

**INTELLIGENT MOBILE MAID MATCHING USING SIMILARITY
SEARCH**

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**A project report submitted in partial fulfilment of the
requirements for the award of Bachelor of Science
(Hons.) Software Engineering**

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September 2020

DECLARATION

I hereby declare that this project report is based on my original work except for citations and quotations which have been duly acknowledged. I also declare that it has not been previously and concurrently submitted for any other degree or award at UTAR or other institutions.

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ABSTRACT

Intelligent Mobile Maid Matching using Similarity Search is a mobile application that allows maid seekers to search for an ideal maid by provide the maid matching function using similarity measures. The purpose of having this idea is because nowadays the maid seekers are lacked of a useful platform to find a quality maid. Moreover, all the applications that had been reviewed are using a simple matching method to search for maids. Thus, when performing searching, the result is very limited, especially when a user searches maids with more preferences. This application developed in this project is only available in Android Platform. Firebase is used as the application database that connects with a real-time database and allows user authentication process. The system development methodology used for this project is the Prototyping model. Therefore, the application can adapt to the environment changes when implementing the application. Functions of the application are implemented according to the result of the questionnaire. In this project, similarity measures such as Euclidean distance, Manhattan distance, Minkowski distance, Jaccard coefficient and cosine similarity will be studied. The most suitable method will be tested through usability testing to find out which method is closest to the ideal maid of maid seekers. According to the result of usability testing, the similarity measure that applied to the searching function is Jaccard Coefficient. This application is developed successfully and pass all the testing. In a nutshell, this project is a successful project that has achieved all the project's objectives.

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CHAPTER 1

INTRODUCTION

1.0 Introduction

Hu (2012) stated that the demand for maids in Malaysia had reached almost 250,000. Nowadays, the demand for maids is still increasing as the number of Malaysia's dual-income families has increased significantly. This is because maids can relieve both physically and mentally stress of the families (Cardinal, 2017). The maids can help to maintain a comfortable household, care for a baby, elderly people, and others. Many people thought that the procedure instructions through the System Maid Online (SMO) were very ambiguous, and the explanation of the relevant application was not clear. Thus, many maid seekers suffered setbacks in progress and eventually giving up and turning to the maid agency for help (Chong, 2019).

In modern times, mobile phones are now indispensable for everyone. Therefore, this project is aimed to design a mobile application that allows maid seekers to search for an ideal and suitable maid. Thus, the maid seekers are able to get maid services and information effective and efficient via this application.

There are various kinds of maid searching applications available on the market. Although there are many similar systems in the market, but they are only available in other countries. Therefore, this project will perform matching and helping maid seekers to choose their preferred maids based on the criteria that they wished. The criteria that can be set as preferences are age, height, weight, marital status, nationality, religion, gender, language spoken, working experience, previous workplace, and education level. This can help the maid seeker to find the most suitable maid.

1.1 Problem statement

- **Maid seekers lack of a platform and hard to find a quality maid.**

Nowadays, the demand for the number of maids is increasing as the number of dual-income families is increasing. Many people hire maids to help them with housekeeping so that they have more time to do their stuff. According to the study by Awang and Wong (2019), a good maid is hard to find as two out of three maids do not complete their service within the contract period. 250 employers replaced their maids five or more times within 2018 based on the Ministry of Manpower (MOM) statistics.

- **The maid seekers cannot search for a maid by setting more preferences in the mobile application in Malaysia context.**

Through the comparison for the existing mobile applications in chapter two, most of the existing applications are providing maid searching but only based on a few criteria. Some applications that with this feature are only available in other countries but not Malaysia. For Malaysia, one of the existing mobile applications only let the maid seekers search the maids with only two options, i.e., nationality and experience. This is not effective as these two options are too general as most of the maids can come from the same country and work for the same country. Thus, through this application, the maid seekers can search the maid based on criteria such as age, marital status, nationality, language spoken, height and weight, working experience and others. This feature is quite important as it can let the maid seeker to find his/her preferred maid.

- **Barriers of rule-based system and database/ SQL query**

Rule-based systems are not recommended to be used in this maid matching as it is only reliable for complex solutions, and the knowledge in the problem area can be written in the form of if-then rules. It is also not suitable when there are too many rules as the system will become hard to maintain, and the performance might not be accurate. Mukundan and his friends (2007) claimed that the rules are an independent piece of knowledge about the field. While adding new pieces of knowledge to a rule-based system, the position of rules that added and what are the interactions with other rules need not be worried. However, they also stated that the rules in many systems cannot be assumed there is no interaction between the rules. Unexpected results will be produced if the rule interaction is being ignored. Furthermore, the performance of database queries is not effective when it processes too much data (Tkachenko, et al.,

June 2008). Some queries are just assisting in filtering data but cannot help to look for the similar results.. In recent years, the acceptance of object-relational databases has increased. However, the biggest issue for the database query is response time. In particular, the response time becomes alarming when the large data are frequently retrieved from the databases from different servers. This is because the query matching method is not satisfied with complex data. Thus, more time will be consumed by the system if the query is complicated and more result is accessed from the server (Faisal, et al., 2019).

1.2 Objectives

- **To design a mobile application for searching ideal maids.**

Nowadays, many people prefer to use mobile applications which are more convenient and effective to accomplish their tasks. By developing a mobile application, the maid seekers can save a lot of time as they can search for the maid anytime and anywhere.

- **To provide a better maid searching using similarity measures.**

Similarity measures are more efficient to be used to measure the similarity between two objects. They are more accurate as compared to simple matching and rule-based. By implementing the searching features with similarity measure, the maid seekers are allowed to search maids by setting more preferences, and to find a suitable maid that is closed to their preferences.

1.3 Proposed Solution

A mobile application is proposed as a solution to improve the maid service system encountered in the existing application. This application uses Firebase as the database, Java programming language, and supports only the Android platform.

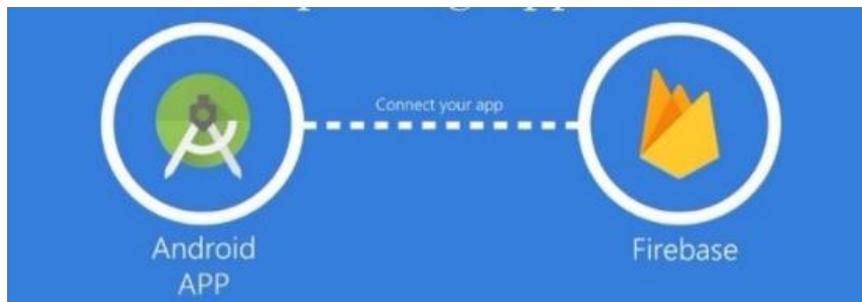


Figure 1.1 *Overview Diagram (Eze, 2017)*

For this application, the Java programming language will use to develop front-end. Eze (2017) claimed that when a mobile application develops with Firebase, then the developers do not need to manage servers or write APIs for a simple project. Thus, this application uses Firebase to develop as Firebase can become the servers, API and database.

By implementing this application, most of the problems faced by the maid seekers could be solved efficiently. In general, this mobile application has the following features and functions to implement in the system, such as:

1) Allow maid seekers to find the maid easily.

The maid seekers are able to search for a maid anytime and anywhere by using an internet-connected mobile application.

2) Allow maid seekers to set their preferences when searching.

The maid seekers are able to search for a maid according to their preferences. Thus, the system can perform matching based on the criteria to suggest a suitable maid.

3) Reduce the number of 'forgetful'.

This application will provide a feature that asks the maid seekers whether they want to set a reminder or not when successful applying for a maid. This can prevent the maid seekers to forget about the arrival date of their maid.

4) Bookmark List

Bookmarking functionality will be included in this application. This feature allows maid seekers to "star" their favourite maids. Then, they can view the list of maids they like.

1.4 Proposed Approach

1.4.1 Methodology

Software Development Methodology is a framework that helps for managing, designing, planning, and controlling the development process in the software development life cycle (SDLC). There are numerous types of methodologies that can be applied in this project such as the Waterfall Model, Agile software development, Prototyping model, Rapid Application Development and others. In this case, the proposed methodology that will be used in this project is prototyping model.

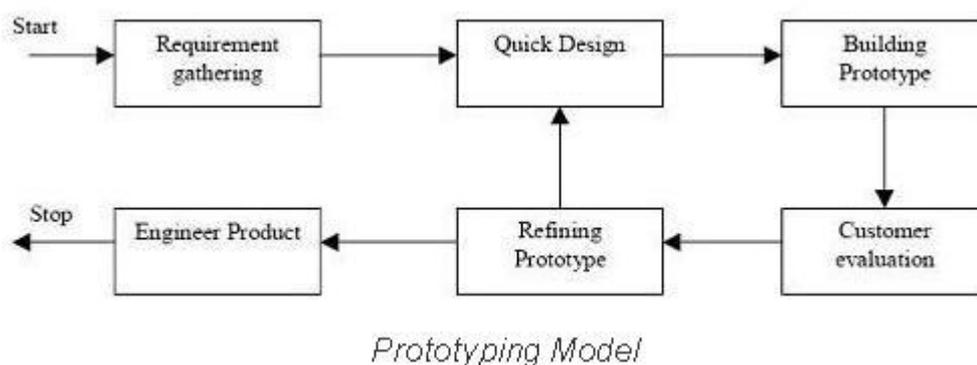


Figure 1.2 Phases of Prototyping model. (Kurma, 2012)

Rouse (2019) claimed that the prototyping model is a method of system development that builds a prototype, tests it and then refines it until a sign-off is achieved from the clients whether this application can be developed. This model is using when the project requirements are ambiguous ahead of time. In addition, it is a process of iterating and the process of trial and error between users and developers.

The prototyping model is suitable for developing the mobile application because the users can involve throughout the mobile application development. By involving the users during the development, the users can see and interact with the prototype of the project. The users able to give the feedback, add or change the project requirements and alter the model specifications. It can reduce the problems of misunderstandings during the development process (Rapid Reproduction, 2016).

Moreover, the defects and bugs can detect earlier by using this method. This is because the process is iterative, where the users can figure out the dissatisfaction and the limitations of the prototypes. (Educba, 2019). This makes the process of maintenance easier as the number of errors can be reduced.

1.4.2 Research Method

The research method that will be applied in this project is quantitative research. The purpose of using this method is data gathering. A set of the questionnaire will be prepared to the potential users to gather the opinion from different potential users and the problem faced by the users so that the system could be improved.

1.5 Project Scope

This scope for this project is to develop a maid searching system that involves a few modules that only available to Android operating system devices. This application is a mobile application. Therefore, android studio and Firebase will be used to develop this application.

The target users of this project are the maid seekers in the Klang Valley area. This system will provide a search engine for maid seekers to search maids by selecting the characteristics of the maids. The system will show the result from the highest to lowest based on the similarity. The maid seekers can view the lists and the details information of the maids such as name, age, marital status, weight, height, nationality, religion, language spoken, education level, previous workplace, and working experience. This project allows setting a reminder to remind the arrival date of the maid. The maid seekers are allowed to bookmark their preferred maids after searching.

Besides that, this system will provide a better maid matching feature that can let the maid seekers search a suitable maid by performing matching based on similarity measures. This project will compare the results provided that based on simple matching and different similarity measures such as Euclidean distance, Manhattan Distance, Jaccard Coefficient, Minkowski Distance and Cosine Similarity. Then, the best measures that provide good result will be selected to apply in the application.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

In this chapter, the features of five similar existing applications will be compared and contrasted to gain more understanding of the system. Although some applications are not exactly the same as the project, useful features can be extracted to include them in this project. Next, to choose the appropriate methodology, a comparison between various development methodologies will consist in this section. Besides that, the advantages and disadvantages of using similarity measures will be studied. The various types of usability testing will be discussed in this section.

2.1 Similar Mobile Applications Study and Evaluation

In this section, five applications have been selected to perform a literature review. There are three mobile applications and two website applications such as Maid Assist, Agensi Pekerjaan Venture Provision (APVP), Agensi Pekerjaan Together Sdn. Bhd., Wilson Maid, and HelperSearch. For Wilson Maid and HelperSearch are only available in Hong Kong.

2.1.1 Maid Assist

This application is released in 2017 by Island Maids (East) Pte Ltd. The following will discuss the features of the application.



Figure 2.1 *Maid Assist Application*

- **Translation Tools**

This application is designed to bridge the communication gap between Domestic Employer and their maids (Foreign Domestic Workers). With the help of translation tools, employers can translate and send messages via text messages to the maids.

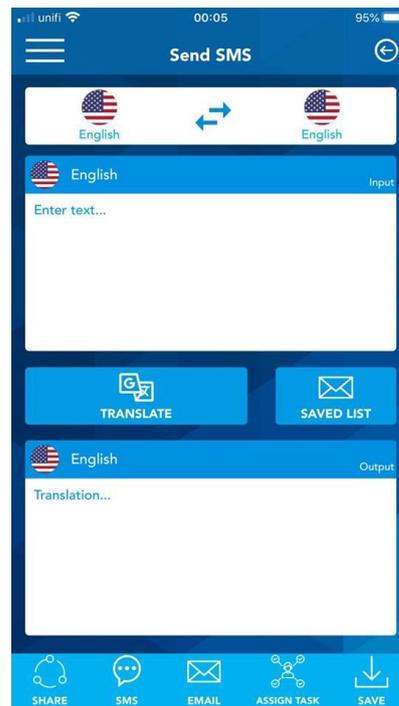


Figure 2.2 *Translation tools*

- **Plan Schedule**

This Schedule Planner has an extra feature which is the employer can plan their maid's work schedule in their own language and then can translate into the required language of choice. They can then decide to send their plan to the maid via SMS or email the plan to themselves in order to print a hard copy to be handed to the maid.

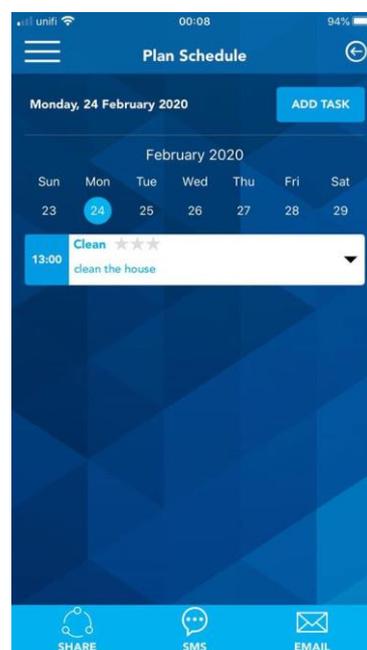


Figure 2.3 *Plan schedule*

- **Guideline**

It provides a video guide on how to manage a maid, as well as housework tips and guides. Moreover, the users can access to translate food recipes, which can be downloaded into emails for maids to learn and improve.

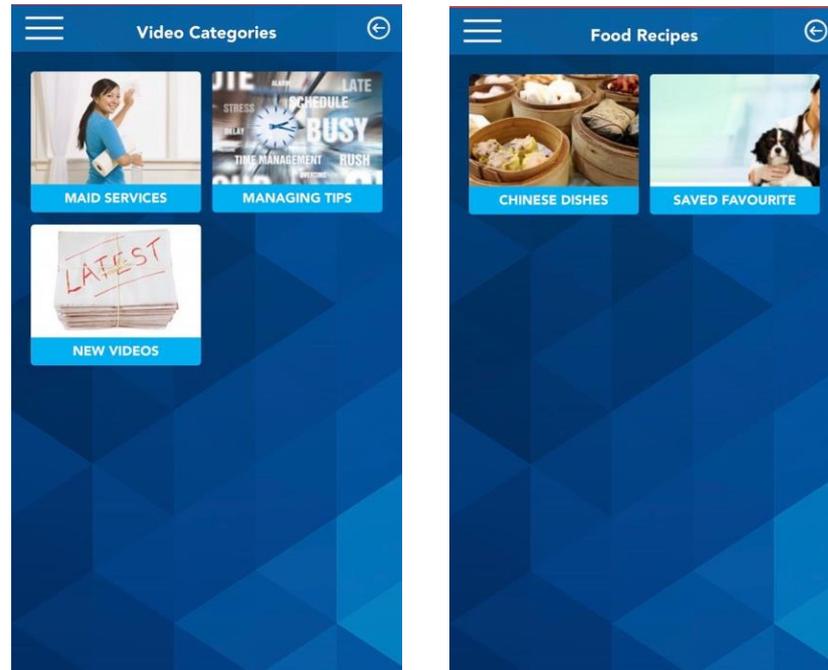


Figure 2.4 *Guideline*

- **Check VISA Requirement**

If the users wish to take a maid abroad, they can use this application to check the visa requirements of the country that intend to visit for the maid.

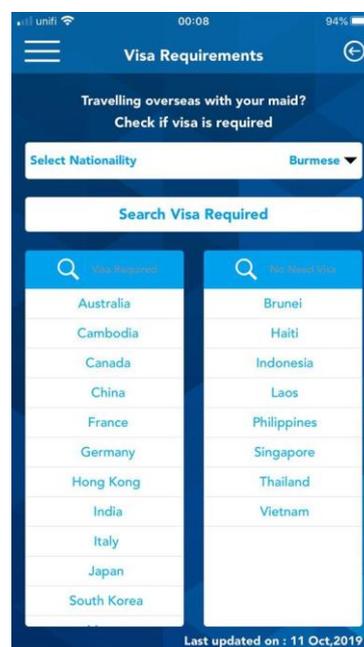
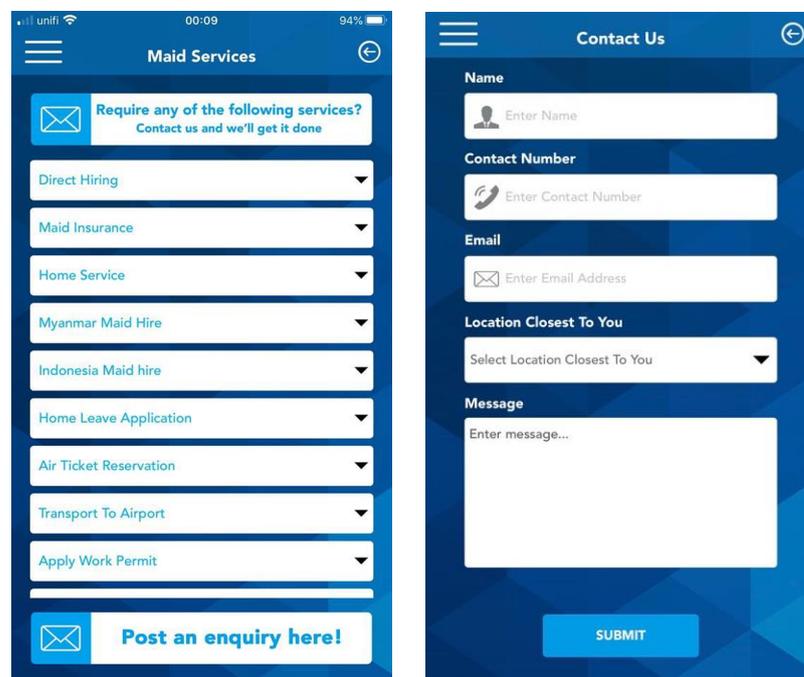


Figure 2.5 *Visa Requirement*

- **Maid Service**

It has a lot of types of maid service. It allows the users to contact them to inquire about the services.



The image displays two mobile application screens. The left screen, titled 'Maid Services', features a blue header with a menu icon, a back arrow, and the title. Below the header is a white box with an envelope icon and the text 'Require any of the following services? Contact us and we'll get it done'. A list of services follows, each in a white box with a dropdown arrow: 'Direct Hiring', 'Maid Insurance', 'Home Service', 'Myanmar Maid Hire', 'Indonesia Maid hire', 'Home Leave Application', 'Air Ticket Reservation', 'Transport To Airport', and 'Apply Work Permit'. At the bottom is a white box with an envelope icon and the text 'Post an enquiry here!'. The right screen, titled 'Contact Us', has a blue header with a menu icon, a back arrow, and the title. It contains a form with the following fields: 'Name' (with a person icon and 'Enter Name'), 'Contact Number' (with a phone icon and 'Enter Contact Number'), 'Email' (with an envelope icon and 'Enter Email Address'), 'Location Closest To You' (with a dropdown arrow and 'Select Location Closest To You'), and 'Message' (with a text area and 'Enter message...'). A blue 'SUBMIT' button is at the bottom.

Figure 2.6 *Maid Service*

- **Maid Profiles**

The users can view the list of the maids. They can click in to view the detail information of a maid they wish to view.

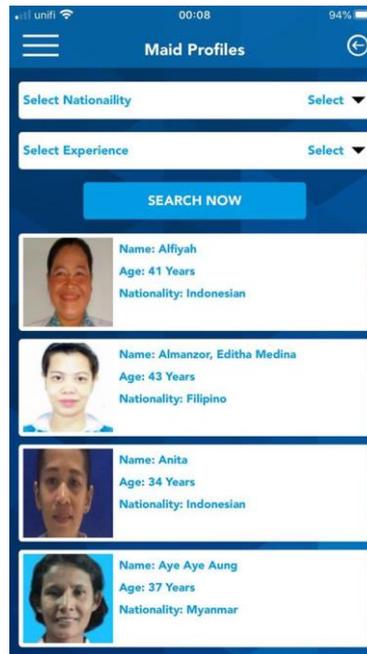


Figure 2.7 *Maid Profiles*

- **Matching Method**

This application only allows users to search for maids by setting two conditions. Since the results provided are exactly the same as the conditions, it can be assumed that the matching method used by this application is simple matching.

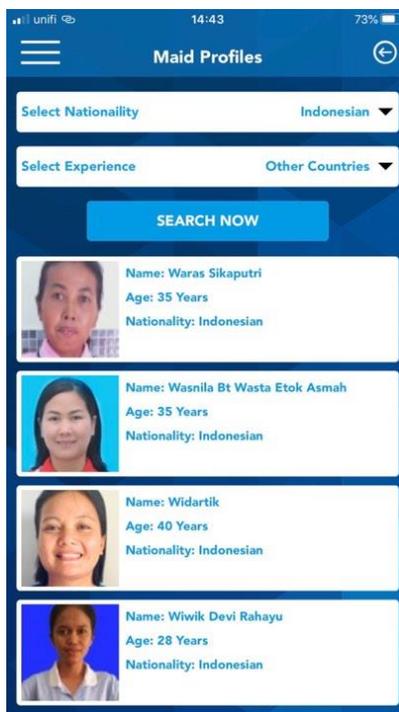


Figure 2.8 *Matching method*

2.1.2 Agensi Pekerjaan Venture Provision (APVP)

APVP is a website application that managed licensed recruitment agency. They have many years of experience in providing good quality and service in KL, Malaysia. They have recruited thousands of foreign maids to meet their personal needs. All of their maids have been screened and trained at the training centre in preparation for deployment to Malaysia.

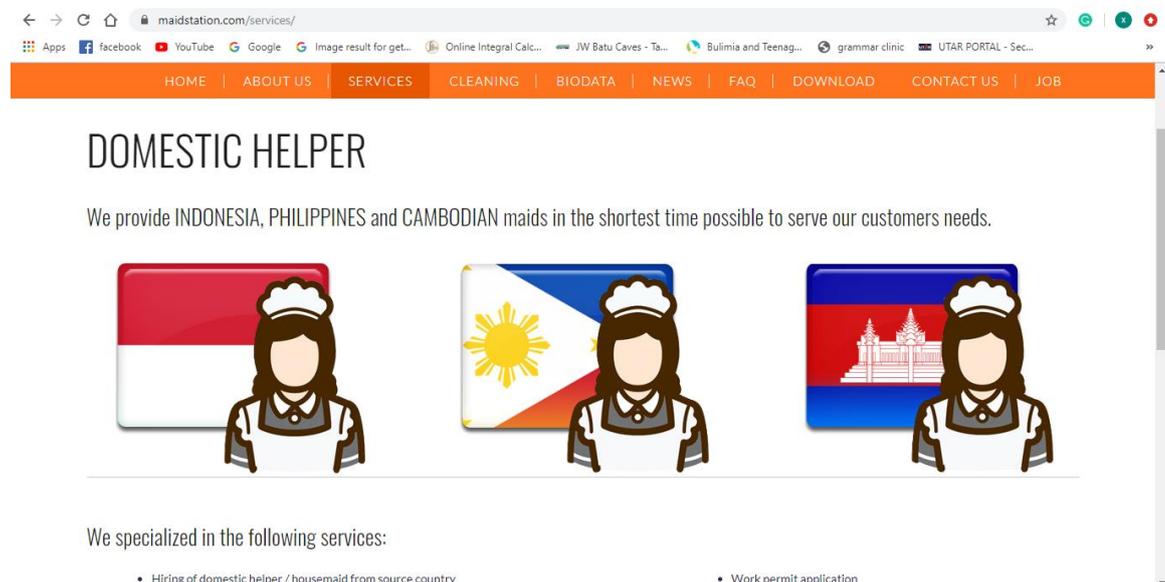


Figure 2.9 APVP

- **Maid Service**

This website has provided the cleaning service by submitting the inquiry form for home cleaning service. The users need to fill up their name, email, contact number, preferred time to contact, full address, and residential type. They also need to choose when, how long the user wants to hire a maid.

