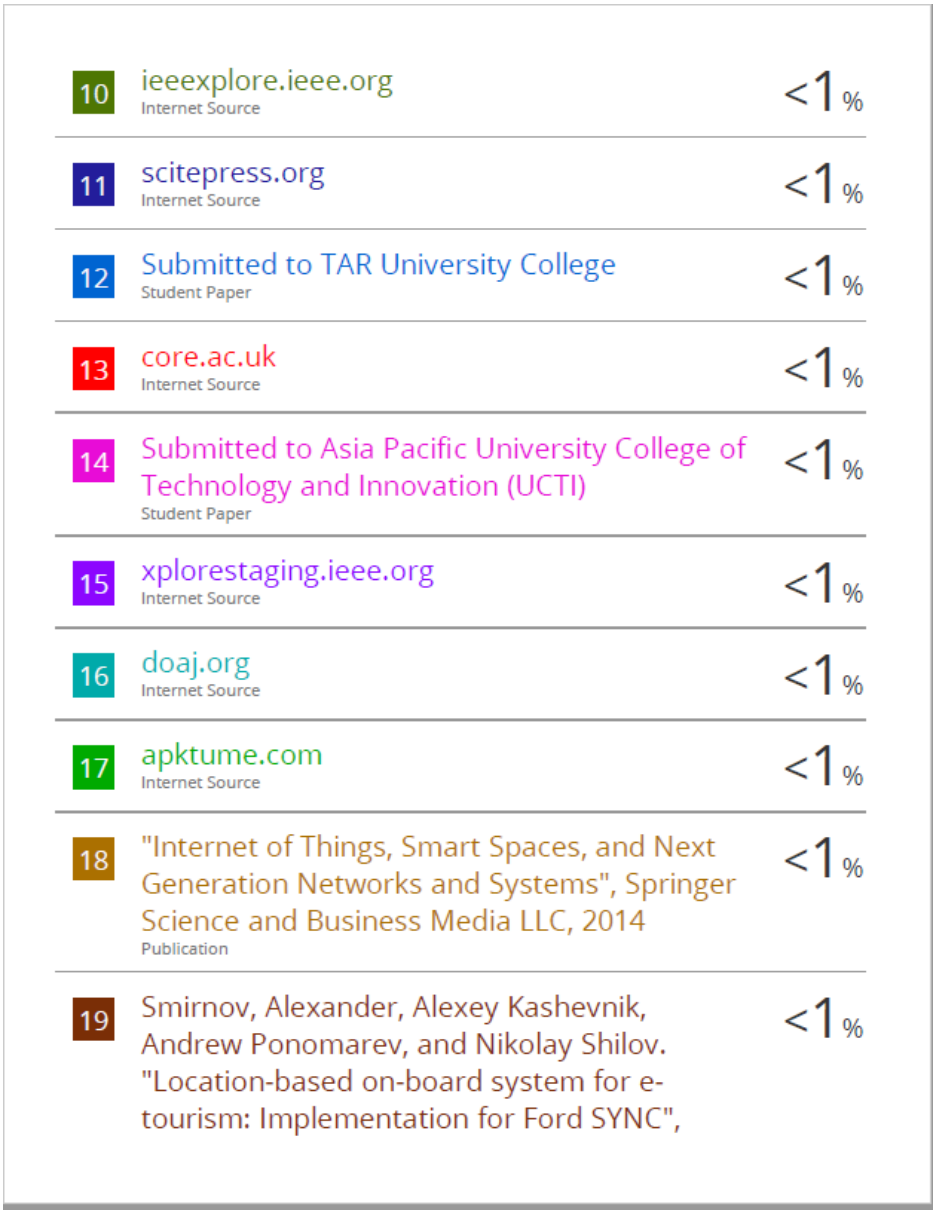

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