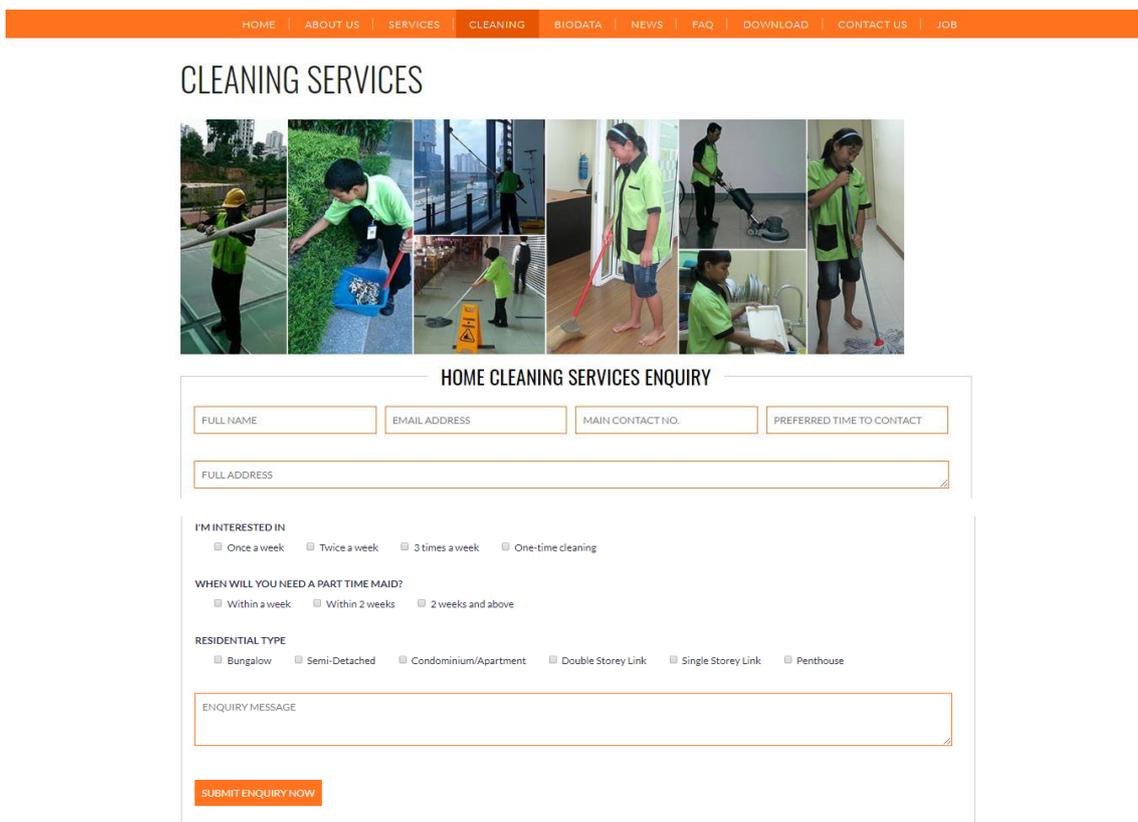


Figure 2.10 Maid Service

- **Maid Profiles**

This website provides maid profiles and allows the users to search for a maid based on certain criteria such as nationality, age range, religion, and marital status. The user can choose to download the profile information or choose to book the maid.

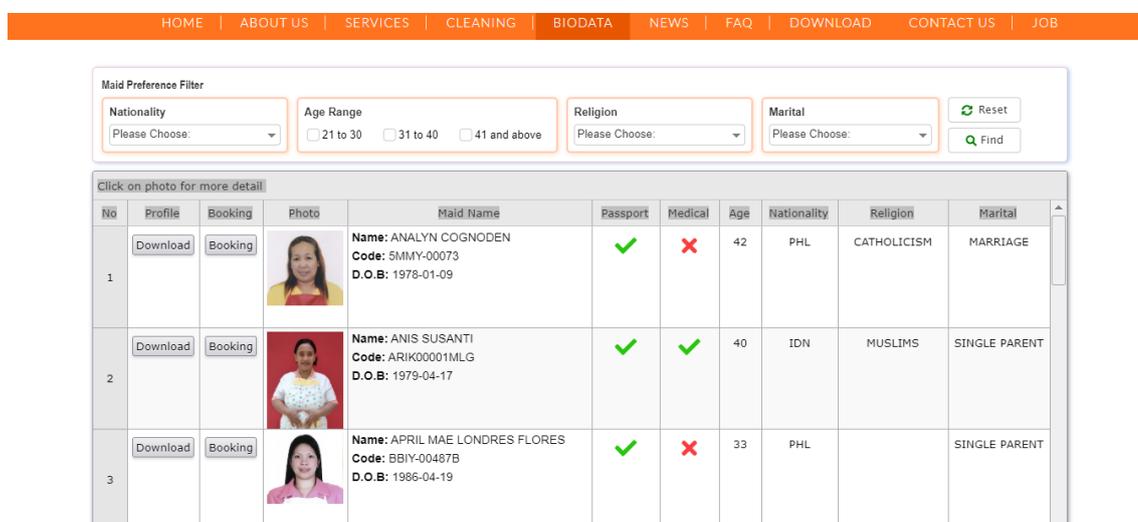


Figure 2.11 Maid Profiles

- **Guideline**

It provides a list of forms that users required to fill up to apply an application. This ease the process as the users have enough information to apply a maid.

Figure 2.12 *Guideline*

- **Matching Method**

As the results came out exactly the same as the preferences, thus it is using a simple matching method to perform searches.

No	Profile	Booking	Photo	Maid Name	Passport	Medical	Age	Nationality	Religion	Marital
1	Download	Booking		Name: ETIK SUSANTI Code: HMM00002LOP D.O.B: 1995-07-06	✓	✗	24	IDN	MUSLIMS	MARRIAGE
2	Download	Booking		Name: MIFTAHUL JANAH Code: ALI00009LOP D.O.B: 1998-01-01	✓	✓	22	IDN	MUSLIMS	MARRIAGE
3	Download	Booking		Name: NURFITRAH Code: ACH00347ACH D.O.B: 1993-03-27	✓	✓	26	IDN	MUSLIMS	MARRIAGE
4	Download	Booking		Name: WA ODE MUSRINA FIMAR Code: FB00065KDI D.O.B: 1990-11-07	✓	✗	29	IDN	MUSLIMS	MARRIAGE

Figure 2.13 *Matching Method*

2.1.3 Agensi Pekerjaan Together Sdn.Bhd

Agensi Pekerjaan Together Sdn Bhd is established on October 9, 2012, under Malaysia's Companies Acts. It is a website application and is a professionally managed recruitment agency licensed under the Private Employment Agency Act which approved by the Ministry of Human Resources.



Figure 2.14 Agensi Pekerjaan Together Sdn Bhd

- **Guideline**

It also provides a guideline to the users such as the document required to apply a maid. There has different information on different hiring conditions.

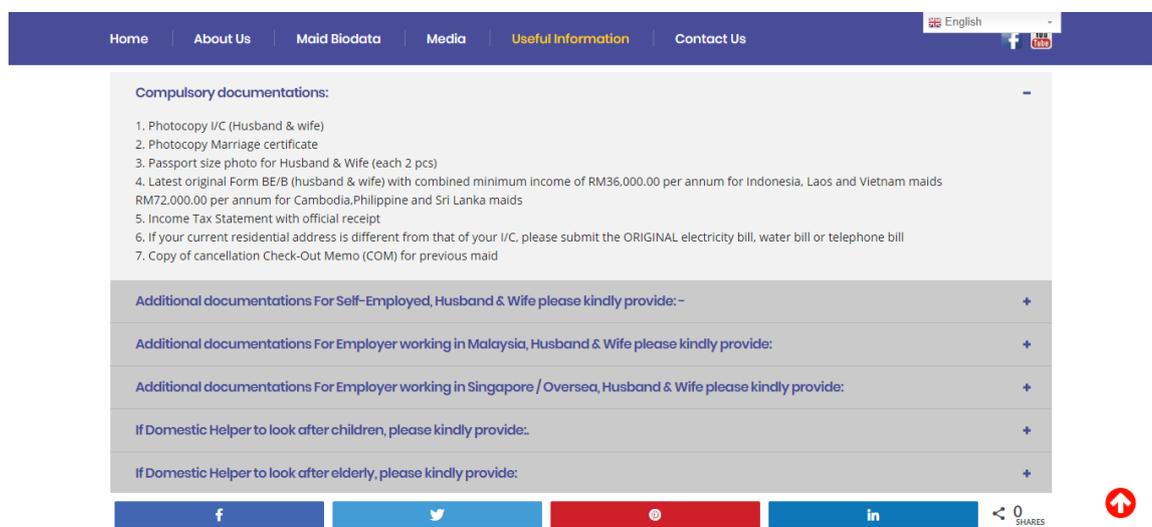


Figure 2.15 Guideline

- **Maid Profiles**

This application allows the users to perform the maid searching by setting more preferences such as nationality, age, responsibilities, marital status, working experience, religion, English proficiency, education level and type of maid. After searching, the users can click the name of the maid, and a form shall be given to download if the users wish to apply this maid.

The screenshot displays the 'Maid Search' interface. At the top, there is a navigation bar with links: Home, About Us, Maid Biodata, Media, Useful Information, and Contact Us. A language dropdown is set to 'English'. Below the navigation bar, the breadcrumb 'Home > Maid Search' is visible. The main heading is 'Maid Search'. The search filters are organized into a grid of 12 panels:

- Nationality:** Indonesia, Philippines, Cambodia, Sri Lanka, Vietnam, Laos, Others, No Preference
- Age:** 21 to 25, 26 to 30, 31 to 40, 41 to above, No Preference
- Responsibilities:** Housework, Child care, Elder Care, Cooking, Disabled Care (all dropdown menus set to '- No Preference -')
- Marital Status:** Single, Married, Widowed, Divorced, Separated, No Preference
- Working Experience in:** Indonesia, Philippines, Singapore, Malaysia, Middle East, Taiwan, Hong Kong, Brunei, Other Countries, No Preference
- Religion:** Free Thinker, Christian, Catholic, Buddhist, Muslim, Hindu, Others, No Preference
- English Proficiency:** Good, Fair, Little, No Preference
- Education Level:** Primary, Secondary, College, University, No Preference
- Type of Maid:** New, Transfer, No Preference

A 'Search' button is located below the filters. Below the search bar, there is a pagination bar with a 'Previous' button, a grid of page numbers (1-14, with 1 highlighted), and a 'Next' button. To the right of the pagination are 'New Search' and 'View All Biodata' buttons. The search results are displayed in a grid of four profile cards:

Name	Ref.Code	Salary	Nationality	Religion	Marital Status
JERRYVEL SOLLEZA DEPASCAN	PH-N-001	Nil	Philippines	Catholic	Single
EVA GARCIA MACASAET	PH-N-002	Nil	Philippines	Catholic	Separate
MAYETTE ORTIZ PULGAN	PH-N-003	Nil	Philippines	Catholic	Married
DESY ANGGRENI PURBA	CM-1135	Nil	Indonesia	Christian	Single



成嘉星人力資源有限公司
AGENSI PEKERJAAN TOGETHER SDN. BHD.

EVA GARCIA MACASAET

Nationality	: Philippines
Code	: PH-N-002
Years of Experience	: 0
Type of Maid	: New
Education	: College
Salary	: Nil
Passport No.	: Nil



PERSONAL INFORMATION

Name	: EVA GARCIA MACASAET
Age	: 42
Date of Birth	: 1975-04-16
Height	: 158 cm
Weight	: 60 kg
Marital Status	: Separate
Religion	: Catholic
English	: Good

WORKING EXPERIENCE

Name of Employer	: NIL
Country of Work	: Philippines
Date of Employment	: Nil
Employer's Type of House	: Nil
Occupation	: Housemaid

PREFERENCES

Housework	: Good
Child Care	: Good
Elderly Care	: Fair
Cooking	: Good
Disabled Care	: Fair

ABILITY IN CARETAKING OF BABY, CHILDREN, ELDERLY & DISABLED

Care of baby (0-12 Months)	: Good
Changing Diapers	: Good
Feed Baby	: Good
Bath Baby	: Good
Look after baby at night	: Good
Care of children (1-6 Years)	: Good
Care of children (7-12 Years)	: Good
Care of Elderly	: Fair
Care of Disabled	: Fair

GENERAL HOUSEWORK

Operate Washing Machine	: Fair
Operate Vacuum Cleaner	: Fair
Do Laundry by Hand	: Fair
Ironing	: Good
Routine Housework	: Good

COOKING

Cook Rice	: Good
Fried Rice, Noodle, Meeshoon	: Good
Fried Chicken, Fish, Vegetable	: Good
Steam Fish, Chicken	: Fair
Cook, Curry(chicken, meat)	: Good
Cook, Soup(mixed veg etc)	: Good
Baking	: Fair

I have gone through the biodata of this FDH and confirm that I would like to employ her.

EMPLOYER NAME & SIGNATURE _____

NRIC NO. : _____

DATE : _____

IMPORTANT NOTES FOR EMPLOYERS WHEN USING THE SERVICES OF AN EA

*Do consider asking for an FDH who is able to communicate in a language you require, and interview her (In person/phone/video conference) to ensure that she can communicate adequately.

*Do consider requesting for an FDH who has a proven ability to perform the chores you require, for example performing household chores (especially if she is required to hand laundry from a high-rise unit), cooking and caring for young children or the elderly.

*Do work together with the EA to ensure that a suitable FDH is matched to you according to your needs and requirements.

Figure 2.16 Maid Profiles

- **Maid Inquiry**

There shall be a form to let users enter the information to search for a maid. They can fill-up the form and indicate the preferences that they would want for a maid. After submitting the filled-up form, a representative shall contact the users regarding their request.

Maid Inquiry

Fields marked with an * are required

Please fill up the form provided in this page and indicate your preferences you would want for a maid.

After submitting the filled-up form, our representative will contact you regarding your request as soon as possible.

Contact Information

Name *

Contact No *

Email *

Address

Figure 2.17 *Maid Inquiry*

- **Matching Method**

As the results came out exactly the same as the preferences, thus it is using a simple matching method to perform searches.

Nationality <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Indonesia <input type="checkbox"/> Philippines <input type="checkbox"/> Cambodia <input type="checkbox"/> Sri Lanka <input type="checkbox"/> Vietnam <input type="checkbox"/> Laos <input type="checkbox"/> Others <input type="checkbox"/> No Preference 	Age <ul style="list-style-type: none"> <input type="checkbox"/> 21 to 25 <input type="checkbox"/> 26 to 30 <input type="checkbox"/> 31 to 40 <input type="checkbox"/> 41 to above <input checked="" type="checkbox"/> No Preference 	Responsibilities <table border="1"> <tbody> <tr> <td>Housework:</td> <td>- No Preference -</td> </tr> <tr> <td>Child care:</td> <td>- No Preference -</td> </tr> <tr> <td>Elder Care:</td> <td>- No Preference -</td> </tr> <tr> <td>Cooking:</td> <td>- No Preference -</td> </tr> <tr> <td>Disabled Care:</td> <td>- No Preference -</td> </tr> </tbody> </table>	Housework:	- No Preference -	Child care:	- No Preference -	Elder Care:	- No Preference -	Cooking:	- No Preference -	Disabled Care:	- No Preference -
Housework:	- No Preference -											
Child care:	- No Preference -											
Elder Care:	- No Preference -											
Cooking:	- No Preference -											
Disabled Care:	- No Preference -											
Marital Status <ul style="list-style-type: none"> <input type="checkbox"/> Single <input checked="" type="checkbox"/> Married <input type="checkbox"/> Widowed <input type="checkbox"/> Divorced <input type="checkbox"/> Separated <input type="checkbox"/> No Preference 	Working Experience in <ul style="list-style-type: none"> <input type="checkbox"/> Indonesia <input type="checkbox"/> Philippines <input type="checkbox"/> Singapore <input type="checkbox"/> Malaysia <input type="checkbox"/> Middle East <input type="checkbox"/> Taiwan <input type="checkbox"/> Hong Kong <input type="checkbox"/> Brunei <input type="checkbox"/> Other Countries <input checked="" type="checkbox"/> No Preference 	Religion <ul style="list-style-type: none"> <input type="checkbox"/> Free Thinker <input type="checkbox"/> Christian <input type="checkbox"/> Catholic <input type="checkbox"/> Buddhist <input checked="" type="checkbox"/> Muslim <input type="checkbox"/> Hindu <input type="checkbox"/> Others <input type="checkbox"/> No Preference 										
English Proficiency <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Little <input type="checkbox"/> No Preference 	Education Level <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Primary <input type="checkbox"/> Secondary <input type="checkbox"/> College <input type="checkbox"/> University <input type="checkbox"/> No Preference 	Type of Maid <ul style="list-style-type: none"> <input checked="" type="checkbox"/> New <input type="checkbox"/> Transfer <input type="checkbox"/> No Preference 										
<input type="button" value="Search"/>												

Figure 2.18 *Set preferences*

New Search View All Biodata



SUHAYATI

Ref.Code : CM-1533
Salary : NIL
Nationality : Indonesia
Religion : Muslim
Marital Status : Married

New Search View All Biodata

Figure 2.19 Result

2.1.4 Wilson Maid

Wilson maid is a mobile application released on August 31, 2016. It is only available for Hong Kong. The Wilson Employment Center is a domestic helper specialist in Indonesia. They have training centers in Indonesia. These training centers are located in Jakarta, Solo (Central Java) and Cody. (East Java). They shall provide Indonesian maids at affordable prices and guarantee replacement.



Figure 2.20 *Wilson Maid*

- **Maid Profiles**

The application allows the users to view the profile of the maids. When clicking inside, it shall let the users choose which maids they wish to view based on the previous workplace working experience. Then, the users can select each of the maids, and their detail information will be shown.

和誠 Wilson

台灣
經驗

香港
經驗

新加坡
經驗

香港
滿約現成

其他
國家
經驗

無
海外經驗


ST-9368 SITI M


#KRA-288 ERWIN


#KRA-289 NURSITI


編號 KRA 292


編號 ST-9319

主頁 最新消息 工人資料 服務介紹 雇主須知

和誠 Wilson

編號 ST-9337



PERSONAL DATA 個人資料

KESI ALFITRI		
	Date of birth 出生日期	1973/4/14
	Place of birth 出生地點	Banyuwangi

CAPABILITY

Religion 宗教	Mostem
Age 年齡	43
Marital Status 婚姻狀況	Married
Height 身高	154cm
Weight 體重	53 kg
Household 家務	YES
Cooking 煮菜	YES
Taking care elderly 照顧老人	YES

主頁 最新消息 工人資料 服務介紹 雇主須知

工作能力		Fair			Good			Excellent		
Taking care children 照顧嬰兒	YES									
Taking care baby 照顧小孩										
Others 其他	YES									
LANGUAGE ABILITY 語言能力		Fair			Good			Excellent		
Cantonese 廣東話	✓									
Mandarin 國語				✓						
Hokkian 福建話										
Hakka 客家話										

EXPERIENCES 工作經驗		Fair			Good			Excellent		
English 英文										
Other 其他										
Indonesia 印尼										
Hongkong 香港										
Taiwan 台灣	6 years									
Singapore 新加坡										
Malaysia 馬來西亞										
Middle East 中東										
Other 其他國家										

Figure 2.21 Maid Profiles

- **Guideline**

This application provides information that employers need to know. For example, application's terms and conditions, legal holidays, annual leave, long service payment and helper compensation. The application has described the steps that users need to perform to apply for a maid.

和誠 Wilson	
申請條件	
法定假期	
年假	
長期服務金	
傭工賠償	

Wilson Employment Centre	
主頁	最新消息
工人資料	服務介紹
業主須知	

Figure 6.2 Guideline

- **Maid Inquiry**

If the users have found the suitable maids, they can fill up an appointment form and submit it. Users are allowing to reserve several maids by entering their code. Users need to provide their name, contact number, and also email address.

The screenshot displays the Wilson mobile application interface. On the left, a dark red sidebar menu contains the following items: '公司簡介' (Company Introduction), '快速撥號' (Quick Dial), '預約表單' (Appointment Form), '相關連結' (Related Links), '加入收藏' (Add to Favorites), '訊息推播' (Message Push), and '主頁' (Home). Below the menu are icons for '工人資料' (Worker Information), '服務介紹' (Service Introduction), and '雇主須知' (Employer须知). The main content area shows a form titled '和誠 Wilson' with the following fields: '姓名' (Name), '電話' (Phone), '電子郵件' (Email), and '預約對象' (Maid Selection). The '預約對象' field includes a sub-field with the instruction '註填寫女傭編號, 可預約多個' (Please enter maid codes, you can reserve multiple). A green button labeled '送出表單' (Submit Form) is located at the bottom of the form.

Figure 2.22 *Maid Inquiry*

2.1.5 Helper Search

Helper Search is available to find maids in Hong Kong that released in 2014. The idea of the application is to develop a better way for maid seekers looking for a helper. This platform is not only just look for a helper but also a way to let the helpers look for an employer.



Figure 2.23 *Helper Search*

- **Maid Profiles**

This application allows users to search maids by setting their preferences such as name, current location, current status, nationality, experience, age, gender, marital status, allergy, driving license, willing to share a room, and working experience. After searching the maids, the application will show the results and users can choose to view their detail information.

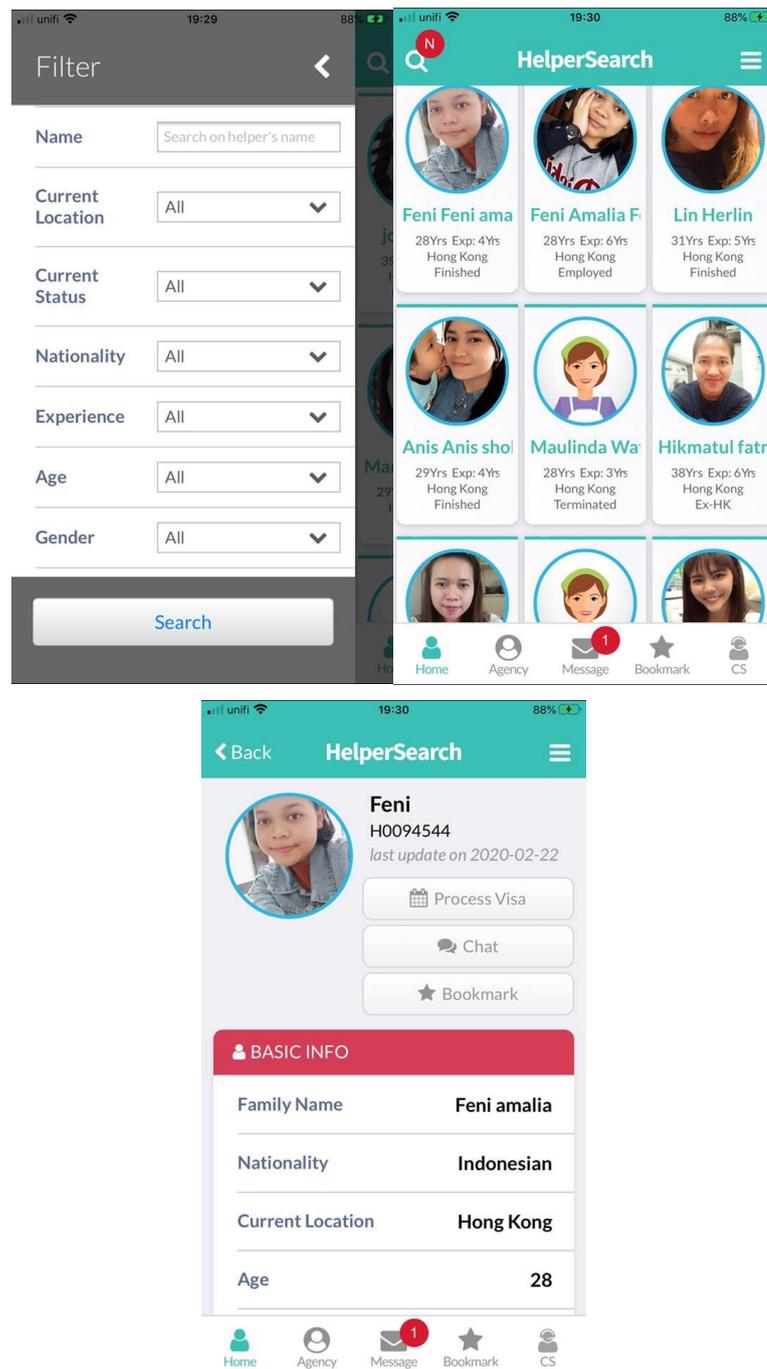


Figure 2.24 Maid Profiles

- **Message platform**

There is a chat button after the users view the detail information. This application has provided a platform to let users chatting with the helper. The users allow sending a picture to them. Users can view and reply the messages at the message column. Any notifications shall be updated in the column which is in the inbox.

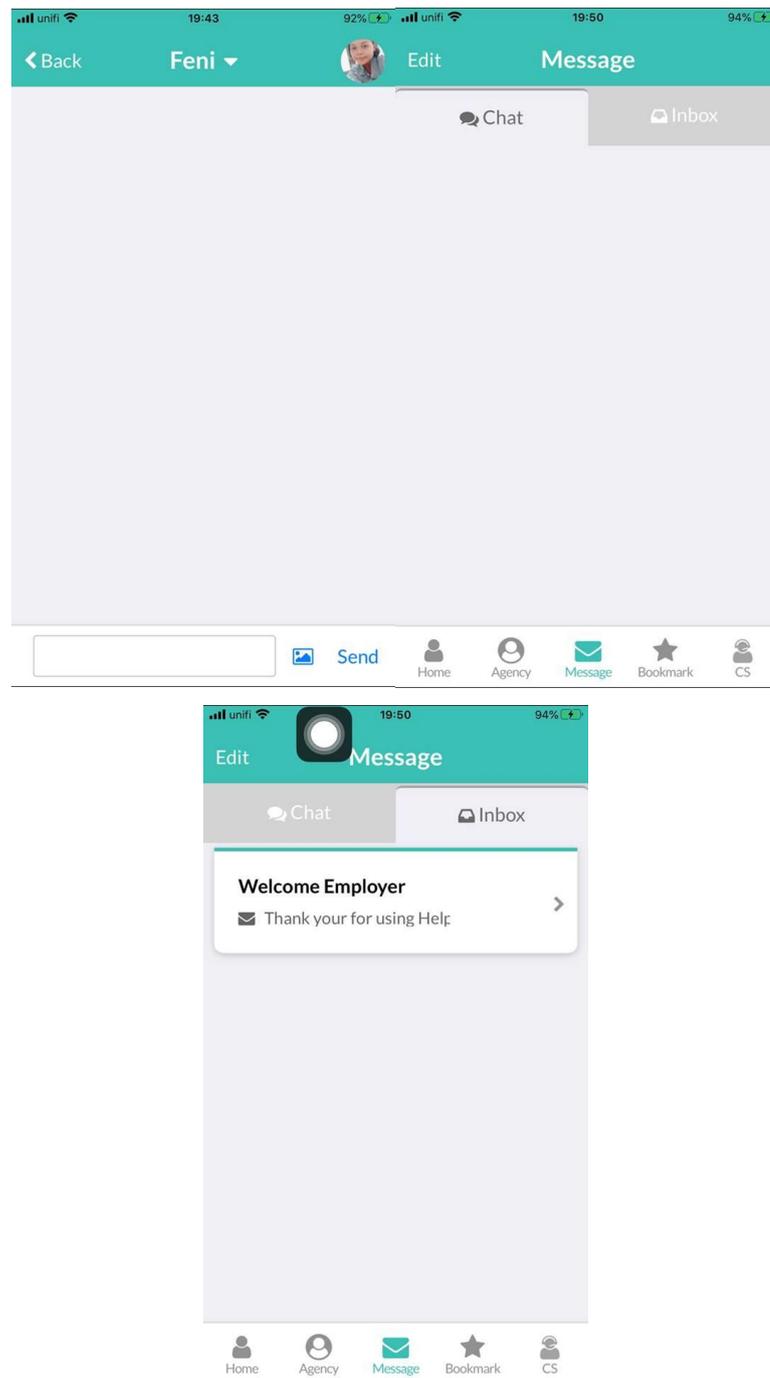


Figure 2.25 *Message Platform*

- **Bookmark**

After searching maids, there is a bookmark option to let users choose. The users can bookmark all the maids they prefer and then view them at the bookmark column. Bookmark is allowing to edit.

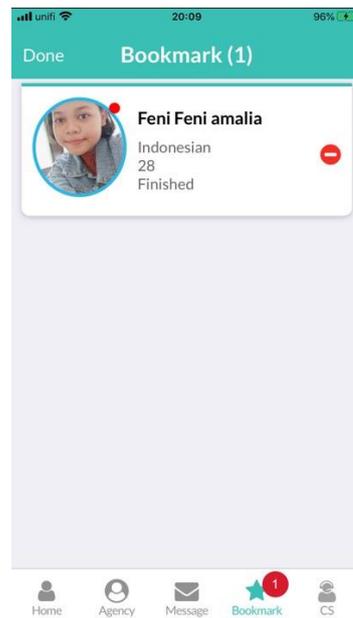


Figure 2.25 Bookmark list

- **Customer Service**

If the users have problems or issues when using the application, they can contact the admin through a customer service platform. This platform allows users to link to Whatapps.

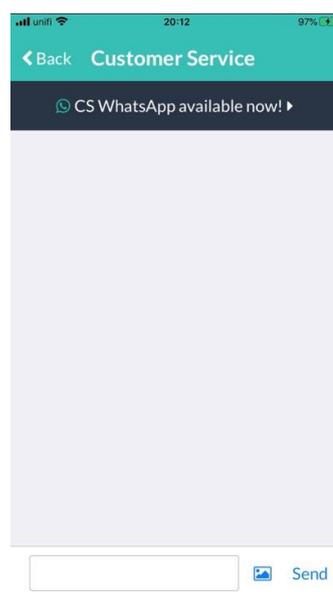


Figure 2.26 Customer Service

- **Matching Method**

This application is using a simple matching to perform the matching. This is because the provided maids are only the maids with the criteria that have been set.

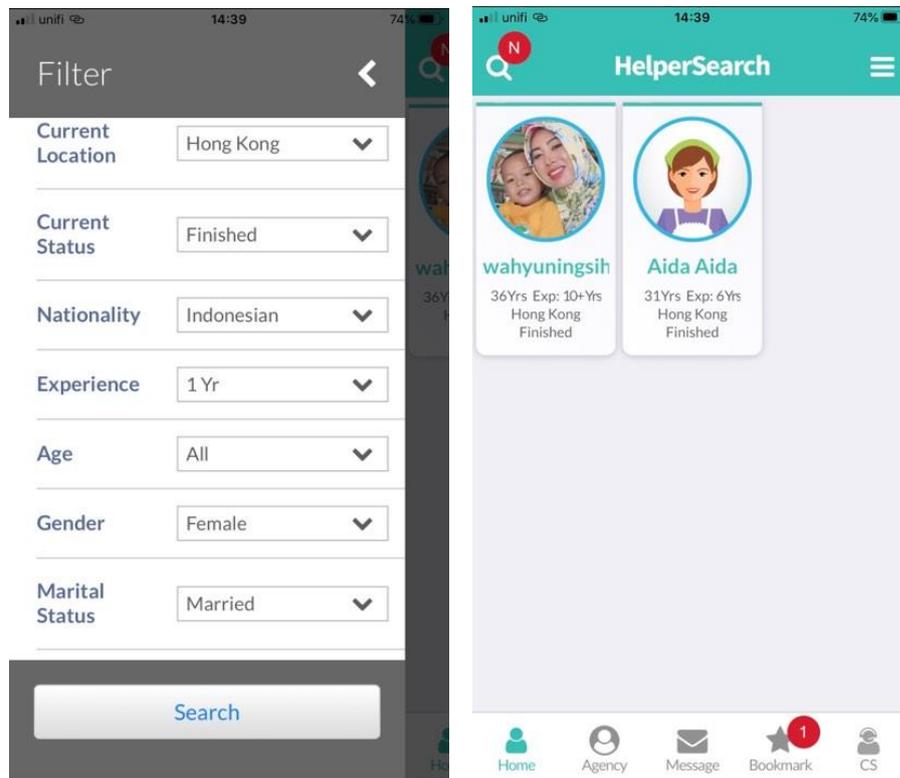


Figure 2.27 Matching Method

2.1.6 Comparison among Similar Existing Application

Table 1 *Comparison between five similar application*

	Maid Assist	Agensi Pekerjaan Venture Provision (APVP)	Agensi Pekerjaan Together Sdn.Bhd	Wilson Maid	HelperSearch
Translation Tools	Yes	No	No	No	No
Plan Schedule	Yes	No	No	No	No
Guideline	Yes	Yes	Yes	Yes	No
Check VISA Requirement	Yes	No	No	No	No
Maid Service	Yes	Yes	No	No	No
Maid Profiles	Yes	Yes	Yes	Yes	Yes
Maid Inquiry	No	No	Yes	Yes	No
Message Platform	No	No	No	No	Yes
Bookmark	No	No	No	No	Yes
Customer Service	No	No	No	No	Yes
Matching Method	Simple	Simple	Simple	-	Simple

In conclusion, every application has different unique features and every feature it serves for different purposes. The overall layout of the mobile application must be neat and tidy, which allows the users to find the information they need as easier as possible. In general, view maid profiles and search based on criteria is a must. The guideline that has given hiring information to the maid seekers are also important. This is because users would not prefer to use a mobile application with ambiguous

information. Features that should be included are maid inquiry as the users can inquire about the status of maids instead of applying the maids and then be rejected. Besides that, this mobile application will have a bookmark function. This is useful for the users as they can select again from the favourite list. In these five existing applications, four out of five are using simple matching to perform maid searching. It is not recommended as there are only a few results that will be provided when the preferences are more. Thus, this project will calculate the similarity between both objects by implementing similarity measures to perform maid searching.

2.2 Software Development Methodologies

2.2.1 Waterfall Model

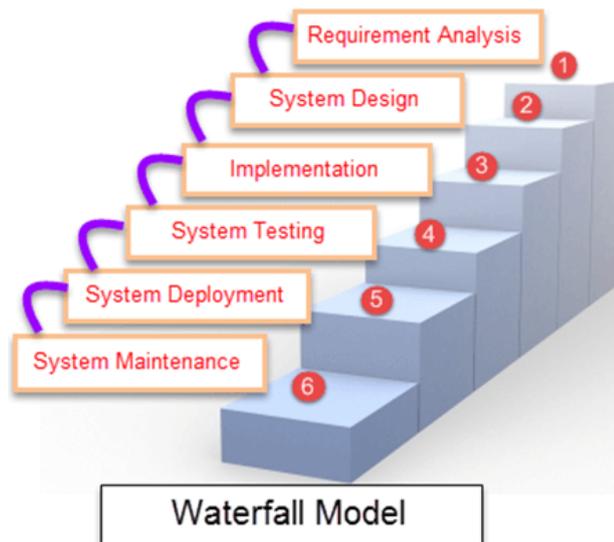


Figure 2.28 *Waterfall Model* (Guru99, 2014)

The waterfall model was the oldest model to be introduced among all of the software development methodologies. It is the earliest software development life-cycle (SDLC) approach that was used for the development process (Sharma, 2016). The process of this model is called as Linear-Sequential Life Cycle Model because it works as a linear sequential flow. A phase must be done before the next phase starts, thus this model has no overlap process.

In this approach, the process has divided into some phases and there is no iterative for the process. The following are the phases of this approach such as requirement analysis, system design, implementation, system testing, system deployment and system maintenance.

- Requirement Analysis: to understand the information of the project and gather the requirement from the client.
- System Design: a brief design of the system will be prepared based on the specification studied in the previous phase (Sharma, 2016). To specify the requirements of hardware and software.
- Implementation: writing code for the software (Sarycheva, 2019).
- System Testing: after doing the testing for the unit that is done in the previous phase, which is to check if there are any defects in the system. It is to make

sure the system meets the client's requirements and then integrated all the units into a system (Sharma, 2016).

- **System Deployment:** deploy the application in the customer environment (Sharma, 2016).
- **System Maintenance:** Make sure that the application can be running smoothly in the respective environment. Once there is any defect found, regular maintenance and support have to provide to the customer (Sharma, 2016).

Table 2 *Advantage and disadvantage of the Waterfall model*

Advantages	Disadvantages
Easy to understand and easy to use.	Hard to defined cost budget and estimate time for the development process.
All phases are processed and complete at a time and no overlap.	Hard to go back to previous phases.
Suitable for a smaller project when the requirements are clear.	Not suitable for the project where the requirement is ambiguous.
Easy to arrange task as each phase has its specific deliverables.	Fixed the error only during the phase.

2.2.2 Prototyping Model

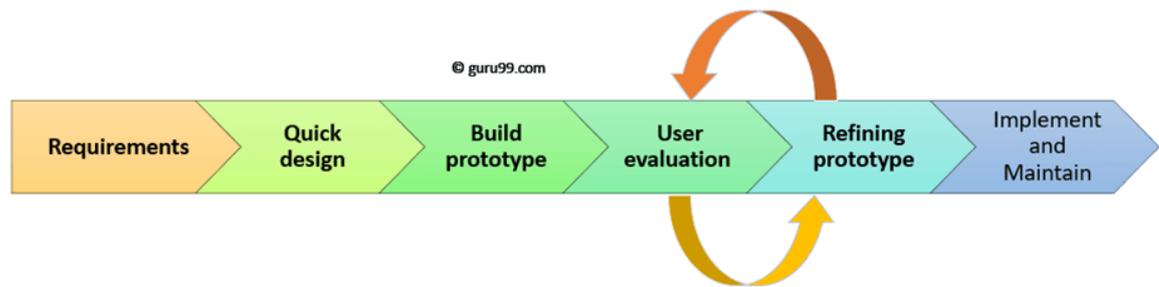


Figure 2.29 Prototyping model (Guru99, 2014)

Prototyping model is called as a prototype model that is can be built, tested and then refined until a satisfying prototype is completed. When the project's requirements are not clear, it is the best approach as it is an iterative approach that can always repeat the phases until the requirements are met. Besides, it was taking place between the developers and the end-users (Rouse, 2019).

There are six SDLC phases in prototyping methodology included in this approach. The following are the phases of the prototyping model, such as:

- Requirements: Conducting the interview with the potential users to know their expectation for the system and analyze the requirements.
- Quick Design: A brief design of the system will be created by the developers based on the requirement collected from the previous phase. Although the design is incomplete, it provides users with simple ideas about the system, and it helps in developing the prototype.
- Build Prototype: This is a small and practical prototype designed according to the requirements described in the previous stages.
- User Evaluation: The prototype created in the previous phase will be provided to the client for initial evaluation. The client can comment and give suggestions for improvement.
- Refining Prototype: Refining the prototype according to the client's feedback and comment.
- Implement and Maintain: Once the prototype is satisfied by the client, a final system is implemented, and the developers will provide support if there is any problem.

Table 3 *Advantage and disadvantage of Prototyping model*

Advantages	Disadvantages
The error can be detected easily and earlier.	Slow and time taking process.
Complicated projects can reuse the prototypes before.	Poor documentation as the requirements are always changing.
Risk of failure can be reduced	The numbers of iteration are unknown.
The users can better understand the system through the provided working model.	Problems that have been analyzed is incomplete and inadequate
Customer's feedback can provide ideas for the customer needs.	Clients might request an excessive change to the prototype.

2.2.3 Agile Software Development



Figure 2.30 Agile Software Development (Anurina, 2019)

Agile methodology is encouraging continuous iteration of development and testing activities throughout SDLC, and it is unlike the Waterfall model as both of the development and testing process are concurrent (Guru99, 2014). In 2001, there are seventeen software development professionals have been introduced an Agile Manifesto that discussing the concepts that around the idea of lightweight software development (Rouse, 2019). There are four core values be discussed, such as:

- The individual and interaction should be focused more as compared to process and tools.
- The comprehensive documentation is less important than working software.
- Customer collaboration instead of contract negotiation.
- A focus on responding to changes instead of following a plan.



Figure 2.31 Phases of Agile Software Development (Anurina, 2019)

There are six SDLC phases in agile methodology include in this approach. Following are the phases of the agile such as:

- Concept: identify the business opportunities, estimate the time will be required to complete a project, and identify resources needed. The project is envisioned and prioritize.
- Inception: identify team members. Discuss the initial requirements with the customers. A project plan is created, including the timeline to define the dateline for each work.
- Iteration/ Construction: begin to create working software based on requirements and client's feedback. This approach will rely on iterations until the project is completed. The flows of the iteration are defined requirements based on the client or stakeholders' feedback, develop software based on the set requirements, conduct quality assurance testing, training and documentation, deliver and integrate final sprint into a product.
- Release: release the final sprint into production after conducting the quality assurance testing, user testing, and documentation creation and get the client's sign off.
- Production: focus on the ongoing support to maintain the software
- Retirement: end-of-life activities of the production which include customer notification and final migration.

(Rouse, 2019)

Table 4 *Advantage and disadvantage of Agile Software Development*

Advantages	Disadvantages
Requirements of the project can be changed anytime as it adapts to change and respond faster	Not suitable for handling a complicated project.
Detect error and solve it quickly	Hard to estimate time complete when the project is large.
The development process is iterative	Less documentation priority thus poor resource planning
Fewer resources are wasted because they always work on up-to-date tasks	High level of interaction with the client and stakeholders, thus it will take time and make the process difficult.

There are several frameworks of agile methodologies such as Agile Scrum Methodology, Extreme Programming (XP), Feature Driven Development (FDD), Lean Software Development, Kanban and others. Three types of frameworks will be discussed in this session which is Scrum, XP and FDD.

- **Agile Scrum Methodology**

Guru99 (2019) claimed that Scrum helps the teams work together more effectively. It is used to manage software delivery. Due to iterative and incremental practices, organizations working software will deliver more frequently. Each of the iterations is known as Sprint. According to Sharma, Sarkar and Gupta (2012), this method starts from collecting user requirements from the user. Users can change the request anytime during the development such as add, remove, and modify features. Next, a product backlog, sprint planning, should be created in each sprint. Daily scrum meet will be held every day to ensure the work progress and make the decision for the next sprint. The project can get a working increment after each sprint.

- **Extreme Programming (XP)**

Guru99 (2012) stated that extreme programming is useful when the demands or requirements are frequently changing by the clients or when the requirements of the project are not sure. The clients can change requests or requirements at any stage of the development life cycle. Sharma, Sarkar and Gupta claimed that XP would collect user requirements and divided into numerous small numbers of cycles. In the iteration planning phase, the number of cycles is deciding, the requirements are prioritizing, and the amount of effort are estimating for each cycle. Pair programming is using for each iteration. The iteration plan should be adjusted if the user requirements have any changes during the development phase. Next, the newly developed version will be tested for errors (if found); these errors will be removed in the next iteration. The project should be tracked to get feedback after each acceptance test.

- **Feature Driven Development (FDD)**

According to Garg (2017), feature-driven development methodology allows a team to update the project frequently and detect errors rapidly. First, the team starts to collect the user requirement and then an overall model of the project will be developed. The

model will describe the idea of the scope of the project. Next, a list of features is created that consists of the information gathered in the first step. The whole projects are divided into features, and the related features are combined into a single group. Then, one chief programmer will lead to prepare a plan, and each feature is assigned to a development team. The last step is a modelling iteration, in which each function of the application is first modelled in UML. The particular feature will continue to implement unless it is approved by the chief programmer (Sharma et al., 2012).

2.2.4 Development methodologies comparison matrix

Table 5 Comparison matrix of various methodologies (Sabale and Dani, 2012, pp.23)

	Waterfall model	Prototyping model	Agile methodology
Requirement gathering	At the beginning of the cycle	Often change	Often change
Cost	Low	Medium	High
Overlap phases	No	Yes	Yes
User Involvement	In the beginning of the cycle only (one time)	Frequent	Frequent
Time Frame	Long	Short	Least Possible
Success rate	Low	High	High

In conclusion, each methodology has its own properties, benefits and limitations. Different types of methodologies are suitable for the different environment of the project. Thus, the right methodology will make the development process easier and the project's goal can be achieved easily.

For this project, the prototyping model will be chosen as the system development methodology. This is because the requirements for the project are ambiguous at the beginning of the project. This methodology allows the requirements to change throughout the process because changing the level of control in this approach is easy. This means that modifications on the prototype can be easily managed to prevent applications from being developed from going beyond the scope. An application can be developed more user friendly if it can adapt to the changes. This is because the project will get feedback from the users after each iteration.

Furthermore, the objective of this project is to create a mobile application for maid seekers to find an ideal maid. Thus, the user involvement for this project is important as it has to ensure the result can meet the end-user satisfaction. This project only has about 7 months to complete. Thus, this methodology is suitable for the project as it is suitable for the project timeframe, which is short and its success rate of development is high.

2.3 Similarity Measure

GradesFixer (2019) claimed that a similarity measure is a measure of how much the similarity between two data objects are. In data mining, the features of objects can be represented by the distance between points of dimensions. For example, when the distance is large, then the degree of similarity will be low, whereas when the distance is small, the degree of similarity will be high. Saif (2019) stated that similarities are usually a positive number in the range of zero to one as zero means no similarity and one means there is a complete similarity. There are several types of similarity measure methods that will be discussed, such as Euclidean distance, Manhattan distance, Minkowski distance, Jaccard coefficient, and Cosine similarity.

2.3.1 Euclidean Distance

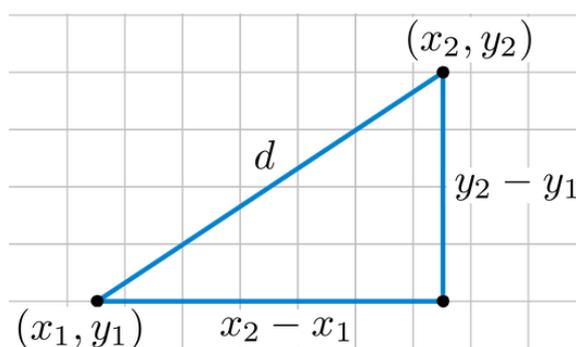


Figure 2.32 *Euclidean Distance (Rosalind, n.d)*

For geometrical problems, Euclidean distance is a standard metric to solve it (GradesFixer, 2019). In general, this method is the most common use of distance and it is called as a simple distance. The best proximity metric is when the data is dense or continuous. The length of the path connecting is the distance between two points and it can be calculated by using the Pythagorean Theorem (Polamuri, 2015). The distance between two points and can be easily measured in two or three-dimensional space.

The formula for two dimensional is:

$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}.$$

Equation 1 *Formula for two dimensional*

The formula for three dimensional is:

$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}.$$

Equation 2 *Formula for three dimensional*

Table 6 *Advantages and disadvantages of Euclidean Distance*

Advantages	Disadvantages
Adding new objects to the analysis does not affect the distance between any two objects (Bora & Gupta, 2014)	The distance is smaller when the two objects have no common attribute as compared to the objects that have the same attribute value.
Effective when there is a small amount of data (Hasan, et al., 2015).	Sensitive to outliers, the high skew will throw off the mean and alter the covariance.

	Larger magnitudes will create larger similarity values even though the values are not so similar (Jamesdal, 2012).
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2.3.2 Cosine Similarity

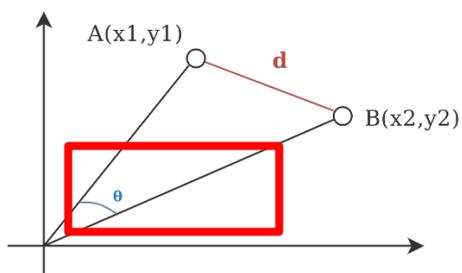


Figure 2.33 *Cosine Similarity* (Emmery, 2017)

Cosine similarity (θ) is a measure of similarity between the inner product spaces of two vectors that measure the cosine of the angle (Emmery, 2017). He stated that cosine similarity is often used as a measure of the angle when the magnitude of the vector is irrelevant. Phabhakaran (2018) claimed that this cosine similarity is used to measure the similarity of documents, regardless of their size. If the angle between two vectors is smaller, then the higher the similarity. The cosine of 0° means 1 and the other angle is less than 1. The outcome of cosine similarity is always bounded in $[0, 1]$ and mostly used in positive space (GradesFixer, 2019).

$$\cos(\theta) = \frac{A \cdot B}{\|A\| \|B\|}$$

Equation 3 *Formula of cosine similarity*

Table 7 *Advantages and disadvantages cosine similarity*

Advantages	Disadvantages
Efficient to evaluate for sparse vectors.	Not enough to capture the effective similar users (Saranya, et al., 2016).
Measure the similarity regardless of the magnitude	

2.3.3 Manhattan Distance

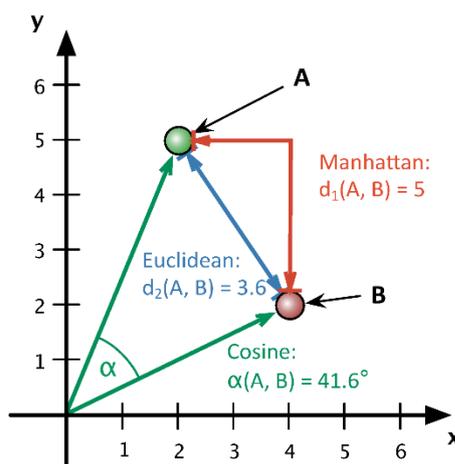


Figure 2.34 *Manhattan Distance* (Evert et al, 2016)

GradesFixer (2019) said Manhattan distance is a metric in which to calculate the total sum of the difference between two points which are x-coordinates and y-coordinates by summing up the difference of absolute x-axis and y-axis. This can find out how two points (point A and point B) are changes in x-axis and y-axis. It calculates the distance between two points along the right-angle axis. For example, given p1 (a1, b1) and p2 (a2, b2) in a two-dimensional plane, the distance is calculated by using $|a1 - a2| + |b1 - b2|$. There are some properties that expect from the measure such as ensure the distance must be a positive value, ensure the distance is zero when the two elements are equal when compare, ensure the point that starts to measure is not matter, and ensure the distance between two elements that are going directly from one to the other is the shortest distance (Sohail, 2018).

$$d(\mathbf{x}, \mathbf{y}) = \sum_{i=1}^n |x_i - y_i|.$$

Equation 4 *Formula of Manhattan Distance* (Craw, 2011)

Table 8 *Advantages and disadvantages of Manhattan Distance*

Advantages	Disadvantages
It based on absolute value distance and it gives a robust result.	Higher cost as compared to Euclidean distance.

	Sensitive to outliers (Shirkhorshidi, et al., 2015).
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2.3.4 Minkowski Distance

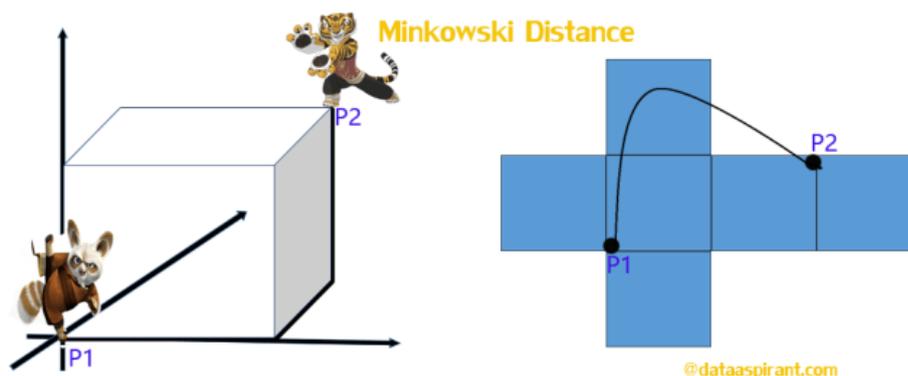


Figure 2.35 Minkowski Distance (Polamuri, 2018)

Minkowski distance is a generalized measure of Euclidean distance and Manhattan distance. This is because the formula that is used to calculate the distance between two points can be calculated in different ways (Sharma, 2019). For the equation, λ is defined must be more than 0, but it is often used for values 1, 2, and ∞ . When λ equal to one, it calculates the Manhattan distance whereas when λ equal to two, it calculates the Euclidean distance. If the $\lambda=\infty$ then it calculates the Chebyshev distance (Polamuri, 2018).

$$d^{MKD}(i, j) = \sqrt[\lambda]{\sum_{k=0}^{n-1} |y_{i,k} - y_{j,k}|^\lambda}$$

Equation 5 Formula of Minkowski Distance

Table 9 Advantages and disadvantages of Minkowski Distance

Advantages	Disadvantages
More effective implementation in spatial analysis modeling (Shahid, et al., 2009).	Does not perform well for categorical data
Used when measuring a variable on a ratio scale with absolute zero (Schulz, 2008).	A wider range of variables affects results

2.3.5 Jaccard Coefficient

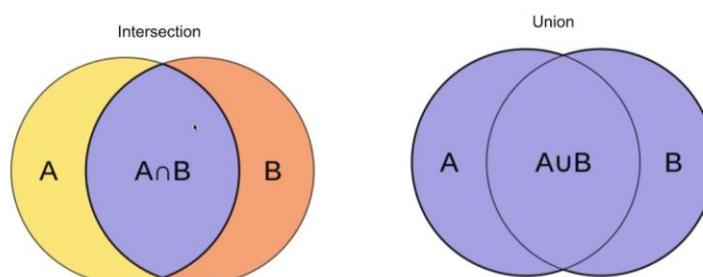


Figure 2.36 *Jaccard Coefficient*

Jaccard coefficient measures the similarity between sets by taking the size of the intersection of both sets and divide it by the size of the union of the sets (GradesFixer, 2019). The range for this Jaccard coefficient is from 0% to 100%. The higher the percentage, the more similarities between the two sets. For example, the percentage is 100% when both sets are similar to each other, whereas when both sets share no members, then the percentage will be 0% (DeepAI, 2016).

$$J(A, B) = \frac{|A \cap B|}{|A \cup B|} = \frac{|A \cap B|}{|A| + |B| - |A \cap B|}$$

Equation 6 *Formula of Jaccard Coefficient*

Table 10 *Advantages and disadvantages of Jaccard Coefficient*

Advantages	Disadvantages
Perform well when the similarity of words is measured (Niwattanakul, et al., 2013).	Not recommended to compare 2 datasets that are different in size (Rees, 2019).