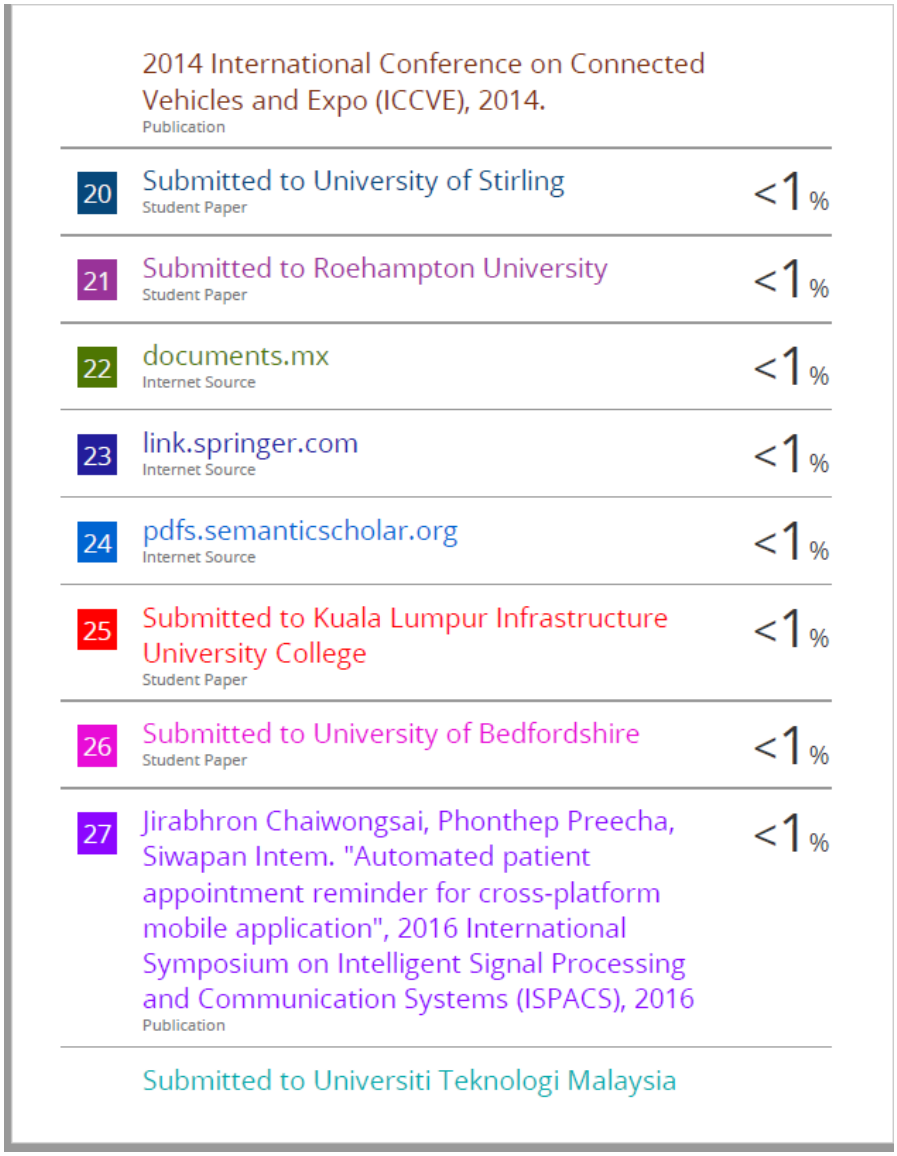
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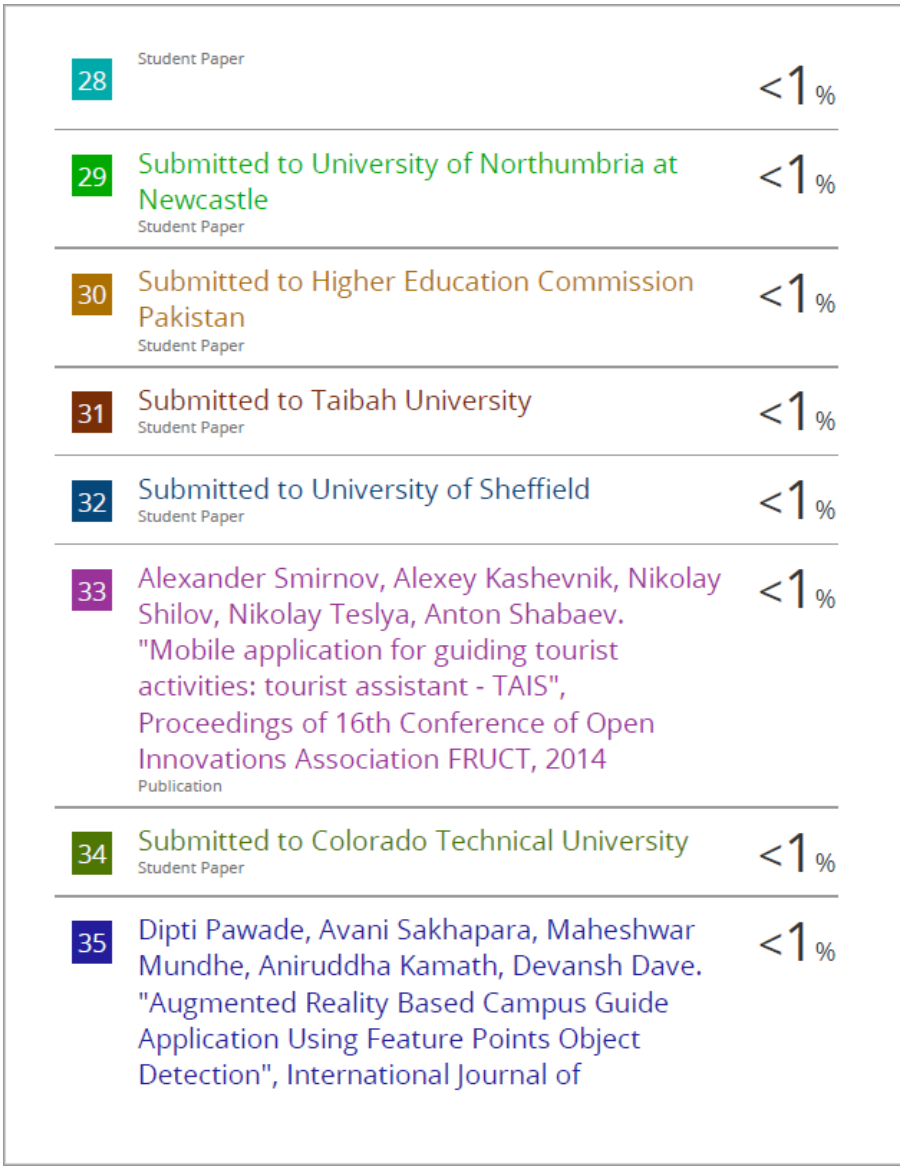