In conclusion, these five similarity measures have their own benefits and limitations. These five similarity measures will be tested to find out which are more accurate and suitable to apply in the application.

2.4 Usability Testing

Usability testing is to test how simple a user can complete their task without any guidance (McPeak, 2017). According to Barnum (2011), usability testing is focusing on the users' experience but not on the product's performance. These are ways to test and observe user behaviour to find effective and ineffective methods. When doing the usability tests, the observers should observe users' body language, their facial expressions, and emotions. The observers need to encourage them to "think aloud" so that the users can provide suggestion and their thoughts aloud when using the product. By performing the test, both qualitative and quantitative data can be obtained and identified the product usability issues (Quovantis, 2018). The purpose of developing a usability test is to ensure the product has met the users' expectation and removes the flaws in the product as earlier as possible.

Brooke (2018) claimed that there are six steps to conduct a test. First, a product or prototype must be built that are going to test. It can be a limited functionality product, a demonstration application or an interactive wireframe as the purpose is to test the concepts and build on the initial framework. Next, a test plan will be developed. The test plan should be designed to answer two questions. The first questions are what are going to test, and the second questions are how the results are measured. After preparing a test plan, the next process is to recruit the right test participants. By recruiting a right participant, they can give the best possible result in the shortest amount of time. A usability test can be performed in different formats. A contingency plan should be prepared to avoid problems that arise during the test. After testing, the test results will be documented. Don't rush during view the record of the result, check carefully for errors that could lead to unreliable data. Lastly, the final part is to fix the errors, address the bugs and enhance the user experience on the product. This can help to confirm whether it can be released to the market.

Table 11 *Advantages and Disadvantages of Usability Testing (Guru99, n.d)*

Advantages	Disadvantages
Improve end-user satisfaction	Higher cost to do the different method of usability test
Gather true feedback from target audiences	More resources needed

Figure out the issues and potential problems before product release	
Save cost on development	

There are several methods of usability testing, such as phone interviews, user testing, observation, lab usability testing, and others. In this session, lab usability testing and user testing will be discussed.

- **Lab Usability Testing**

Lab usability testing is a moderated and remote test performed through a computer or phone. A trained moderator is required along with the test. Kaushik (2006) stated that the usability test normally is conducting inside a specially designed usability testing lab. Typically, the observers are watching the test and take notes behind a one-way-mirrored window. If not, ensure the observers are standing behind the test subject throughout the test. When the test subjects start working on their tasks, the moderator will start observing. The moderators will take notes on the behaviour and records whether or not they able to complete the task and consume how long or take what step to complete. The advantages of lab usability testing are all the sessions will run under the same environments, thus make it useful for comparing the results. This could be a good mechanism to generate ideas to solve customer problems.

- **User Testing**

User testing is an un-moderated and in-person test conducted in a controlled environment but without a person to oversee the test. This is good because it reduces the possibilities that the moderator will influence users. User testing should be performed at every point of the process as part of the iterative design process (Murphy, 2018). McPeak (2017) claimed that user testing requires a real person to use the application to ensure all the function go well from the unfamiliar and non-biased perspective. It allows researchers to observe the body language and facial expressions of participants without interfering with a moderator. By user testing, high user satisfaction can be achieved because the stories and sights of users can be more understand during the test.

CHAPTER 3

METHODOLOGY AND WORK PLAN

3.0 Introduction

According to Sivaranjani and Rajeswari (2017), a software development approach needed for a project. The development methodology is a framework that helps to plan and control the entire process of when building this application. This framework helps to manage each phase of software development in an organized way. Thus, software development methodology can help to make the project successful. In this chapter, the details of work for every phase in the system development methodology will be discussed.

3.1 System Development Methodology

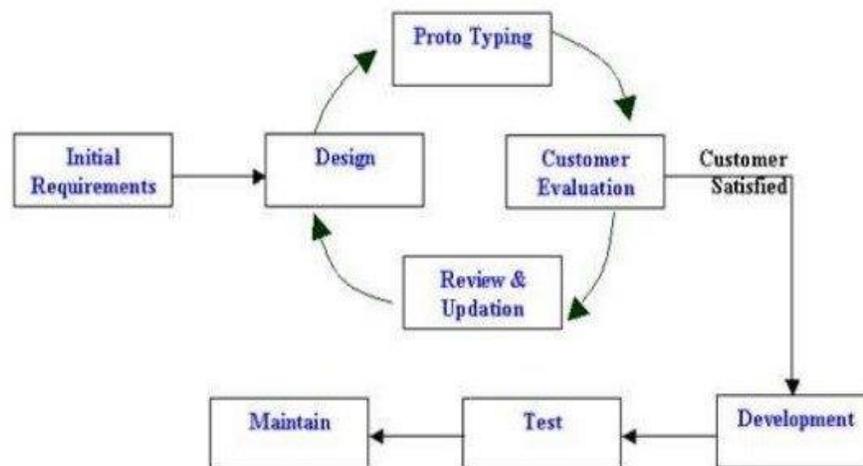


Figure 3.1 *Prototyping model (Meileni, et al., 2019)*

The prototyping model is suitable when the requirements are ambiguous and develop a large application. Furthermore, it helps to identify missing functionalities and errors faster. By using this methodology, users can be more understanding of the application (Sivaranjani and Rajeswari, 2017). Therefore, the prototyping model was chosen to apply on this application based on analyzing and comparing with many software development methodologies in Chapter 2. It has several phases and different features in each phase. The phases of the prototyping model are project initiation, iteration process, development, testing, and maintenance or deployment phases.

3.1.1 Project Initiation

In the project initiation phase, research on project-related articles or conference papers had been conducted to obtain the information needed to develop mobile applications. These studies were used to define the problem statement more specifically by providing strong evidence. The required details and data had been collected through fact-finding. From the research, various pieces of information were carried out:

1. The problems existed in the current.
2. The objectives and scopes of the proposed application.
3. The end-user of the proposed application development.

The data collected through fact-finding had been analyzed to provide accurate and comprehensive functional and non-functional requirements for the application. Next, the work-breakdown-structure and Gantt chart were developed to illustrate the workflow and schedule for each phase. Thus, this application would be developed within the specified and estimated time. A quick design was developed for the user to evaluate and then continue with the iteration phase.

3.1.1.1 Milestone

Intelligent Mobile Maid Service Agency	145 days	Tue 28/1/20	Mon 17/8/20
1.0 Project Initiation	39 days	Tue 28/1/20	Fri 20/3/20
1.1 Preliminary Report	14 days	Tue 28/1/20	Fri 14/2/20
1.1.1 Executive Summary	2 days	Wed 29/1/20	Thu 30/1/20
1.1.2 Define Problem Statement	3 days	Sat 1/2/20	Tue 4/2/20
1.1.3 Define Objectives	3 days	Wed 5/2/20	Fri 7/2/20
1.1.4 Define Proposed Solution	2 days	Sat 8/2/20	Mon 10/2/20
1.1.5 Define Proposed Approach	2 days	Mon 10/2/20	Tue 11/2/20

Figure 3.2 Milestones I

1.1.6 Define Project Scope	2 days	Wed 12/2/20	Thu 13/2/20
1.2 Literature Review	13 days	Mon 17/2/20	Wed 4/3/20
1.2.1 Identification of similar application design standards and trends	2 days	Mon 17/2/20	Tue 18/2/20
1.2.2 Flow study on similar application	2 days	Tue 18/2/20	Wed 19/2/20
1.2.3 Study on different methodologies	3 days	Thu 20/2/20	Mon 24/2/20
1.3.1 Waterfall model	1 day	Thu 20/2/20	Thu 20/2/20
1.3.2 Prototyping model	1 day	Fri 21/2/20	Fri 21/2/20
1.3.3 Agile Software Development	1 day	Sat 22/2/20	Sat 22/2/20
1.2.4 Study on similarity measures	5 days	Mon 24/2/20	Fri 28/2/20
1.2.4.1 Euclidean Distance	1 day	Mon 24/2/20	Mon 24/2/20
1.2.4.2 Manhattan Distance	1 day	Tue 25/2/20	Tue 25/2/20
1.2.4.3 Minkowski Distance	1 day	Wed 26/2/20	Wed 26/2/20
1.2.4.4 Jaccard Coefficient	1 day	Thu 27/2/20	Thu 27/2/20
1.2.4.5 Cosine Similarity	1 day	Fri 28/2/20	Fri 28/2/20
1.2.5 Study on type of usability test	1 day	Sat 29/2/20	Sat 29/2/20
1.2.5.1 Lab Usability Testing	0.5 days	Sat 29/2/20	Sat 29/2/20
1.2.5.2 User Acceptance Testing	0.5 days	Sat 29/2/20	Sat 29/2/20
1.3 Develop project plan	3 days	Thu 5/3/20	Mon 9/3/20
1.4 Define Development tools	2 days	Tue 10/3/20	Wed 11/3/20
1.5 Collect data for maid's database	3 days	Sat 14/3/20	Tue 17/3/20
1.6 Create UML Diagram	4 days	Fri 13/3/20	Wed 18/3/20
1.6.1 Use Case Diagram	2 days	Fri 13/3/20	Mon 16/3/20
1.6.2 Use Case Description	2 days	Tue 17/3/20	Wed 18/3/20

Figure 3.3 Milestones II

2.0 Iteration Process	45 days	Tue 31/3/20	Mon 1/6/20
2.1 First Iteration	7 days	Tue 31/3/20	Wed 8/4/20
2.1.1 Design Prototype for Maid Matching based on	3 days	Tue 31/3/20	Thu 2/4/20
2.1.1.1 Simple Matching	1 day	Tue 31/3/20	Tue 31/3/20
2.1.1.2 Euclidean Distance	1 day	Wed 1/4/20	Wed 1/4/20
2.1.1.3 Manhattan Distance	1 day	Thu 2/4/20	Thu 2/4/20
2.1.2 Survey for users	2 days	Fri 3/4/20	Mon 6/4/20
2.1.3 Review and update prototype for improvement	2 days	Mon 6/4/20	Tue 7/4/20
2.2 Second Iteration	10 days	Sun 3/5/20	Thu 14/5/20
2.2.1 Design Prototype for Maid Matching based on	3 days	Mon 4/5/20	Wed 6/5/20
2.2.1.1 Minkowski Distance	1 day	Mon 4/5/20	Mon 4/5/20
2.2.1.2 Jaccard Coefficient	1 day	Tue 5/5/20	Tue 5/5/20
2.2.1.3 Cosine Similarity	1 day	Wed 6/5/20	Wed 6/5/20
2.2.2 Design prototype for reminder feature	2 days	Tue 5/5/20	Wed 6/5/20
2.2.3 Design prototype for bookmark feature	2 days	Thu 7/5/20	Fri 8/5/20
2.2.4 Survey for users	2 days	Sat 9/5/20	Mon 11/5/20
2.2.5 Review and Update prototype for improvement	2 days	Tue 12/5/20	Wed 13/5/20
2.3 Third Iteration	10 days	Thu 14/5/20	Wed 27/5/20
2.3.1 Design prototype for	6 days	Thu 14/5/20	Thu 21/5/20
2.3.1.1 View Maids' list	2 days	Fri 15/5/20	Mon 18/5/20
2.3.1.2 Login/Register	2 days	Mon 18/5/20	Tue 19/5/20
2.3.1.3 HomePage design	2 days	Wed 20/5/20	Thu 21/5/20
2.3.2 Survey for users	2 days	Tue 19/5/20	Wed 20/5/20
2.3.3 Review and Update Prototype for Improvement	2 days	Thu 21/5/20	Fri 22/5/20

Figure 3.4 *Milestones III*

3.0 Development	25 days	Mon 1/6/20	Fri 3/7/20
3.1 Implement all mobile application interface	6 days	Mon 1/6/20	Mon 8/6/20
3.2 Link the fragment between the interface	5 days	Thu 11/6/20	Wed 17/6/20
3.3 Create database for application	2 days	Thu 18/6/20	Fri 19/6/20
3.4 Insert database	2 days	Mon 22/6/20	Tue 23/6/20
3.5 Create for register and login activity (authentication)	2 days	Wed 24/6/20	Thu 25/6/20
3.6 Beautify the interface of mobile application	3 days	Fri 26/6/20	Tue 30/6/20
3.7 Coparison o similarity measures for maid matching	2 days	Tue 30/6/20	Wed 1/7/20
3.8 Code Revision	3 days	Wed 1/7/20	Fri 3/7/20
3.8.1 Clean codes obligation	1.5 days	Wed 1/7/20	Thu 2/7/20
3.8.2 Object-oriented obligation	1.5 days	Thu 2/7/20	Fri 3/7/20
4.0 Testing	15 days	Fri 26/6/20	Thu 16/7/20
4.1 Unit Testing	4 days	Sat 27/6/20	Wed 1/7/20
4.2 Integration Testing	3 days	Wed 1/7/20	Fri 3/7/20
4.3 System Testing	3 days	Fri 3/7/20	Tue 7/7/20
4.4 User Acceptance Testing	2 days	Thu 9/7/20	Fri 10/7/20
4.5 Complete Testing and Debugging	3 days	Sat 11/7/20	Tue 14/7/20
5.0 Maintenance/Deployment Process	12 days	Sun 2/8/20	Mon 17/8/20
5.1 Application Installation	5 days	Mon 3/8/20	Fri 7/8/20
5.2 Documentation (report)	5 days	Sat 8/8/20	Thu 13/8/20
5.3 Presentation	2 days	Fri 14/8/20	Mon 17/8/20

Figure 3.5 *Milestones IV*

3.1.1.2 Work Breakdown Structure (WBS)

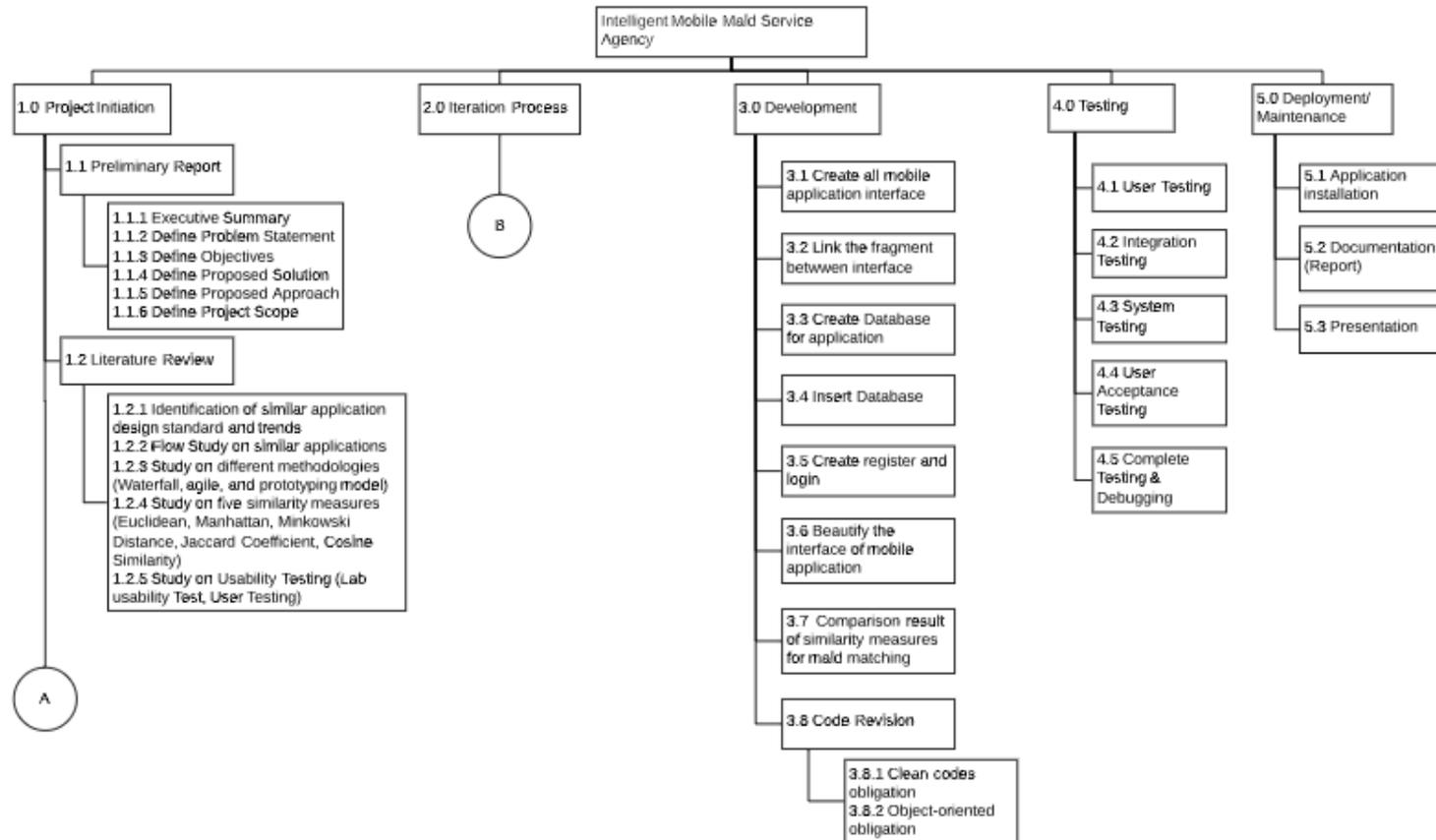


Figure 3.6 Work Breakdown Structure (WBS) I

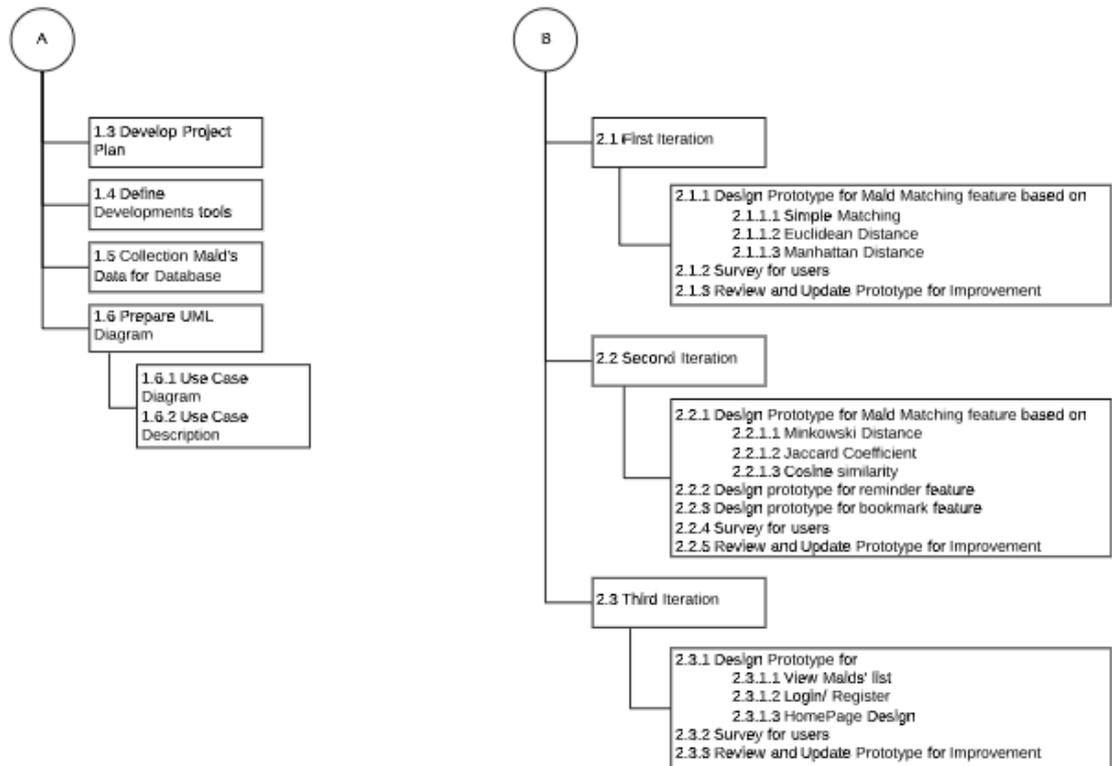


Figure 3.7 Work Breakdown Structure (WBS) II

3.1.1.3 Gantt Chart

Gantt chart was attached at appendix.

3.1.2 Iteration Process

Once the project initiation phase completed, the design phase for the project began. The iteration process includes several minor phases. There are four general stages, such as design, prototyping, customer evaluation, and review and update phases. In this project, the prototype was divided into three iterations which were first, second, and third iteration.

3.1.2.1 First Iteration

Firstly, a low fidelity prototype was produced to illustrate the interface of this application. Next, the features of the application were designed as simple as possible in the first prototype. For the first prototype, the developed prototype included a maid match based on a simple match and two similarity measures. The purpose of the first prototype was to let examiners understand the differences between the three methods.

a) Design phase

First, the user interface was designed by creating a simple prototype with the user interface only. Thus, an outline of the structure of the prototype and the maid matching feature based on three.

b) Prototyping phase

A prototype was produced by creating a mobile application by using the android studio with the react native framework. The prototype was designed based on the design in the previous phase. The designed prototype was only included the primary feature which is performed the maid matching based on some similarity measures.

c) Customer Evaluation phase

Supervisors and selected users were given a short survey to evaluate the prototype. They were required to review the prototypes and provide feedback for further refinement in the next phase.

d) Review and Update phase

For this phase, the feedback of the respondents had been reviewed and studied for improvement. If the feedback indicates problems with the prototype, or there are other suggestions for the prototype, the prototype was refined and enhanced to meet the requests of the clients. Next, the prototype was refined and continued with the second iteration.

3.1.2.2 Second Iteration

Continuing from the first iteration, the maid matching features were developed by using another three similarity measures. Some additional features had been added to this iteration. The additional features enable users to set the reminder after some activities. Moreover, a bookmark feature was added to this iteration. This iteration divided into four stages.

a) Design Phase

After refining the first iteration process, the design of the interface was sketched and outlined for each feature. The UML diagrams were drawn to provide insight into how system activities work.

b) Prototyping Phase

In this phase, the interface design of the prototype from the previous design phase was used for the implementation. The additional features were added in this stage such as maid matching based on another three similarity measures, set reminder, and bookmark.

c) Customer Evaluation Phase

After implementing all features, the prototype was reviewed again by supervisors and selected users. The purpose is to get feedback from different perspectives. Another brief survey of them was to be conducted to analyze the limitations of the prototype. Then, the feedback was processed in the next phase.

d) Review and Update Phase

The feedback provided by the surveyors was reviewed and studied. A refinement process on the prototype was done before continuing with the third iteration.

3.1.2.3 Third Iteration

In the third iteration, some of the general features such as login/logout, register and, homepage were developed. Next, a maids' list was developed as a feature to let the end-users view all maids from the database. The interface design of this application was finalized in this process. This iteration was also split into 4 stages.

a) Design phase

In this phase, an additional feature was added into the prototype, which allows users to view the list of maids. Next, the layouts of the maids' list, login, register, and homepage were sketched and continued with the next phase.

b) Prototyping phase

The interface design of the prototype in previous was continued to implement with the newly added feature, which is view maids' list. In this iteration process, the prototype was designed like a final version of the product. After whole features were implemented, there were several tests on the maid matching feature based on similarity measures, and simple matching were be tested. A comparison of results was being produced. The best similarity measure was selected as the final method to implement in the application.

c) Customer Evaluation phase

Similar to the second iteration, the supervisor and the selected users were selected as evaluators of the prototype. A brief survey of evaluators was conducted to evaluate prototypes.

d) Review and Update phase

At this phase, the feedback was collected from the supervisors and the selected users. The improvement of the system was based on the feedback given until they are satisfied with the final product and moved to the development phase.

3.1.3 Development

In this phase, the final prototype was ready to implement in an actual application. The final implementation of coding was done by reference to the last prototypes built in the previous iteration stage. The features available in the prototype can be reused and refined. The coding of the entire system will be checked for clean code and object-oriented obligations. Once the final version is developed, the application was tested and deployed into production.

3.1.4 Testing Phases

In this phase, the final version of the application was undergoing a series of tests to ensure that the application can provide accurate output and accepted by the users. Each feature and component in the application had performed the unit, integration, and system test to ensure it functions correctly. When all features were assembled and tested correctly, user acceptance testing was performed to double-check whether the application met the end-user requirements. This application was tested by using a lab usability test. The application is ready for deployment when all the tests are approved.

3.1.5 Maintenance/ Deployment Phases

After the application was testing completed, a final report was prepared to illustrate all the workflow of this project. A final report was documentation that prepared for the process of implementing this mobile application. This report outlines how to develop mobile applications and the main objectives of mobile applications. Next, the presentation slide was prepared to present the functionality of the mobile application to the supervisors and moderator. The presentation slide included progress when developing this application.

3.2 Research Methodology

3.2.1 Quantitative research

Quantitative research is a method that emphasizes the objective measurement of a project. There are three types of analysis methods such as statistical, mathematical, or numerical analysis methods. The data can be collected via different data collection methods such as opinion polls, surveys, and questionnaires, or computing techniques can be used to process existing statistics data. Quantitative research aims to collect numerical information and summary or explain the specific needs in the population (Babbie, 2010).

a) Questionnaires

Frechtling (2002) claimed that when the information requires to be collected from a group of people, or when a clearly defined questions need to be answered, surveys are often chosen as the data collection method. Thus, the questionnaire has been chosen for this project for gathering requirements and collecting data.

The questionnaires for this project was created via Google form and have been distributed to 40 people to obtain their feedback. In this questionnaire, there are two unique questions which are open-ended questions and close-ended questions. The open-ended questions allow respondents to think aloud to express their answers in their personal words, while the closed-ended questions allow only fixed answers provided by researchers.

b) Literature Review

The importance of a literature review is to review useful features in the project. In addition, it allows studying how to implement similar applications. Therefore, the robustness and feasibility of the application to be developed are improved.

During the literature review phase, five similar mobile applications had been evaluated, and their features were compared. Some important features had been extracted for inclusion in this project. For instances, Maid Assist, Agensi Pekerjaan Venture Provision (APVP), Agensi Pekerjaan Together Sdn. Bhd., Wilson Maid, and Helper Search.

Besides that, three system development methodologies were studied to determine the most appropriate methodologies for the project. For example, the waterfall model, agile software development, and prototyping model.

Moreover, the features of five similarity measures have been studied, which are Euclidean distance, Manhattan distance, Minkowski distance, Cosine Similarity, and Jaccard Coefficient. The strength and limitations of each measure have been evaluated.

Type of usability testing had been studied to determine which testing was suitable for this project, such as lab usability testing and user testing.

3.3 Development Tools

Mobile application tools and resources are essential items to help developers with mobile application development workflow. There are numerous tools and resources available in the market, such as Android studio, react native and others.

3.3.1 Firebase

Khawas and Shah (2018) stated that Firebase can help build an application with high quality. The data stored in JavaScript Object Notation (JSON) format, which does not need queries for inserting, updating, deleting, or retrieving data. For this project, firebase had been used as a cloud function which allowed the mobile application to run mobile backend code without managing servers. Besides that, it was a verification method that can perform simple and secure authentication of users. Firebase had a notification feature that provides targeted user notifications for mobile applications, and these services are available for free.

3.3.2 Android Studio

For this project, Android Studio has been used because it is the official integrated development environment (IDE) for developing the Android platform. Android studio has provided a layout editor using eXtensible Markup Language which is easier to design the front end. And for the back end, android studio is using Java code to design and allow to use python by using Chaquopy.

CHAPTER 4

PROJECT INITIAL SPECIFICATION

4.0 Introduction

In this chapter, the use case diagram and use case description will be included. In addition, this chapter also discusses functional requirements, non-functional requirements, and the results of the questionnaires obtained.

4.1 Use Case Diagram

The purpose of use case diagrams is used to collect internal and external influences system requirements. Generally, these requirements are defined as design requirements. Thus, when the application is analyzed to gather its capabilities, the use cases will be ready, and the actors will be identified (Waykar, 2015). Use case diagrams represent user interactions with applications to show the relationship between users and different use cases.

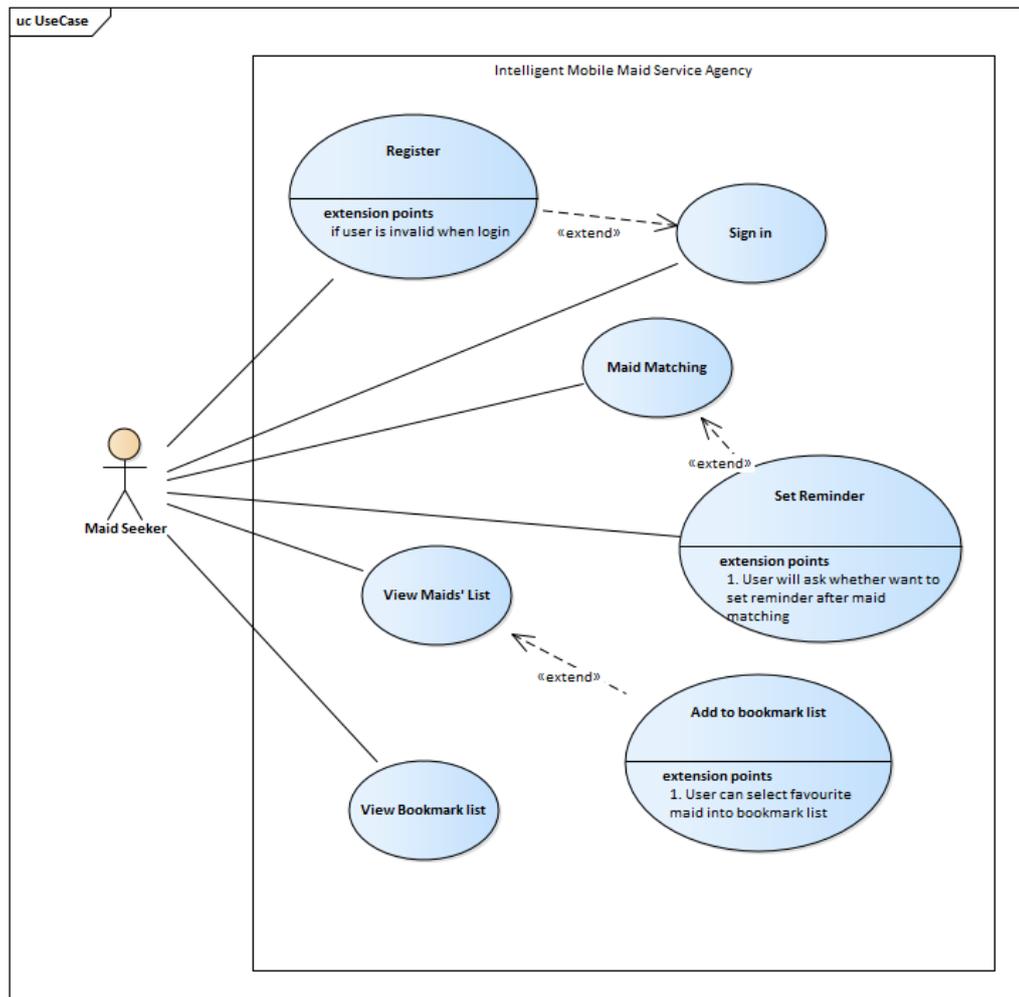


Figure 4.1 Use Case Diagram

4.2 Use Case Description

In this section, a description of each use case will be completed. The description described each use case to better understand the goals, processes, and constraints for each use case. A use case description is a list that describes each use case in detail to understand the flow of the application of how users will perform tasks.

4.2.1 Sign in

Table 12 *Use case for sign-in*

Use Case ID	1
Use Case Name	Sign in
Actor	Maid Seeker
Description	The maid seeker logs into an account.
Pre-Condition	The maid seeker should have an account for this application.
Relationship	
Association:	Maid Seeker
Include:	-
Extend:	Register
Generalization:	-
Flow of Events:	<ol style="list-style-type: none"> 1) The maid seeker enters username and password. 2) The system will validate the username and password. 3) If username and password do not match, the maid seeker retypes or <i>Proceed to E1: Validate Account</i> 4) The system displays a message indicating the login is successful.
Alternative flow of events:	<p><u>E1: Validate Account</u></p> <p>3.1 Register</p> <ol style="list-style-type: none"> 3.1.1 If the account doesn't exist in the database 3.1.2 The maid seeker enters information into the system to create a new account 3.1.3 The system registers the account and save it into the database.

4.2.2 Maid Matching

Table 13 Use case for maid matching

Use Case ID	2
Use Case Name	Maid Matching
Actor	Maid Seeker
Description	The maid seeker who wants to search maid based on setting preference.
Pre-Condition	The maid seeker should have an account for this application.
Relationship	
Association:	Maid Seeker
Include:	-
Extend:	Set Reminder
Generalization:	-
Flow of Events:	<ol style="list-style-type: none"> 1) The maid seeker login to their account. 2) The maid seeker selects to perform maid matching. 3) The maid seeker set preferences to search for a maid. 4) The system performs matching and provide the result. 5) The maid seeker can view the information of the maids. 6) Once confirm, the system displays a message indicating the searching is successful. The maid seeker will be asked to set a reminder. 7) If maid seeker agrees to <i>Proceed to E7: Set Reminder</i>. 8) The system returns to the homepage.
Alternative flow of events:	<p><u>E7: Set Reminder</u></p> <p>7.1 Set Reminder</p> <ol style="list-style-type: none"> 7.1.1 The maid seeker enters the date, time, and description. 7.1.2 The maid seeker confirms and saves. 7.1.3 Use case terminates.

4.2.3 View Maids' list

Table 14 Use case for view maids' list

Use Case ID	3
Use Case Name	View Maids' List
Actor	Maid Seeker
Description	The maid seeker who wants to view the list of maids.
Pre-Condition	The maid seeker should have an account for this application.
Relationship	
Association:	Maid Seeker
Include:	-
Extend:	Add to bookmark list
Generalization:	-
Flow of Events:	<ol style="list-style-type: none"> 1) The maid seeker logs in to their account. 2) The maid seeker selects to view the maids' list. 3) The maid seeker can scroll down to view the information of maids. 4) If maid seeker wants to save favourite maids in the bookmark. <i>Proceed to <u>E5</u>.</i> 5) The maid seeker continues to view the list. 6) After viewing, the system returns to the homepage.
Alternative flow of events:	<p>Alternative flow of events:</p> <p><u>E5: Add to bookmark list</u></p> <p>5.1 Add to bookmark list</p> <ol style="list-style-type: none"> 5.1.1 The maid seeker chooses the maid to favourite. 5.1.2 The system displays a message indicating the maid has been added successfully. 5.1.3 The system returns to view list page.

4.2.4 View Bookmark List

Table 15 Use case for view Bookmark list

Use Case ID	4
Use Case Name	View Bookmark list
Actor	Maid Seeker
Description	The maid seeker who wants to view the bookmark list.
Pre-Condition	The maid seeker should have an account for this application.
Relationship	
Association:	Maid Seeker
Include:	-
Extend:	-
Generalization:	-
Flow of Events:	<ol style="list-style-type: none"> 1) The maid seeker logins to their account. 2) The maid seeker selects to view the bookmark list. 3) The maid seeker can scroll down to view the list. 4) The maid seeker can edit the bookmark list. 5) The maid seeker continues to view the list. 6) After viewing, the system returns to the homepage.
Alternative flow of events:	

4.3 Functional and Non-Functional Requirement

4.3.1 Functional Requirement

- 1) The mobile application shall allow the maid seeker to perform maid matching based on their preferences such as age, gender, marital status, nationality, spoken language, education, and working experience.
- 2) The mobile application shall allow the maid seeker to set reminders after performing matching.
- 3) The mobile application shall allow the maid seeker to view the list of maids.
- 4) The mobile application shall allow the maid seeker to add a favourite maid into the bookmark list when viewing the list of maids.
- 5) The mobile application shall allow the maid seeker to view the bookmark list.
- 6) The mobile application shall allow the maid seeker to edit the bookmark list.

4.3.2 Non-Functional Requirement

- 1) The mobile application shall design with a user friendly interface which is easy to use
- 2) The mobile application shall compatible with Android platforms.
- 3) The access to the mobile application is allowed in the presence of network connection.
- 4) The mobile application shall operate on Android platforms.
- 5) Re-installation of the mobile application shall not affect the data of the user in the database.

4.4 Fact Finding

In this project, the questionnaires had sent out to 40 people. The objective of this questionnaire is to collect the user requirements for this application. The questions of the questionnaire were attached in the appendix. A summary and analysis of the feedback collected from the respondents are as follows:

1) Age

Age
40 responses

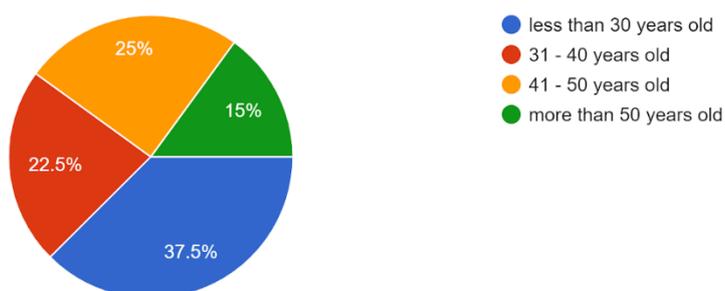


Figure 4.2 Age

From Figure 4.2, 37.5% of the respondents are less than 30 years old, 25.0% of the respondents are between 41 and 50, 22.5% of the respondent are between 41 and 50, and also 15% of the respondents are more than 50 years old.

2) Gender

Gender
40 responses

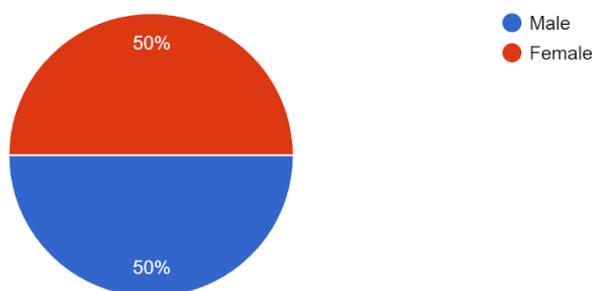


Figure 4.3 Gender

20 male respondents, and 20 female respondents responded to the questionnaires.

3) **Have you ever use the online maid hiring application before? (No matter online or mobile application)**

Have you ever use the online maid hiring application before? (No matter online or mobile application)

40 responses

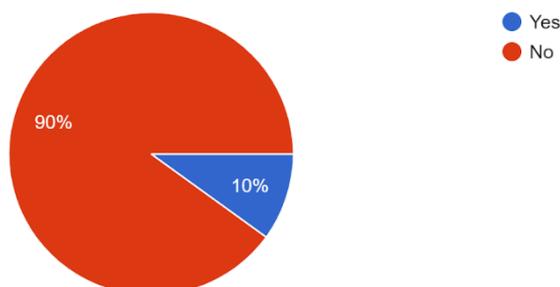


Figure 4.4 *Experience of respondents*

From Figure 4.4, 10% of the respondents (four respondents) stated that they have used the maid hiring application before while the remaining respondents have not used related applications before.

4) **If you have a chance to use it, will you use web application or mobile application?**

If you have a chance to use it, will you use web application or mobile application?

40 responses

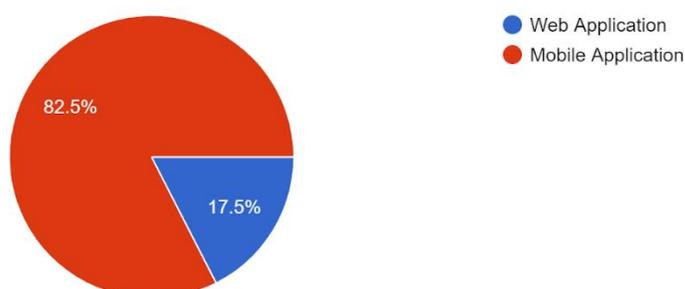


Figure 4.5 *Web or Mobile Application*

From Figure 4.5, 82.5% of the respondents (33 respondents) are more prefer to use the mobile application and 17.5% of the respondents (seven respondents) preferred using the web application.

5) If your answer is “Mobile Application”, what is the factor you choose it as a platform to search for a maid?

If your answer is "Mobile Application", what is the factor you choose it as a platform to search for a maid?

40 responses

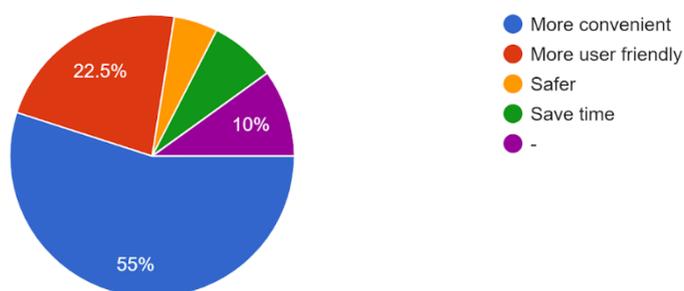


Figure 4.6 *Factor of using mobile applications*

From Figure 4.6, most of the respondents think that mobile application is more convenient because everyone has a mobile phone with them. Next, 22.5% of the respondents (nine respondents) feel that mobile application is more user friendly as compared to the web application. 5% of the respondents feel that mobile applications are safer, and 12.5% of the respondents said it can save their time when using. 10% of the respondents (three respondents) are not giving any comment.

6) Which feature do you most want to apply to the application?

Which feature do you most want to apply to the application? (Please select at most 3 features)
40 responses

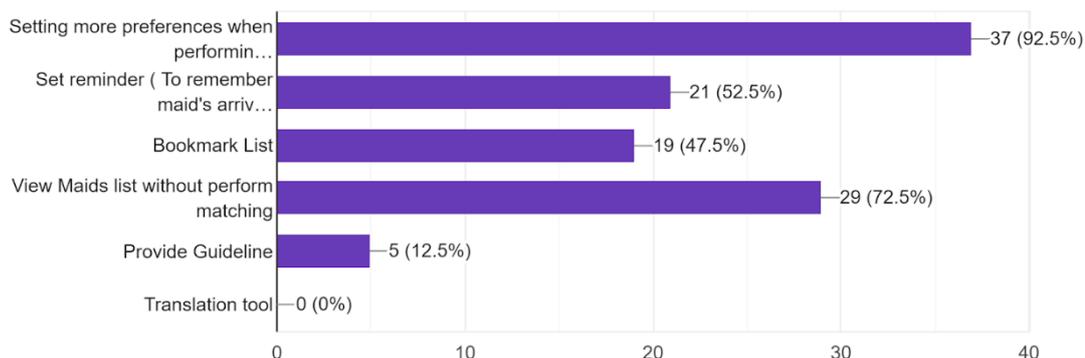


Figure 4.7 Features of the application

From Figure 4.7, 92.5% of the respondents think that the feature should apply in the application are allowing the user to set more preferences when performing maid matching. Next, 29 respondents voted for viewing the maids list without performing any action, whereas 52.5% of the respondents said that bookmark list feature should be applied in the application. There are only five respondents think that guideline should be provided. Nobody chooses to apply translation tool for the application.

7) Which characteristics do you want to set your preference to search a maid?

Which characteristics do you want to set your preference to search a maid?
40 responses

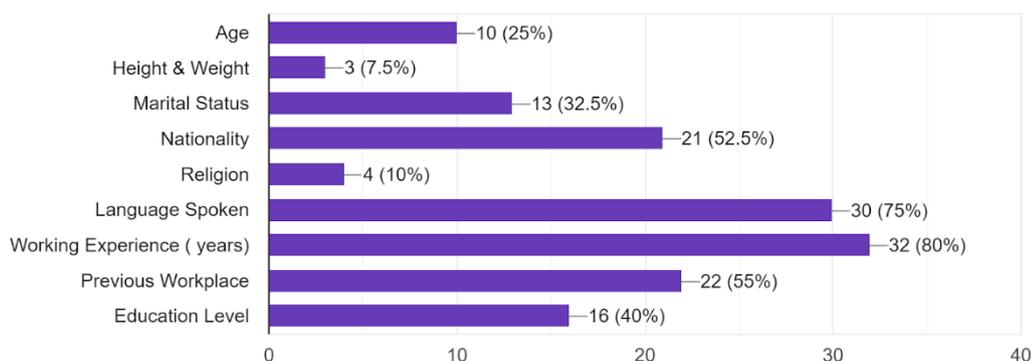


Figure 4.8 Characteristics of maid to set as preference

From Figure 4.8, 80% of the respondent (32 respondents) more prefer to use the working experience to search for a maid. The second most characteristics that are chosen by 75% of respondents is the language spoken. 55% of the respondents and 52.5% of the respondents are choosing a maid's previous workplace and nationality, respectively. 16 respondents stated that they will also focus on the education level of a maid when searching for a maid. Marital status has been chosen by 13 respondents which are 32.5% from 40 respondents. There are only four respondents who want to use religion as a preference, whereas there are only three respondents will search a maid based on their height and weight.

8) Is there anything else that you would like to apply on the application?

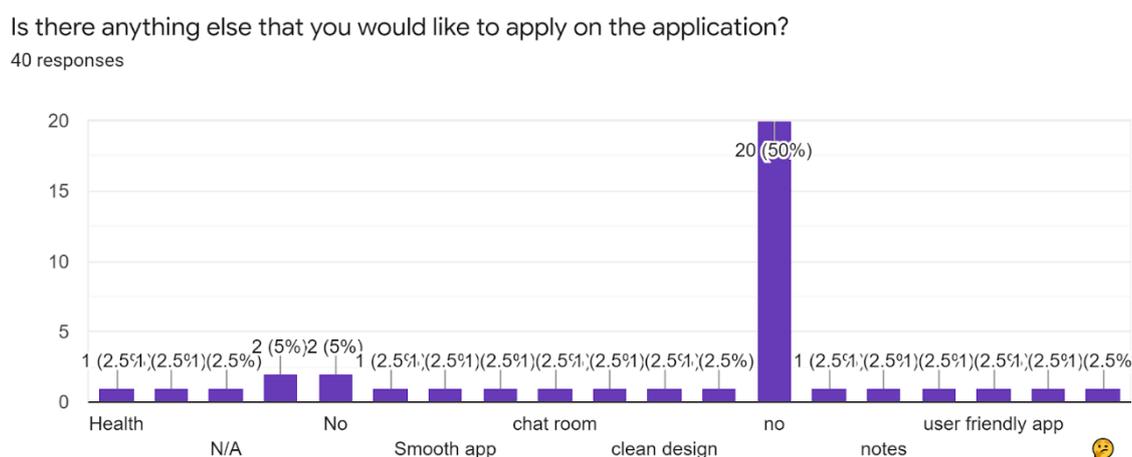


Figure 4.9 Suggestion

From Figure 4.9, most respondents did not provide any suggestions. Some respondents have misunderstood the question because they made suggestions that are not about the functionality of the application, such as the application's smooth application, clean design, user-friendly application, and beautiful layout. Only two respondents said the application should allow users to chat with maids. Next, one respondent said that the app should have an additional feature that allows hired maids to review maids.

4.3.2.1 Summary

Based on the results of the analysis, most respondents stated that the maid hiring app should allow users to set more preferences during the maid matching process. In addition to this, 29 respondents voted for the View Maid List feature, which they believe should be implemented in this application. Next, the bookmark function should also be applied to the application so that users can save their favourite maids and allow them to view the information of the maids again without searching from many maids. Twenty-one respondents support the use of reminders in the app, as it helps them remind things like the arrival date of a maid.

Of these nine characteristics, the top five characteristics that respondents chose to search for maids were work experience, language spoken, previous workplace, nationality, and education level. This may be because they can learn about work abilities and learn more about the maid's lifestyle. Besides, appearance, such as the age, height and weight of the maid was not important for respondents to find maids.

CHAPTER 5

System Design

5.0 Introduction

In this chapter, the design of system architecture, the design of the database, the design of system models and the structure of the user interface for the application will be shown.

5.1 System Design Models

In this section, the system architecture diagram, the Data Flow Diagram (DFD), and the activity diagram will be shown to show the connection between the application and the end users.

5.1.1 System Architecture Diagram

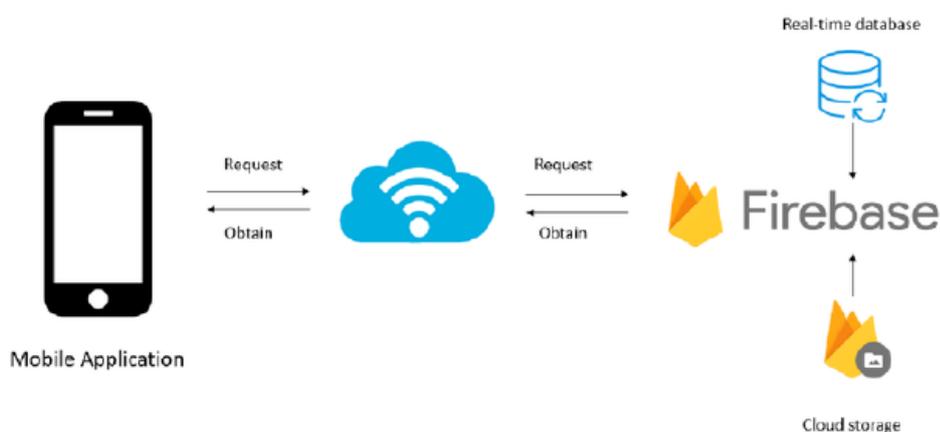


Figure 0.1 *Diagram of System Architecture*

In this project, the client-server architecture is utilized as the architectural pattern, which appropriates the system into two applications. The Android device as a client requests the server to send or acquired the necessary information. The server is a database, used to receive data or send the required data to the client.