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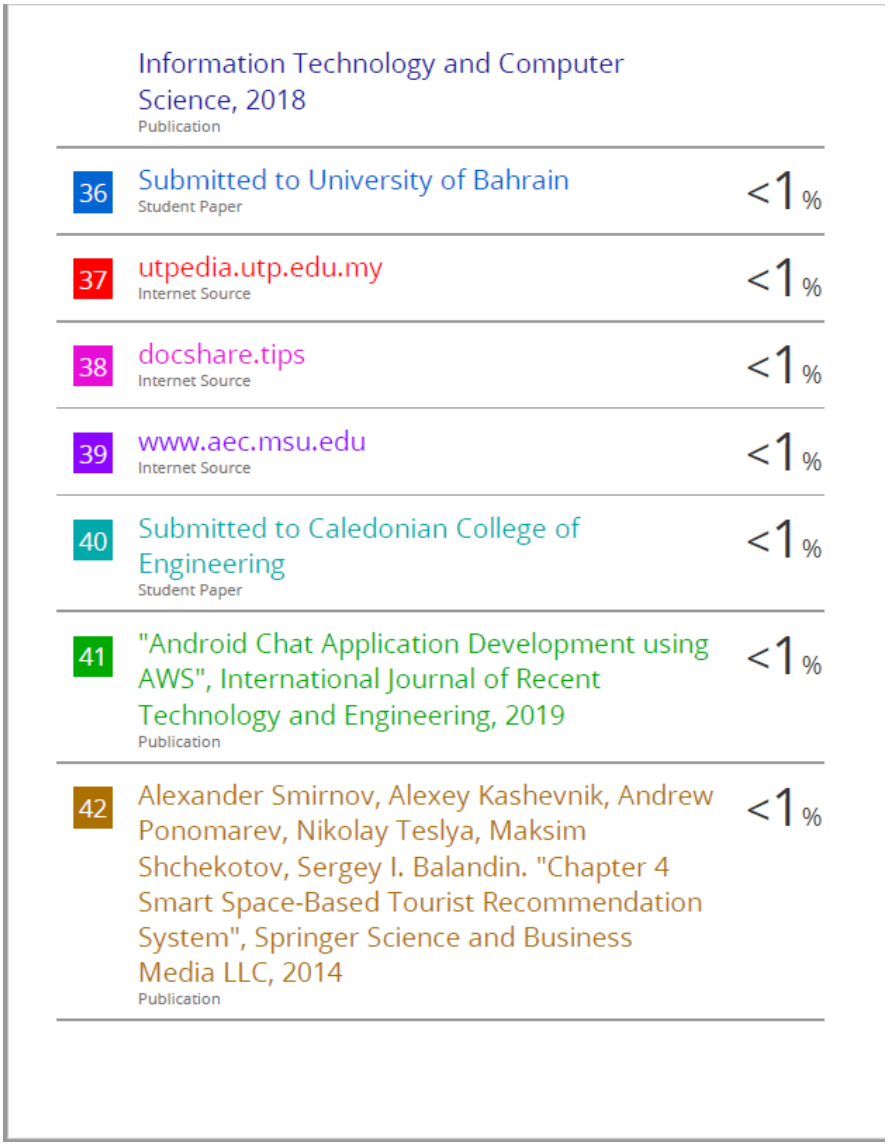