To begin with, the android application has been created and the firebase is incorporated into the application. The application empowers continuous information procurement and composing by associating through the Firebase database server and cloud storage. Since the entire system shares a database, every information and activity performed from the application program can be finished by sending a solicitation to

the server. To sync the firebase with the application, there are some steps that must be followed:

- Step 1: Add the code to the gradle file of the project.

```
buildscript {
    dependencies {
        classpath 'com.google.gms:
            google-services:3.0.0'
    }
}
```

Figure 0.2 Code for gradle file (Project)

- Step 2: Add the code to the gradle file of the android application.

```
apply plugin: 'com.android.
    application'
android { }
dependencies {
    compile 'com.google.firebase:
        firebase-core:9.6.1'
    // ADD THIS AT THE BOTTOM
    apply plugin: 'com.google.gms.
        google-services'
}
```

Figure 0.3 Code for gradle file (Android)

- Step 3: Change the rules for the real-time-database in the firebase to ensure the database is readable and editable.

```
{
    "rules": {
        ".read": true
        ".write": true
    }
}
```

Figure 0.4 Rules for real-time database

5.1.2 Context Diagram

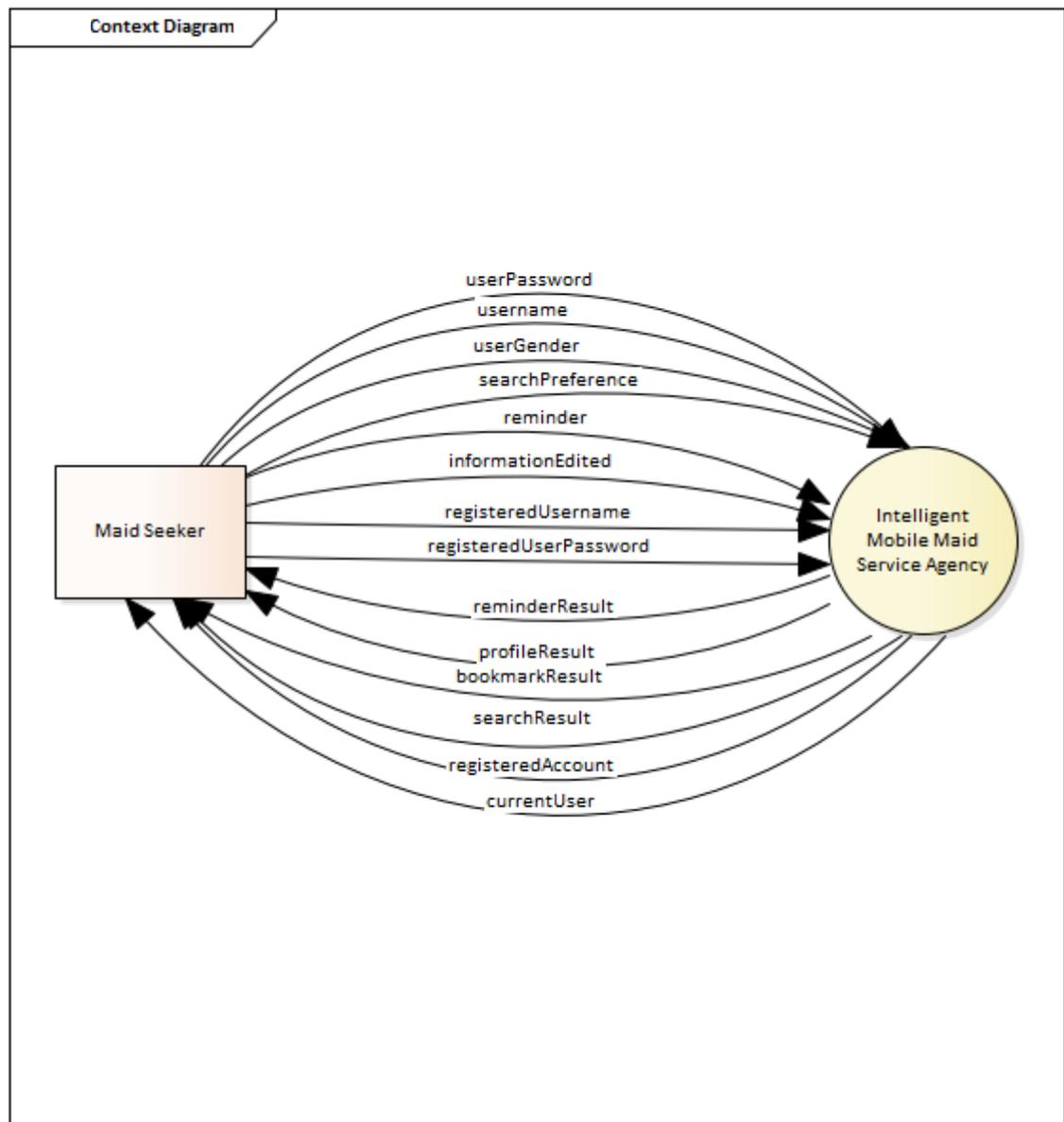


Figure 0.5 Context Diagram

5.1.3 Data Flow Diagram (Level 1)

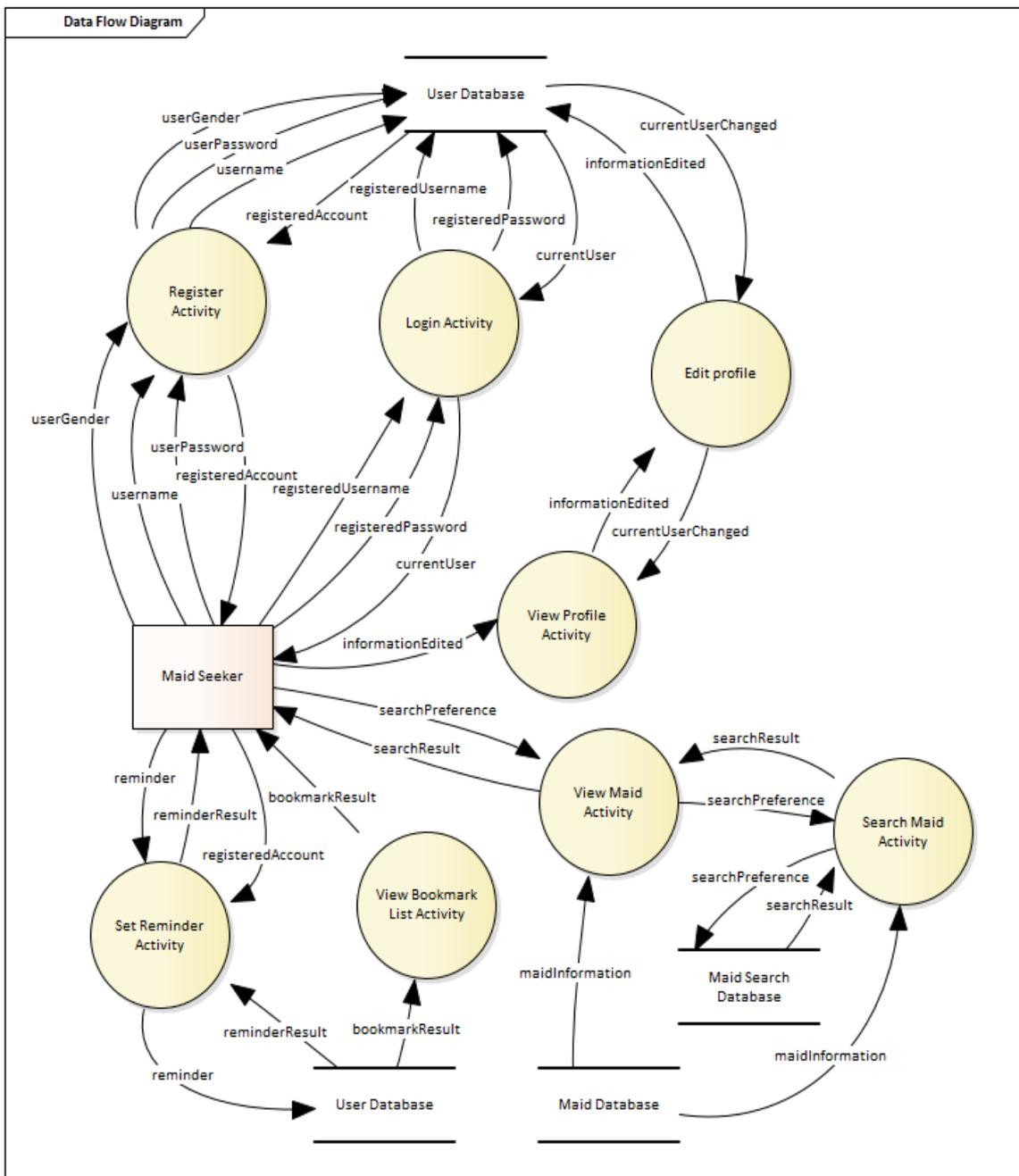


Figure 0.6 DFD (Level 1)

5.1.4 Activity Diagram

5.1.4.1 Login Activity

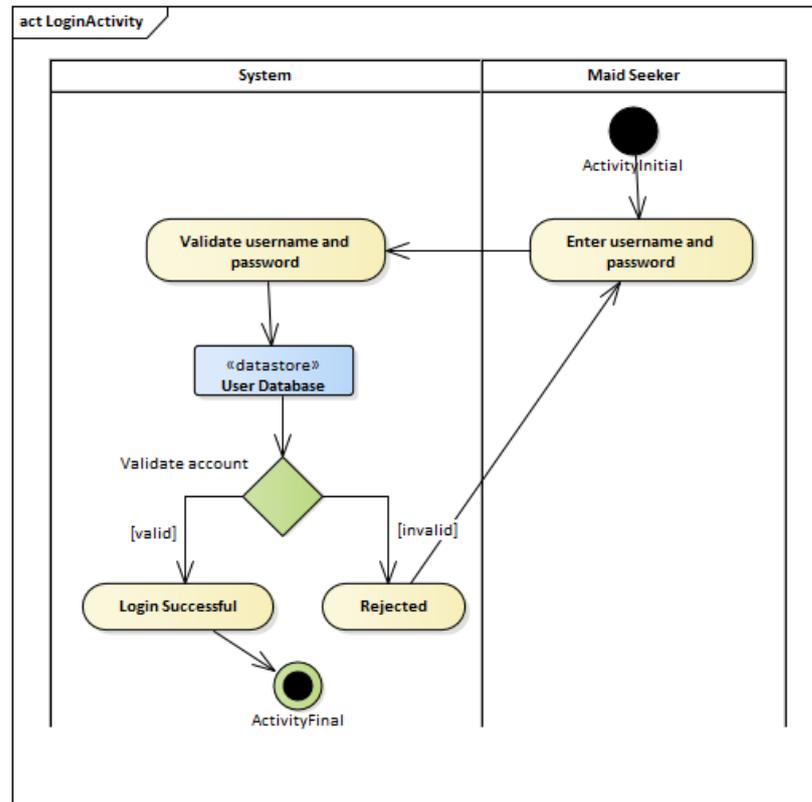


Figure 0.7 Activity Diagram for Login Activity

5.1.4.2 Register Activity

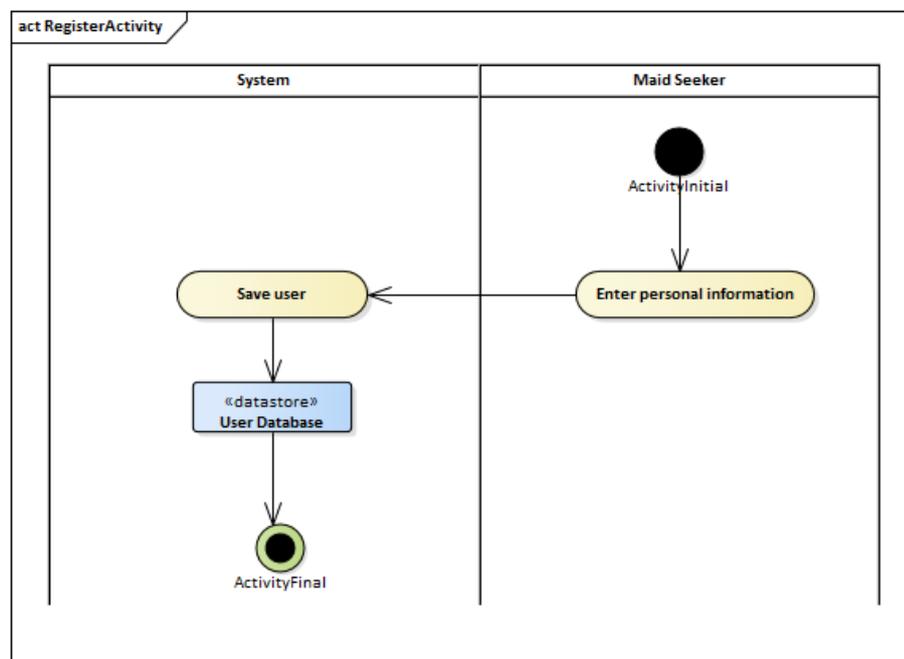


Figure 0.8 Activity Diagram for Register Activity

5.1.4.3 View Maid Activity (Search)

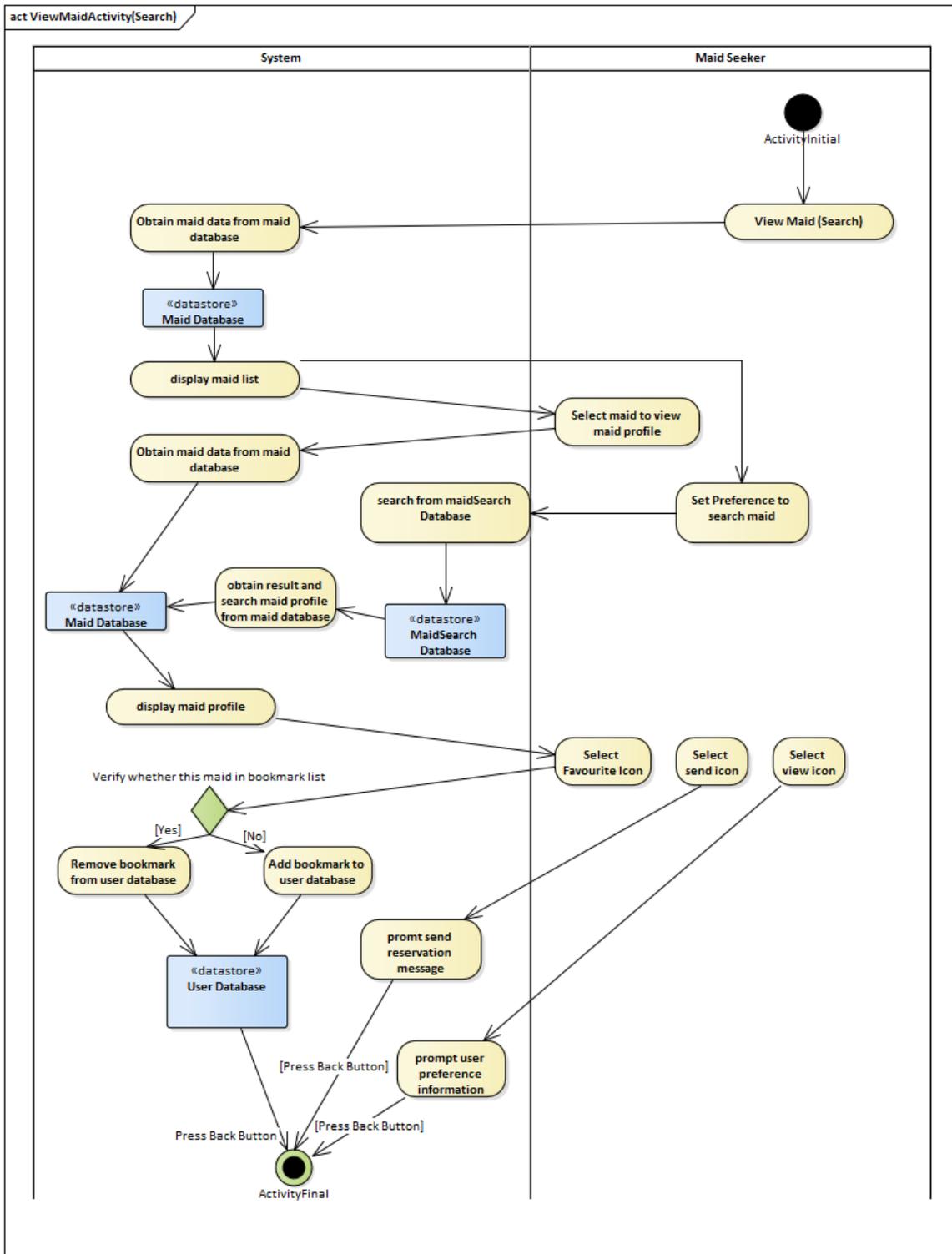


Figure 0.9 Activity Diagram for View Maid Activity (Search)

5.1.4.4 View Bookmark List Activity

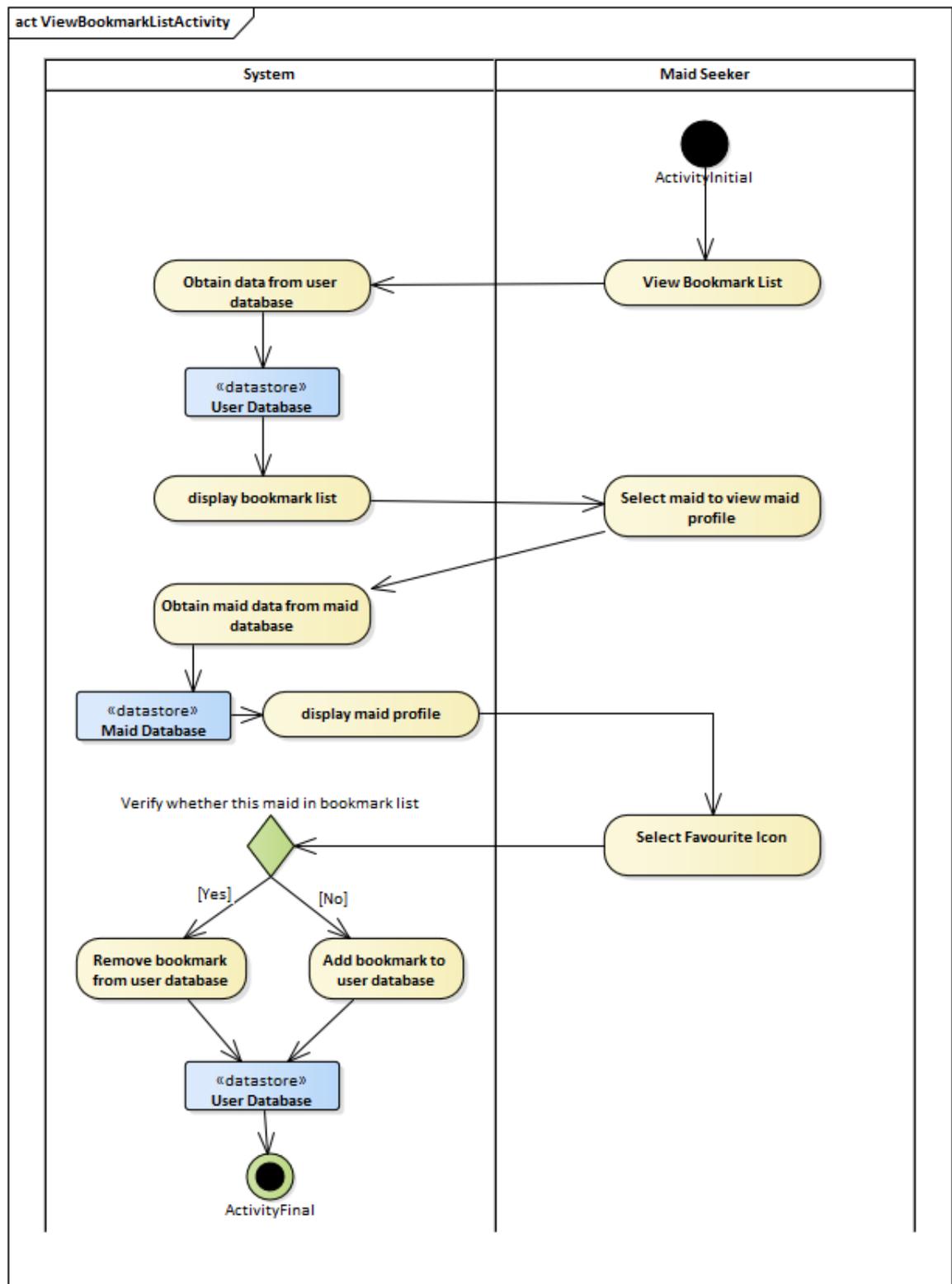


Figure 0.10 Activity Diagram for View Bookmark List Activity

5.1.4.5 Reminder Activity

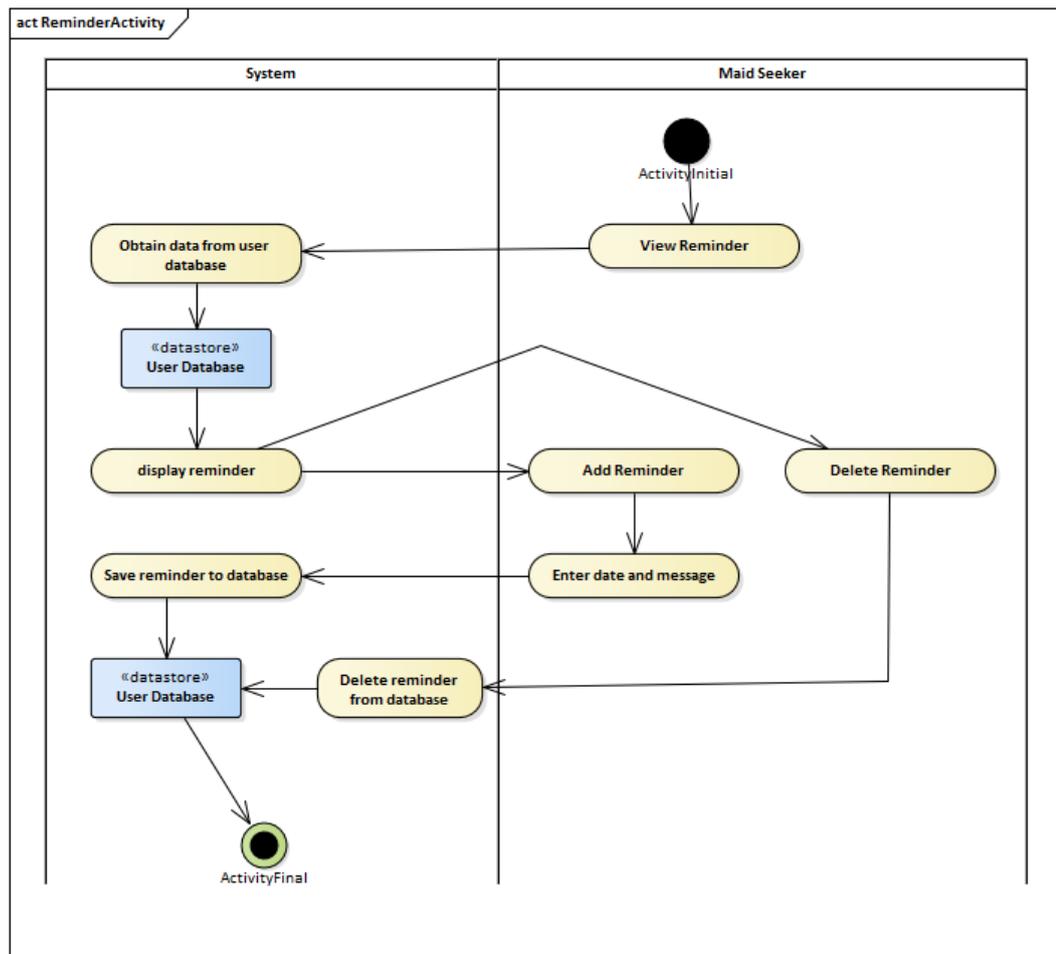


Figure 0.11 Activity Diagram for Reminder Activity

5.1.4.6 Edit Profile Activity

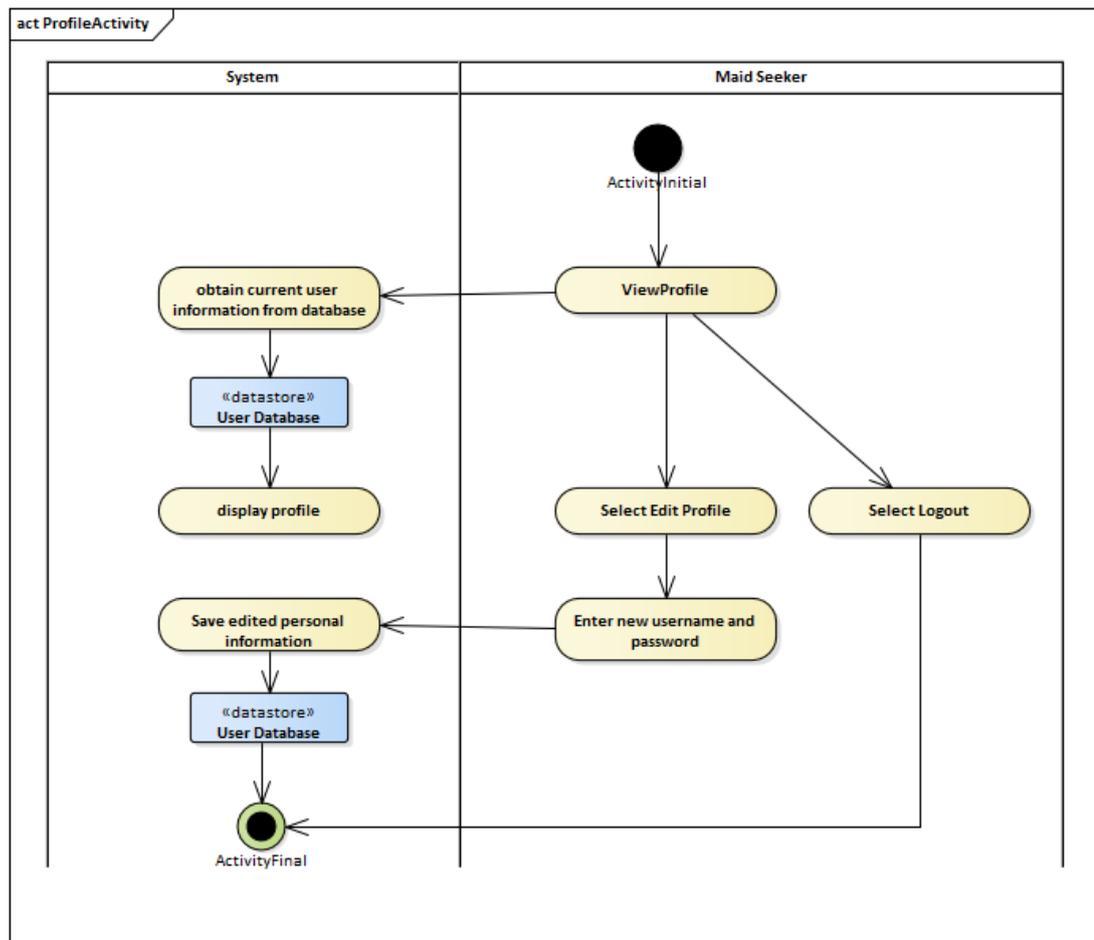


Figure 0.12 Activity Diagram for Edit Profile Activity

5.2 Database Design

5.2.1 Entity Relationship Diagram (ERD)

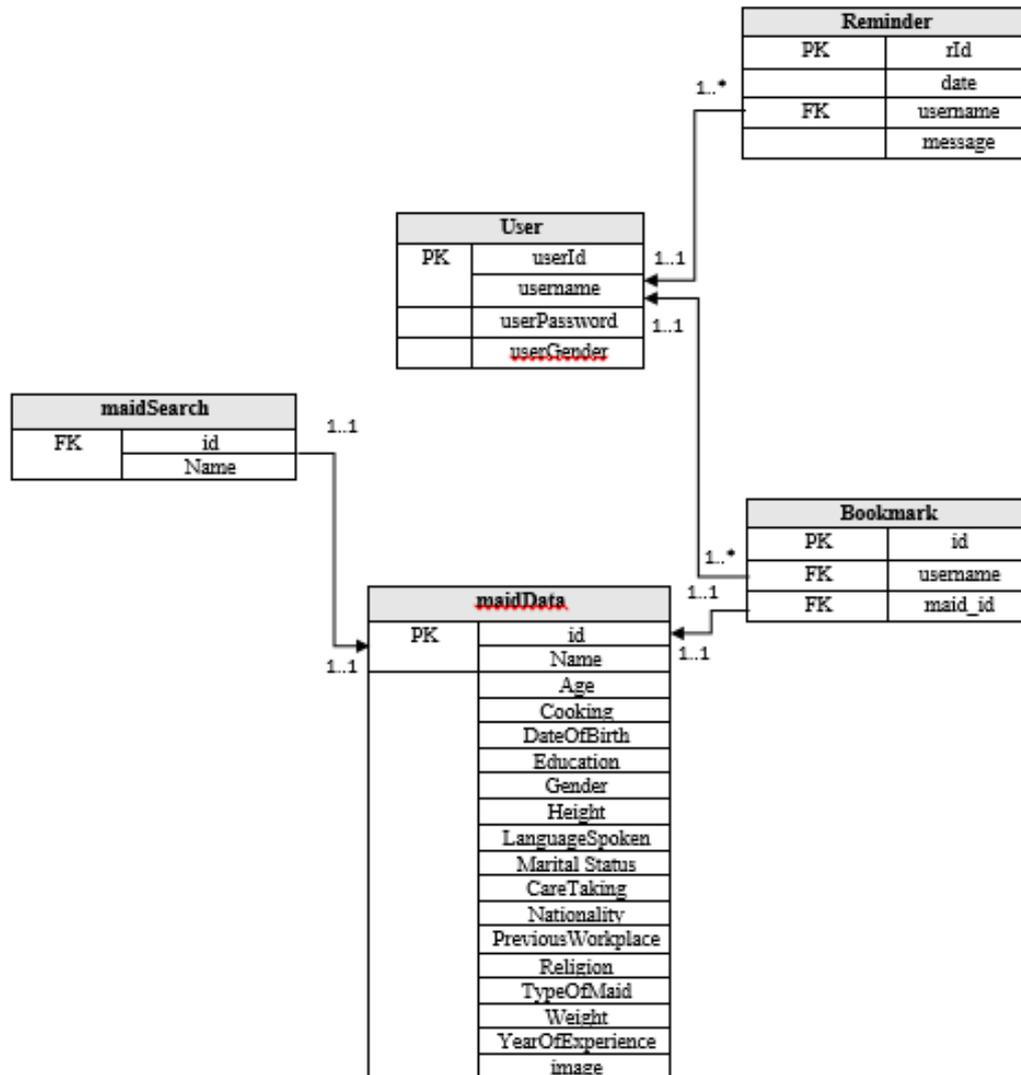


Figure 0.13 ERD Diagram

5.2.2 Description of Entity Relationship Diagram

Table 16 *Description for ERD*

Table Name	Description
User	The end user personal information and activities.
maidData	Contains the maid profile information
Reminder	The end user's reminder item
Bookmark	The end user's bookmark item
maidSearch	Contains the searching maid information.

5.2.3 Data Dictionary

*For null: N= not null, Y= can be null.

5.2.3.1 User

Table 17 *Data Dictionary for User*

Attribute	Description	Data Type	PK/FK	Null
userId	Unique identification for registered user.	Varchar	PK	N
username	Username of the registered user.	Varchar	PK	N
userPassword	Password for the registered user to access account.	Varchar	-	N
userGender	Gender of the registered user.	Varchar	-	N

5.3.3.2 Reminder

Table 18 *Data Dictionary for Reminder*

Attribute	Description	Data Type	PK/FK	Null
rId	Unique identification for reminder item.	Varchar	PK	N
username	Unique identification for user who save the reminder.	Varchar	FK	N

date	Reminder date set by registered user.	Varchar		N
message	Reminder message set by registered user.	Varchar	-	N

5.3.3.3 maidData

Table 19 Data Dictionary for maidData

Attribute	Description	Data Type	PK/FK	Null
id	Unique identification for maid profile.	Varchar	PK	N
Name	Name of the maid.	Varchar	PK	N
Age	Age of the maid.	Int	-	N
Cooking	Cooking experience of the maid.	Varchar	-	N
DateOfBirth	Birth day of the maid.	Varchar	-	N
Education	Education level of the maid.	Varchar	-	N
Gender	Gender of the maid.	Varchar	-	N
Height	Height of the maid.	Int	-	N
LanguageSpoken	Language spoken of the maid.	Varchar	-	N
Marital Status	Marital status of the maid.	Varchar	-	N
CareTaking	Care taking experience of the maid.	Varchar	-	N
Nationality	Nationality of the maid.	Varchar	-	N
PreviousWorkplace	Previous workplace of the maid.	Varchar	-	N
Religion	Religion of the maid.	Varchar	-	N
TypeOfMaid	Type (low, medium, expert) of the maid.	Varchar	-	N
Weight	Weight of the maid.	Int	-	N
YearOfExperience	Working experience (year) of the maid.	Varchar	-	N
image	Image URL of the maid.	Varchar	-	N

5.3.3.4 Bookmark

Table 20 *Data Dictionary for Bookmark*

Attribute	Description	Data Type	PK/FK	Null
id	Unique identification for favorite maids.	Varchar	PK	N
username	Unique identification for user who save the bookmark.	Varchar	FK	N
maid_id	Unique identification for maid profile.	Varchar	FK	N

5.3.3.5 maidSearch

Table 21 *Data Dictionary for maidSearch*

Attribute	Description	Data Type	PK/FK	Null
id	Unique identification for searching maid.	Varchar	PK	N
Name	Name of the profile.	Varchar	FK	N

5.3 User Interface Design

In this application, there is only one type of end user, which are the maid seekers who need to look for a maid. The maid seekers are allowed to perform searching, set reminder, view bookmark list and edit personal information.

5.3.1 Navigation Model for the User Interface

This model will show the navigation flow of the overall application for maid seekers. First, the root page of the application is to let the maid seekers register as an existing user or login to the application. After login into the application, the registered users will explore to homepage screen, and they can access to the function they wished. Following will show the navigation model of the application:

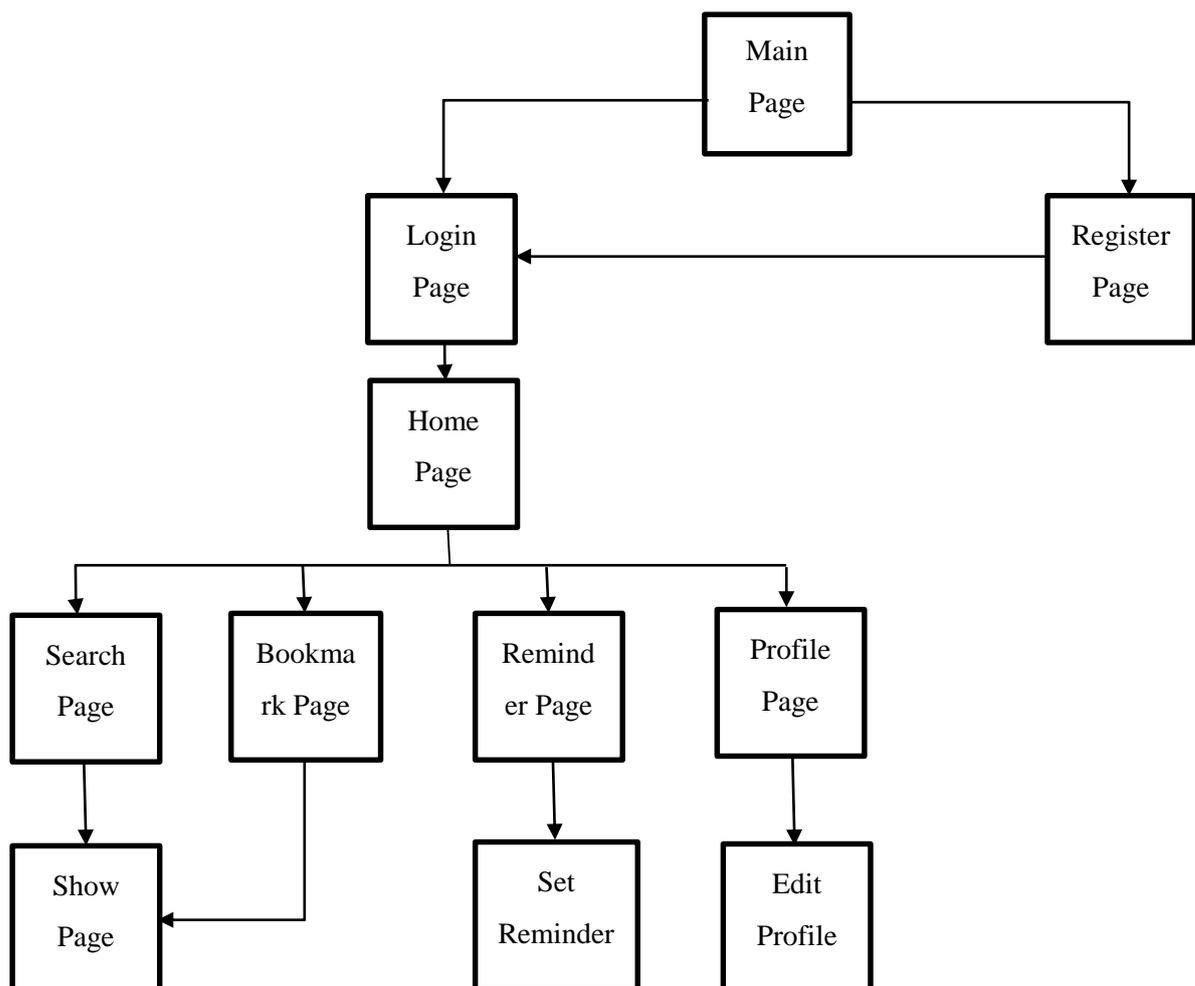


Figure 0.14 *Navigation model*

5.3.2 Prototype and User Interface Design

In this section, the prototype of the application will be displayed.

5.3.2.1 Main Page

The figure below shows the prototype of the main page that navigates the user to login or register an account.

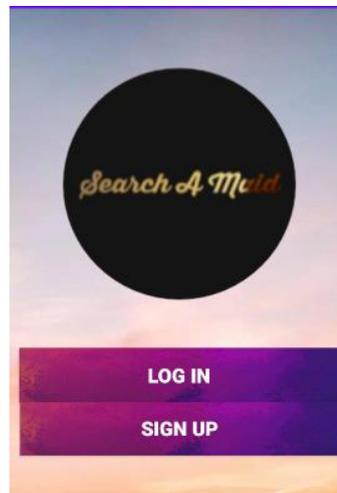


Figure 0.15 Main Page (Prototype)

5.3.2.2 Login and Register Page

The first picture shows the prototype of the login page and the second picture shows the prototype of the register page. For the login page, the users need to enter username and password while the register page required the user to enter their account to register.

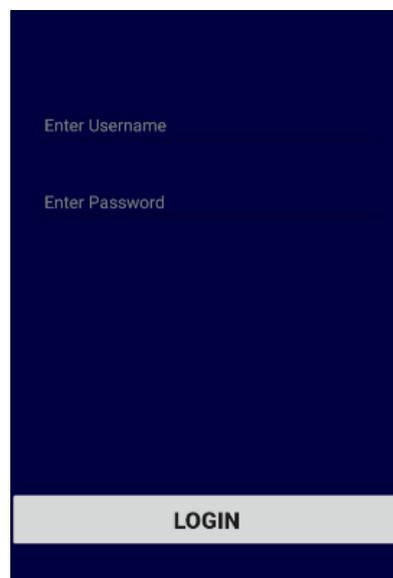


Figure 0.16 Login Page (Prototype)

Username:

Password:

Gender
 Male
 Female

REGISTER

Figure 0.17 Register Page (Prototype)

5.3.2.3 View and Search Maid Page

Figure 5.18 shows the prototype of the searching function which allowed the users to set the preferences to find maids. After all the preferences are set, the users can view their preferences and choose which algorithm they wish to get the result (Figure 5.19). Figure 5.20 shows the prototype of view page.

Please select age:
 24-30
 31-37
 38-44
 45 and above
 No preference

Please select gender:
 Female
 Male
 No preference

Please select marital status:
 Single
 Married
 Seperated
 Divorced
 Widow
 No preference

Figure 0.18.1 Set Preference Page (Prototype)

No preference

Please select weight:

38-43

44-49

50-55

56-61

62 and above

No preference

Please select height:

143-147

148-152

153-157

158-162

163 and above

No preference

>
NEXT

Figure 0.18.2 Set Preference Page (Prototype)

Please select nationality:

Myanmar

Filipino

Indonesian

Indian

No preference

Please select religion:

Buddhist

Islam

Christian

Roman Catholic

No preference

Please select language spoken:

Chinese

English

Malay

Myanmar

Tagalog

Figure 0.18.3 Set Preference Page (Prototype)

Bahasa Indonesia

Mizo

No preference

Please select education:

Primary

Secondary

College

No preference

>
NEXT

Figure 5.18.4 Set Preference Page (Prototype)

Please select type of maid (Year):

New (1-4)

Medium (5-7)

Expert (8-10)

No preference

Please select cooking (experience):

No

Yes

No preference

Please select care taking (experience):

No

Yes

No preference

Figure 0.18.5 Set Preference Page (Prototype)

Please select previous workplace (experience):

Malaysia

Singapore

Hong Kong

Indonesia

No preference

Figure 0.18.6 Set Preference Page (Prototype)

Age: No preference

Gender: No preference

Height: No preference

Weight: No preference

Marital: No preference

Nationality: No preference

Religion: No preference

Language: No preference

Type: No preference

Cooking: No preference

Care: No preference

Figure 0.19.1 *Select Algorithm Page (Prototype)*

Education: No preference

Previous Workplace: No preference

SIMPLE MATCHING

EUCLIDEAN DISTANCE

MANHATTAN DISTANCE

JACCARD COEFFICIENT

COSINE SIMILARITY

MINKOWSKI DISTANCE

Figure 0.19.2 *Select Algorithm Page (Prototype)*



Aye Aye Aung 
37
Myanmar

Baw Mel 
37

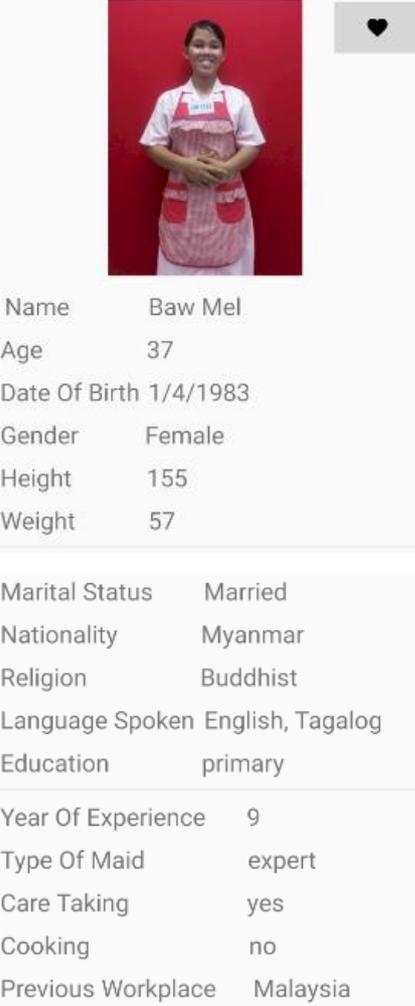
Figure 0.20 *View Page (Prototype)*

5.3.2.4 View Bookmark List Page

The picture shows the prototype of the bookmark list. When the users click on one of the profiles, the second will be shown, which contains the maid's information.



Figure 0.21 View Bookmark List Page (Prototype)



Name	Baw Mel
Age	37
Date Of Birth	1/4/1983
Gender	Female
Height	155
Weight	57
Marital Status	Married
Nationality	Myanmar
Religion	Buddhist
Language Spoken	English, Tagalog
Education	primary
Year Of Experience	9
Type Of Maid	expert
Care Taking	yes
Cooking	no
Previous Workplace	Malaysia

Figure 0.22 *View Detail Information of maid (Prototype)*

5.3.2.5 Reminder Page

The first picture shows the prototype of the reminder page. When the users click the floating action, which means to add a reminder, the second picture will be shown and let the users enter the reminder date and message.

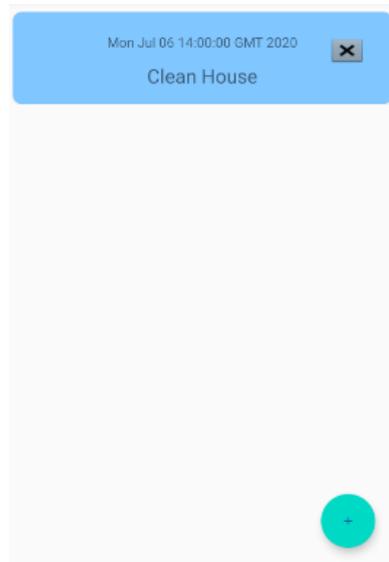


Figure 0.23 *Reminder Page (Prototype)*

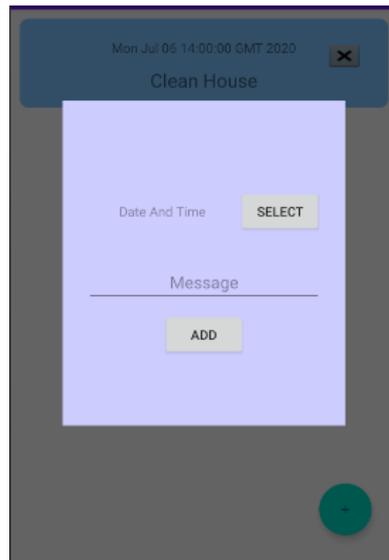
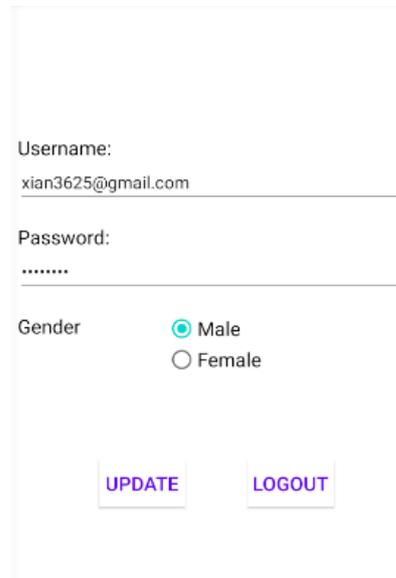


Figure 0.24 *Add Reminder Page (Prototype)*

5.3.2.6 Profile Page

The first picture shows the prototype of the profile page, which contains the personal information of the current user. When the users wish to edit personal information, the update button is clicking, and the second picture will be shown. If the users click the logout button, then an alert window will be pop up which is the third picture to ensure whether the users are confirming to log out.



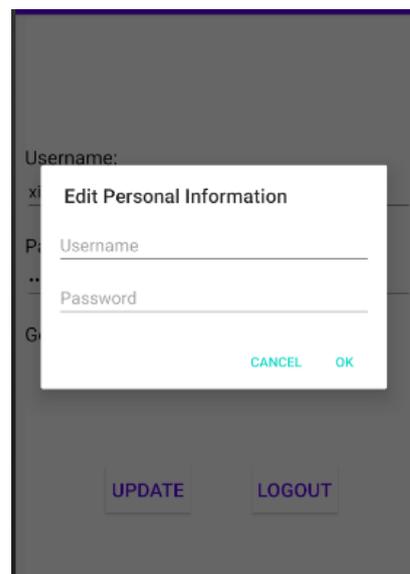
Username:
xian3625@gmail.com

Password:
.....

Gender Male
 Female

[UPDATE](#) [LOGOUT](#)

Figure 0.25 Profile Page (Prototype)



Username:
xian3625@gmail.com

P:

G: Male
 Female

[UPDATE](#) [LOGOUT](#)

Edit Personal Information

Username
Password

[CANCEL](#) [OK](#)

Figure 0.26 Edit Profile Page (Prototype)

Username:
xian3625@gmail.com

Are you sure?

NO YES

Gender Male
 Female

UPDATE LOGOUT

Figure 0.27 *Confirm Edit Profile (Prototype)*

CHAPTER 6

System Implementation

6.0 Introduction

The system implementation of the application will be discussed in this chapter. In this Intelligent Mobile Maid Matching using Similarity Search, the users need to register before they can access the module designed by the application.

6.1 Project Activity Explained

In this section, the activities of the application will be described.

6.1.1 Main Activity

The figure below shows the Main Activity of the application. At the point when the users press the “Login” button then it will navigate to login activity (subsection 6.2.2) while when the users press the “Register” button, the application will navigate to register activity (subsection 6.2.3).

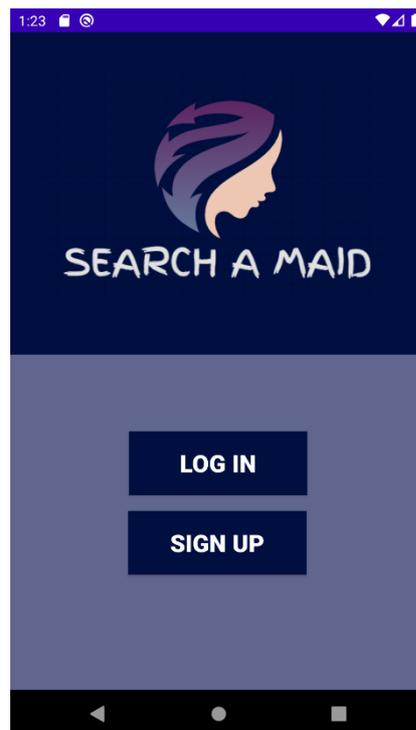


Figure 0.1 *Main Activity*

6.1.2 Login Activity

This feature will verify whether the user is a registered user who is allowed to utilize the search service application. This process will authenticate through the Firebase database. Figure 6.3 shows the approach to get the user database from the firebase.

```
databaseUsers.addValueEventListener(new ValueEventListener() {
    @Override
    public void onDataChange(@NonNull DataSnapshot dataSnapshot) {
        Iterable<DataSnapshot> children = dataSnapshot.getChildren();

        for (DataSnapshot c : children){
            userList.add(c.getValue(User.class));
        }
    }
})
```

Figure 0.2 Code snippet to get user database

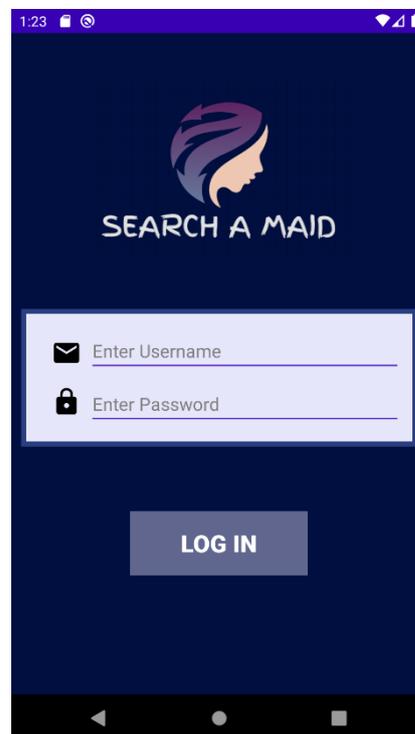


Figure 0.3 Login Activity

The users should fill in the username and password on the login page. After the users enter the information and press the "Login" button, the application will pass the information to the database and verify that the information is registered. On the off chance that the username and password are invalid, the error message "Wrong

username and password" will be shown (Figure6.4). In the event that the users do not enter any information in the username or password column, the error message "Please fill in this field" will be displayed in each unfilled column (Figure 6.5). When the users enter a legitimate registered information, the users will be navigated to the home page (section 6.2.4).

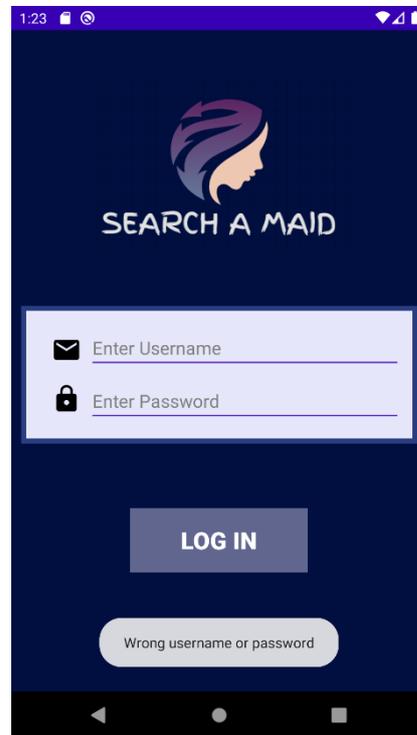


Figure 0.4 Username and password are invalid

6:25

SEARCH A MAID

Enter Username **Please fill in this field.**

Enter Password **Please fill in this field.**

LOG IN

Figure 0.5 *Unfilled column*

Figure 6.6 shows how the system verifies the information entered by the users.

```
private boolean checkValid() {
    tempName = username.getText().toString();
    tempPass = userpwd.getText().toString();

    if (tempName.isEmpty()){
        TextView name = findViewById(R.id.textView13);
        name.setVisibility(View.VISIBLE);
    }

    if (tempPass.isEmpty()){
        TextView pw = findViewById(R.id.textView14);
        pw.setVisibility(View.VISIBLE);
    }

    for(User u: userlist){
        if(tempName.equals(u.username)&& tempPass.equals(u.userpwd)){
            currentUser = new User(u.userId,u.username, u.userpwd, u.gender);
            access = true;
        }
    }

    return access;
}
```

Figure 0.6 Code snippet that verifies user's input

6.1.3 Register Activity

This function allows the users to register an account to use the application. The information of the account created will send to the database. Figure 6.7 shows the register page of the application.