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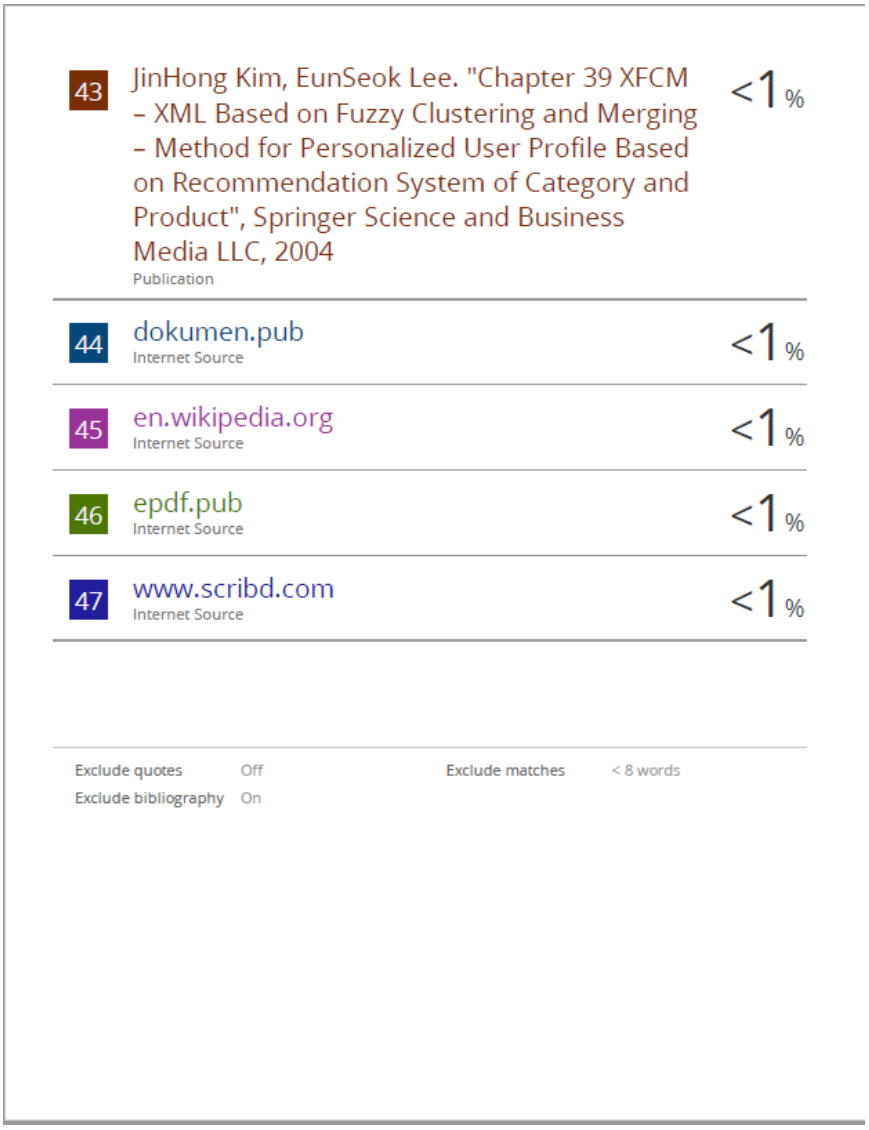
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Trimester, Year: Y3S3	**Study week no.: 1**
Student Name & ID: 18ACB02230	
Supervisor: Ts Dr Liew Soung Yue	
Project Title: The Development of Mobile Itinerary Planner for Kampar Tourism	

1. WORK DONE

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

List out the work to be done.

2. WORK TO BE DONE

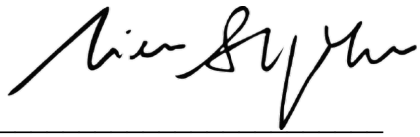
Collect hotel and restaurant data

3. PROBLEMS ENCOUNTERED

No idea for develop the new recommendation system.

4. SELF EVALUATION OF THE PROGRESS

Quite satisfied



Supervisor's signature

Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: Y3S3	**Study week no.: 2**
Student Name & ID: 18ACB02230	
Supervisor: Ts Dr Liew Soung Yue	
Project Title: The Development of Mobile Itinerary Planner for Kampar Tourism	

1. WORK DONE

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

Add the Hotel Feature

2. WORK TO BE DONE

Develop the Google Map into the application

3. PROBLEMS ENCOUNTERED

The flow of new recommendation system

4. SELF EVALUATION OF THE PROGRESS

Quite satisfied

Supervisor's signature

Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: Y3S3	**Study week no.: 3**
Student Name & ID: 18ACB02230	
Supervisor: Ts Dr Liew Soung Yue	
Project Title: The Development of Mobile Itinerary Planner for Kampar Tourism	

1. WORK DONE

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

Add the Google Map features in the application

2. WORK TO BE DONE

Develop the new algorithm of recommendation system

3. PROBLEMS ENCOUNTERED

The step of the new algorithm

4. SELF EVALUATION OF THE PROGRESS

Quite satisfied

Supervisor's signature

Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: Y3S3	**Study week no.: 5**
Student Name & ID: 18ACB02230	
Supervisor: Ts Dr Liew Soung Yue	
Project Title: The Development of Mobile Itinerary Planner for Kampar Tourism	

1. WORK DONE

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

Develop the new algorithm of recommendation system

2. WORK TO BE DONE

Save hotel data to the firebase and retrieve from firebase

3. PROBLEMS ENCOUNTERED

-

4. SELF EVALUATION OF THE PROGRESS

Quite satisfied

Supervisor's signature

Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: Y3S3	**Study week no.: 6**
Student Name & ID: 18ACB02230	
Supervisor: Ts Dr Liew Soung Yue	
Project Title: The Development of Mobile Itinerary Planner for Kampar Tourism	

1. WORK DONE

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

Revise the Hotel Map features

2. WORK TO BE DONE

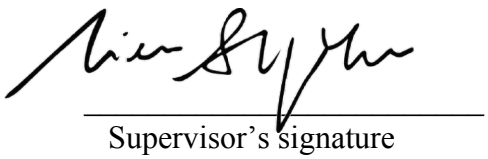
Develop the auto arrange plan features

3. PROBLEMS ENCOUNTERED

-

4. SELF EVALUATION OF THE PROGRESS

Quite satisfied



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FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: Y3S3	**Study week no.: 7**
Student Name & ID: 18ACB02230	
Supervisor: Ts Dr Liew Soung Yue	
Project Title: The Development of Mobile Itinerary Planner for Kampar Tourism	

1. WORK DONE

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

Develop the auto arrange plan algorithm.

2. WORK TO BE DONE

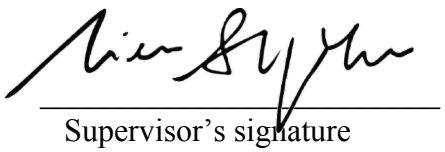
Develop the optimize route of travel day

3. PROBLEMS ENCOUNTERED

Difficult to draw the optimize route on the google map

4. SELF EVALUATION OF THE PROGRESS

Quite satisfied



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FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: Y3S3	**Study week no.: 8**
Student Name & ID: 18ACB02230	
Supervisor: Ts Dr Liew Soung Yue	
Project Title: The Development of Mobile Itinerary Planner for Kampar Tourism	

1. WORK DONE

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

Setting up the google direction api

2. WORK TO BE DONE

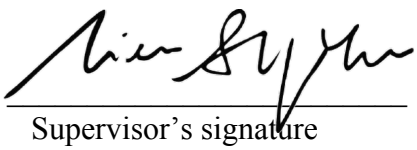
Use the google direction api to develop the optimize route system

3. PROBLEMS ENCOUNTERED

Need enable the billing of google cloud platform to enable google direction api.

4. SELF EVALUATION OF THE PROGRESS

Quite satisfied



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FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: Y3S3	**Study week no.: 9**
Student Name & ID: 18ACB02230	
Supervisor: Ts Dr Liew Soung Yue	
Project Title: The Development of Mobile Itinerary Planner for Kampar Tourism	

1. WORK DONE

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

Develop the optimize route of travel day

2. WORK TO BE DONE

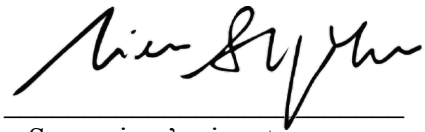
Show the optimize on google map

3. PROBLEMS ENCOUNTERED

Pass data to the google map and draw the route.

4. SELF EVALUATION OF THE PROGRESS

Quite satisfied



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FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: Y3S3	**Study week no.: 10**
Student Name & ID: 18ACB02230	
Supervisor: Ts Dr Liew Soung Yue	
Project Title: The Development of Mobile Itinerary Planner for Kampar Tourism	

1. WORK DONE

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

Develop the navigation of the optimize route on google map.

2. WORK TO BE DONE

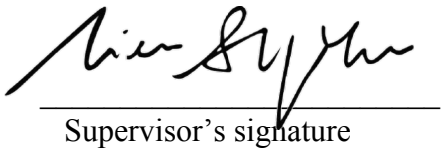
Develop nearby restaurant system

3. PROBLEMS ENCOUNTERED

-

4. SELF EVALUATION OF THE PROGRESS

Quite satisfied



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FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: Y3S3	**Study week no.: 11**
Student Name & ID: 18ACB02230	
Supervisor: Ts Dr Liew Soung Yue	
Project Title: The Development of Mobile Itinerary Planner for Kampar Tourism	

1. WORK DONE

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

Develop the nearby restaurant system

2. WORK TO BE DONE

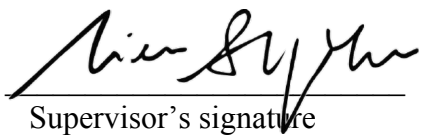
Write report

3. PROBLEMS ENCOUNTERED

-

4. SELF EVALUATION OF THE PROGRESS

Quite satisfied



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FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: Y3S3	**Study week no.: 12**
Student Name & ID: 18ACB02230	
Supervisor: Ts Dr Liew Soung Yue	
Project Title: The Development of Mobile Itinerary Planner for Kampar Tourism	

1. WORK DONE

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

Write Report

2. WORK TO BE DONE

Submit the final report to turnitin

3. PROBLEMS ENCOUNTERED

-

4. SELF EVALUATION OF THE PROGRESS

Quite satisfied

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Name: Liew Soung Yue

Date: 16/4/2021

Signature of Co-Supervisor

Name: _____

Date: _____

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