Figure 0.7 Register Activity

The users will be requested to fill up some information such as a username (email address), password, confirm password and gender. At the point when the users fill in an existing username, an error message will be prompt stated that “Username Taken” (Figure 6.8). If the users do not enter any information in the column, the error message "Please fill in this field" will be displayed in each unfilled column (Figure 6.9). If the entered password and entered confirms password do not match, an error message with “Password not match” will be shown (Figure6.10). When the entered password is less than eight words, the users will be prompt with a message stated that “Password should at least eight words” (Figure 6.11). When there is no error, the application will create a new account and the users’ information will be sent to the database. At that point, the users will be navigated to login activity (Figure 6.12).



Figure 0.8 *Enter existing username*

9:34

SEARCH A MAID

Username: **Please fill in this field.**

Password: **Please fill in this field.**

Confirm Password: **Please fill in this field.**

Gender
 Male Female

REGISTER
Invalid input

This screenshot shows the registration form for 'SEARCH A MAID' with all input fields empty. Red error messages are displayed for the Username, Password, and Confirm Password fields. The Gender section has the 'Male' radio button selected. A 'REGISTER' button is visible with an 'Invalid input' error message below it.

Figure 0.9 *Unfilled Column*

9:36

SEARCH A MAID

Username:
xianong@gmail.com

Password:
.....

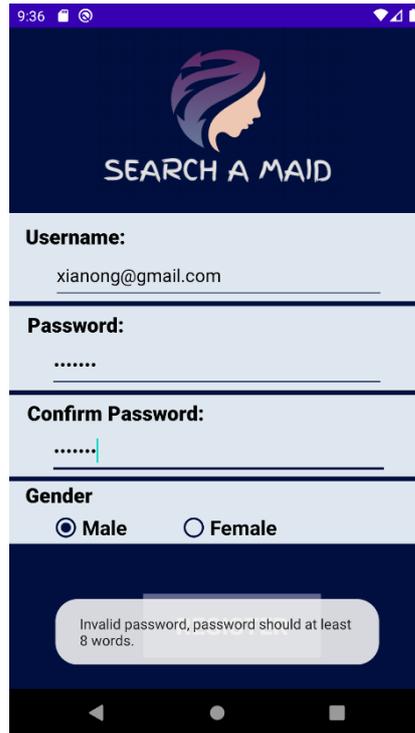
Confirm Password:
.....

Gender
 Male Female

REGISTER
Password Not Match

This screenshot shows the registration form with the username 'xianong@gmail.com' and a password entered in both the Password and Confirm Password fields. A 'Password Not Match' error message is displayed below the 'REGISTER' button.

Figure 0.10 *Username and Password not match*



9:36

SEARCH A MAID

Username:
xianong@gmail.com

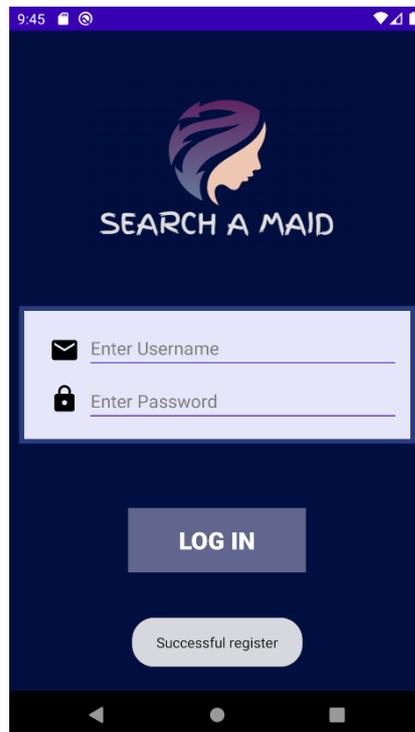
Password:
.....

Confirm Password:
.....

Gender
 Male Female

Invalid password, password should at least 8 words.

Figure 0.11 *Password less than 8 words*



9:45

SEARCH A MAID

✉ Enter Username

🔒 Enter Password

LOG IN

Successful register

Figure 0.12 *Navigate to Login Activity*

```

public boolean isValidPassword(final String password) {
    Pattern pattern;
    Matcher matcher;
    final String PASSWORD_PATTERN = "(?=.*[0-9])(?=.*[A-Z])(?=.*[@#%&+!])(?=\\S+$).{4,}$";
    pattern = Pattern.compile(PASSWORD_PATTERN);
    matcher = pattern.matcher(password);

    return matcher.matches();
}

if (cont) {
    if (username.getText().toString().isEmpty() ||
        userpwd.getText().toString().isEmpty() ||
        ((String) genderBtnClick.getText()).isEmpty()) {

        if (username.getText().toString().isEmpty()){
            TextView name = findViewById(R.id.textView15);
            name.setVisibility(View.VISIBLE);
        }

        if (userpwd.getText().toString().isEmpty()){
            TextView pw = findViewById(R.id.textView16);
            pw.setVisibility(View.VISIBLE);
        }

        if (userpwdC.getText().toString().isEmpty()){
            TextView pw = findViewById(R.id.textView18);
            pw.setVisibility(View.VISIBLE);
        }

        Toast.makeText(context, this, "Invalid input", Toast.LENGTH_LONG).show();
    } else if (userpwd.getText().toString().length() < 8 && !isValidPassword(userpwd.getText().toString().toString())) {
        Toast.makeText(context, this, "Invalid password, password should at least 8 words.", Toast.LENGTH_LONG).show();
    }
    else if(!userpwd.getText().toString().equals(userpwdC.getText().toString())){
        Toast.makeText(context, this, "Password Not Match", Toast.LENGTH_LONG).show();
    }
}

```

Figure 0.13 Code snippet for checking information entered by the users is valid

6.1.4 Home Page Activity

This is the homepage of the application. The users have four choices to select the function of the application. First, the users are allowing to search maid (section 6.2.5), view bookmark list (section 6.2.6), set reminder (section 6.2.7), and view profile (section 6.2.8).

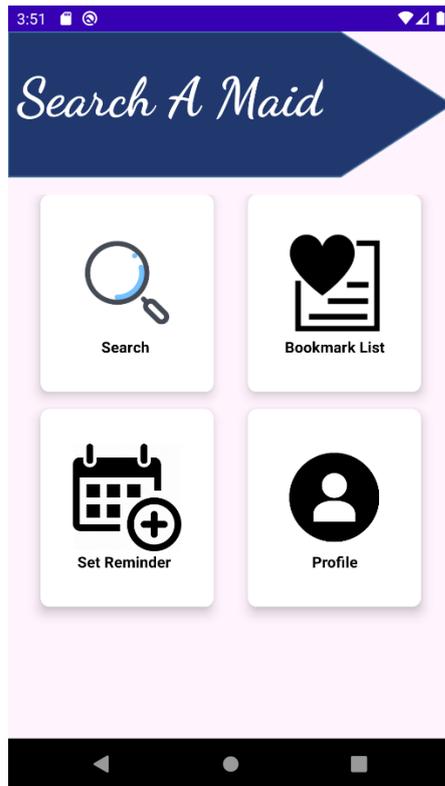


Figure 0.14 *Homepage Activity*

6.1.5 View Maid Activity

This feature allows the users to view the list of maids with some information which is image, name, age, and nationality (Figure 6.15). Besides that, the users allow searching maids through setting the preferences (section 6.2.5.1). Moreover, the users can view the detail information of a maid by clicking on the card view of the maid (section 6.2.5.2). At the point when the users are in the show activity, the users can bookmark the maid if they preferred on he/she (section 6.2.5.3).



Figure 0.15 View maid activity

6.1.5.1 Search Activity

To perform this searching function, the users are allowing to set the preferences such as age, gender, height, weight, marital status, nationality, religion, education, language spoken, type of maid, cooking experience, caretaking experience and previous workplace (Figure 6.16). After the users selecting their preferences, the application will navigate view page with the search output (Figure 6.17). If the users press on the "Reset" button, all the dropdown selection will set to the original value, which implies no preferences on it.

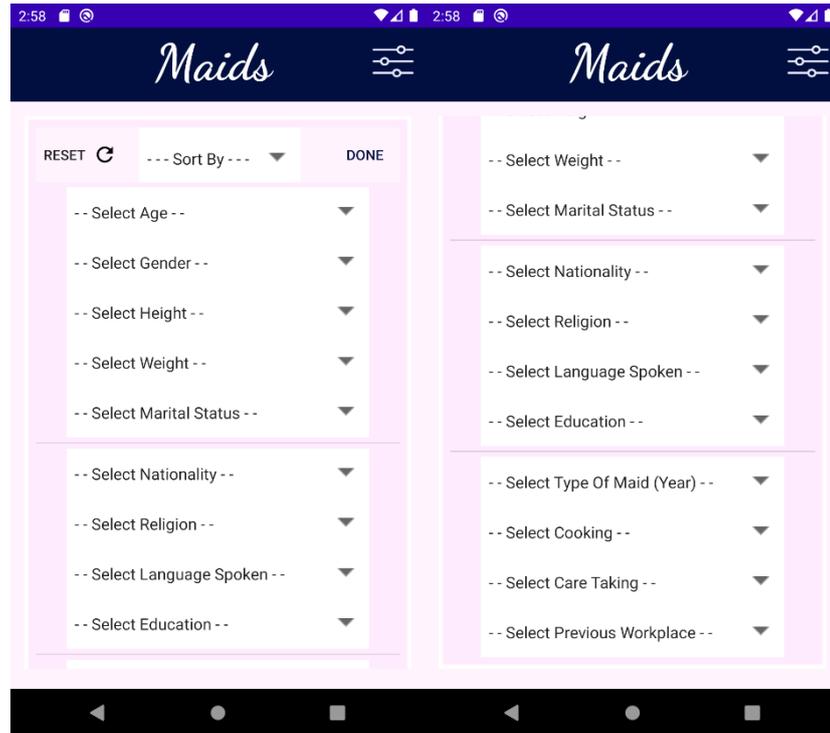


Figure 0.16 Set Preferences Activity



Figure 0.17 Search Result

6.1.5.2 Show Activity

When the users press on the card view of a maid, the application will navigate users to the show activity. This activity will show the detail information of the maid (Figure 6.18). There are three buttons adjacent to the image of the maid which are bookmark icon (section 6.2.5.3), send reservation icon, and view preference icon. Figure 6.19 shows when the users press on the reservation icon which will show a message that stated “Successful send reservation” while figure 6.20 shows the preferences that set by the users.

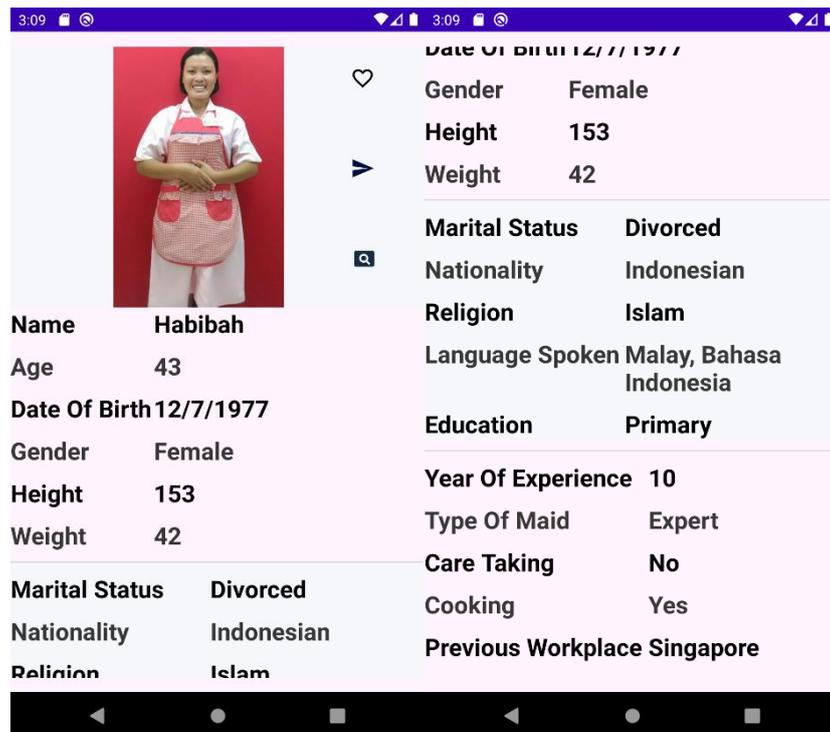


Figure 0.18 *Show Maid Information*

Figure 0.19 *Send Reservation*Figure 0.20 *View user preferences*

6.1.5.3 Bookmark

This feature provides users with the ability to save the maid as a favourite. On the maid showing page, the users can add the maid as a favourite by pressing the "favourite" icon at the top right of the page.

When the users want to consider the maid from the page, they can click the icon to save the maid or remove it from the bookmark list. At that point, after the user completes the action, the application will update the list of favourites in the database. A message with "Successful Added" will be displayed, and the icon will change to the colour-filled icon. When clicking the icon again, the application will remove this maid from the database.



Figure 0.21 Add Bookmark

6.1.6 View Bookmark Activity

This feature allows users to view and delete their favourite maids. The view bookmark activity allows users to save time without having to consistently look through the view activity to find the preferred maid in their selection list. The application will display the list of maids by retrieving from the database. Figure 6.22 shows the bookmark page of the application.

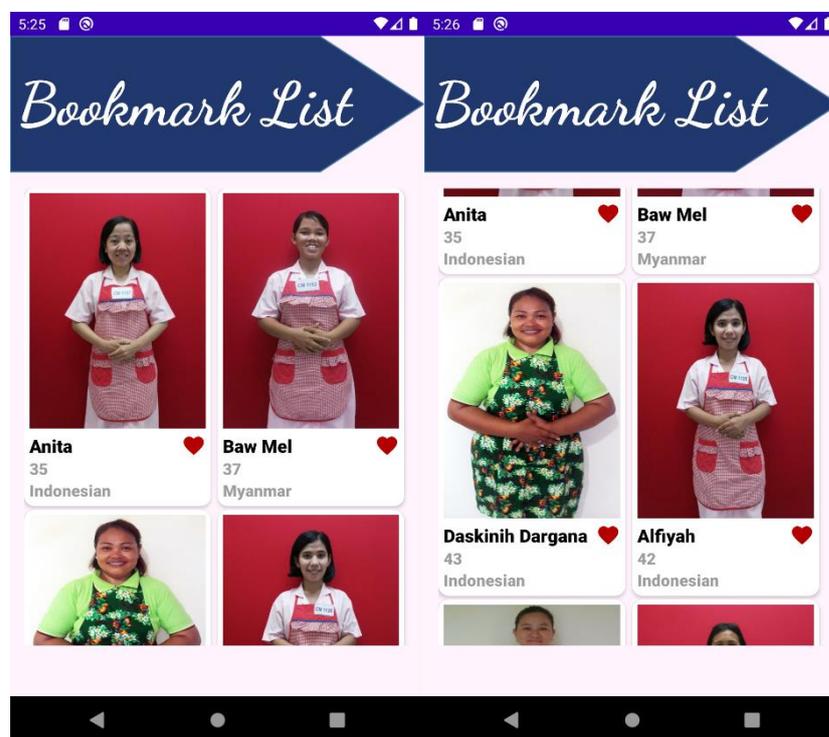


Figure 0.22 View Bookmark List

At the point when the users want to delete the maid from the bookmark list, the users click the "Favourites" icon and a message with "Successfully deleted" will be displayed. Then, the page remains in the view maid information activity with a black border "favourite" icon (Figure 6.24). When the users click the back button, the application will take the user back to the view bookmark page they are viewing.

```
private void removeBookmark(Bookmark u) {
    databaseBookmark.child(u.getId()).removeValue();
    Toast.makeText(context: this, text: "Successful Removed", Toast.LENGTH_LONG).show();
    Demo_button.setImageResource(R.drawable.ic_favorite_border_black_24dp);
    finish();
    startActivity(getIntent());
}
```

Figure 0.23 Code snippet for removing a bookmark

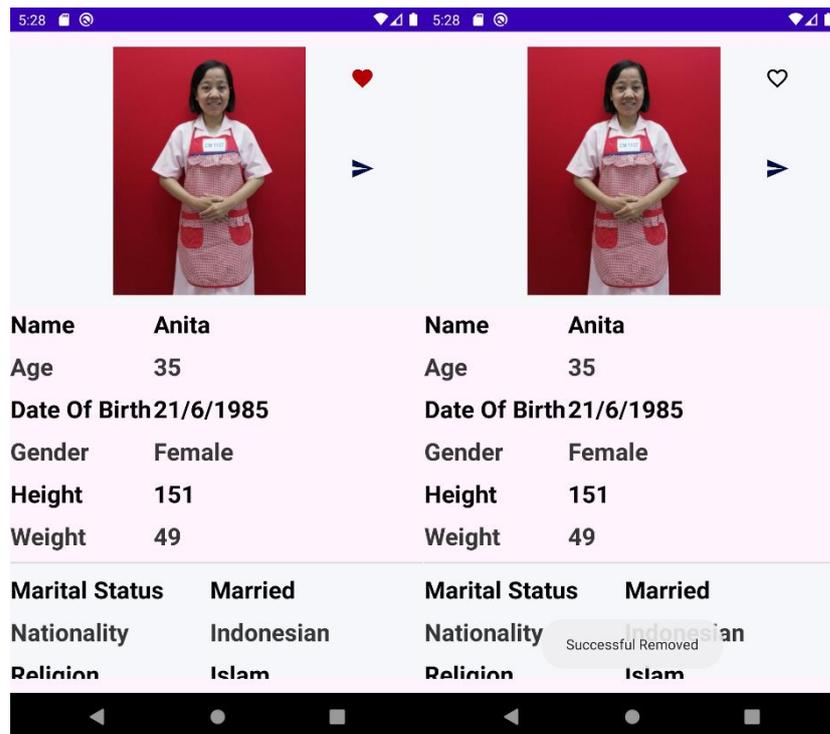


Figure 0.24 Remove Bookmark

6.1.7 Reminder Activity

This function allows the users who want to utilize the application to set a reminder. The reminders that have been created by the users will retrieve from the database. Figure 6.25 shows the reminder page of the application.

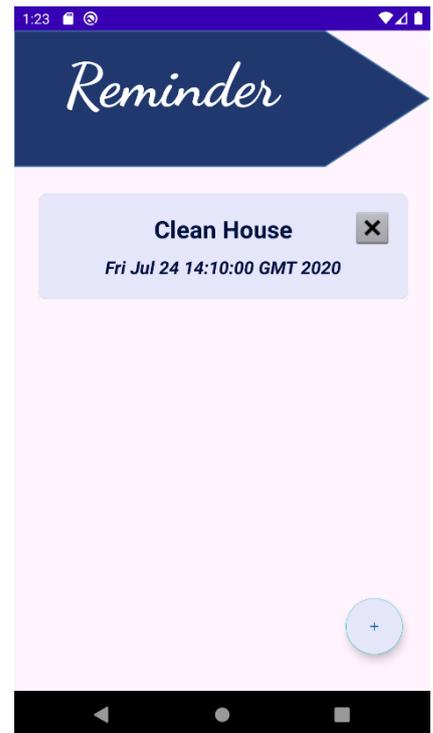


Figure 0.25 *Reminder Page*

6.1.7.1 Remove Reminder Activity

The users allow removing reminder by pressing the “x” button. When the “x” button is pressed, the application will straightforwardly remove the reminder from the user list without any alert.

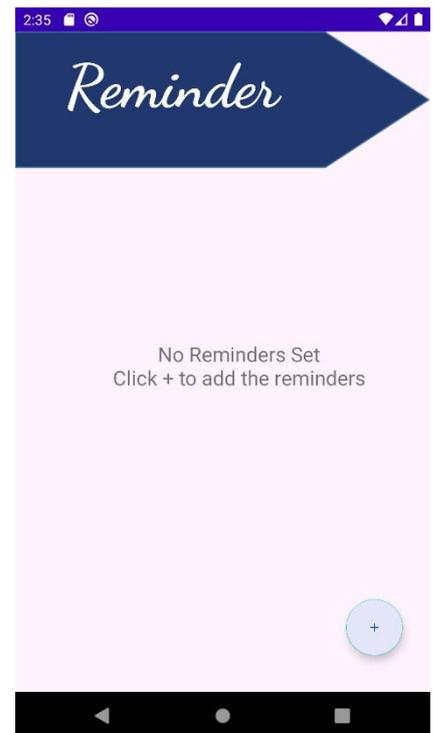


Figure 0.26 *Remove Reminder*

6.1.7.2 Set Reminder Activity

The users allow setting reminders by pressing the “+” floating button. When the button is pressed, the users are brief to select the date and time and enter the title of this remember. After the users pressing on “Add” button, the application will save the information to the database and redirect to the reminder page.

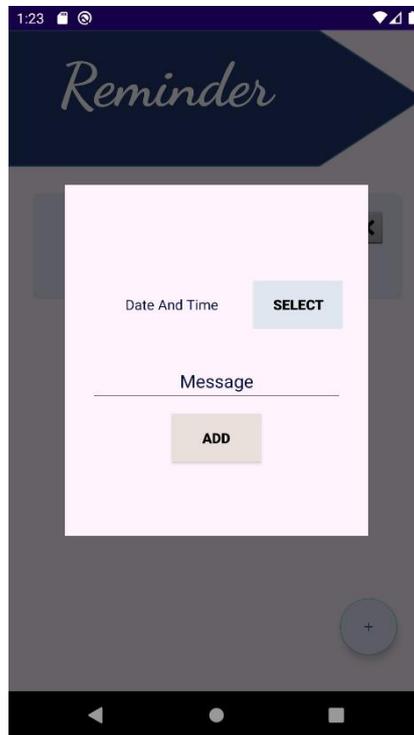


Figure 0.27 Add Reminder

6.1.8 Profile Activity

The application will have a settings section for users to view, edit their profile and change their password. In the next section, how users edit their personal data will be discussed. The users are only allowed to logout through this page.

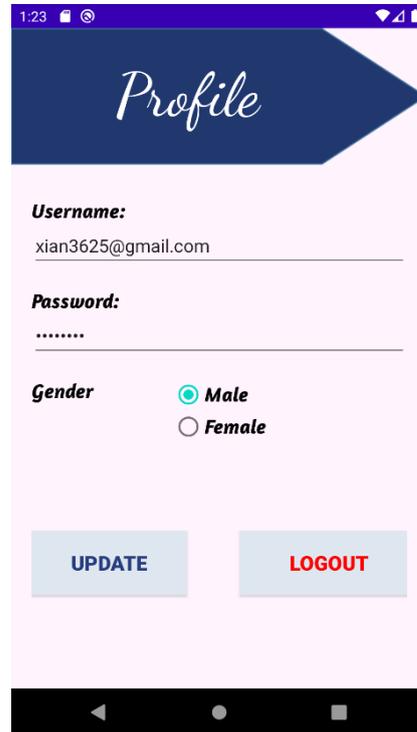


Figure 0.28 Profile Activity

6.2.8.1 Edit Personal Information Activity

To modify the personal information, the users are required to click the "Update" button, and the application will pop up a window to edit the user name and password (Figure 6.29). If the users press the "Cancel" button, the application will return to the original page. On the off chance that the users left blank to the username or password column, the users will be prompted with an error message which is "Invalid Input" (Figure 6.30). The users are required to fill in the username and password columns. After the user clicks the "Done" button, the pop-up window is dismissed. Then, the profile page will refresh and show the modified personal information (Figure 6.31).

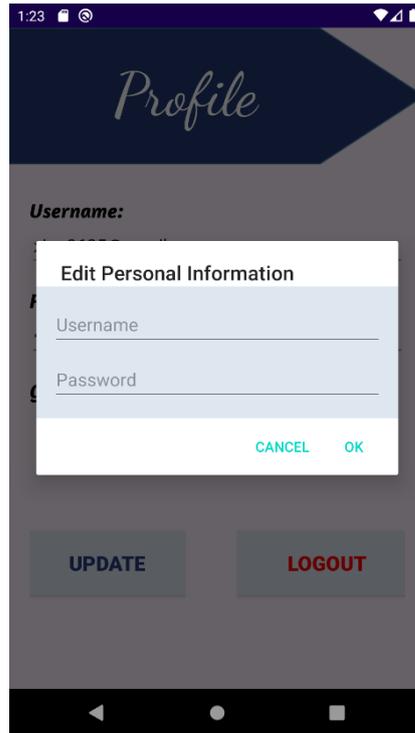


Figure 0.29 *Edit personal information*

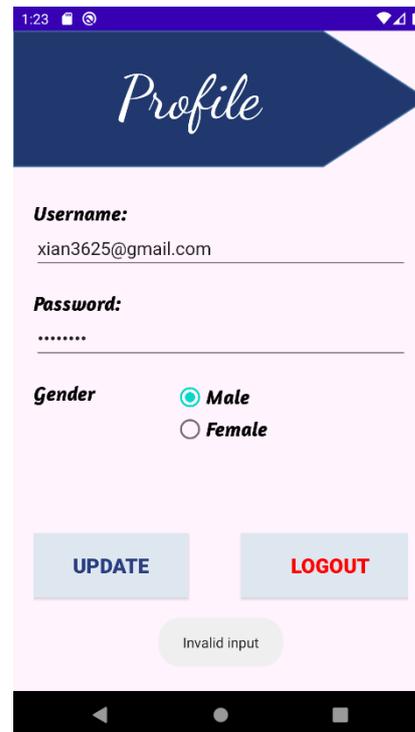


Figure 0.30 *Invalid username and password*

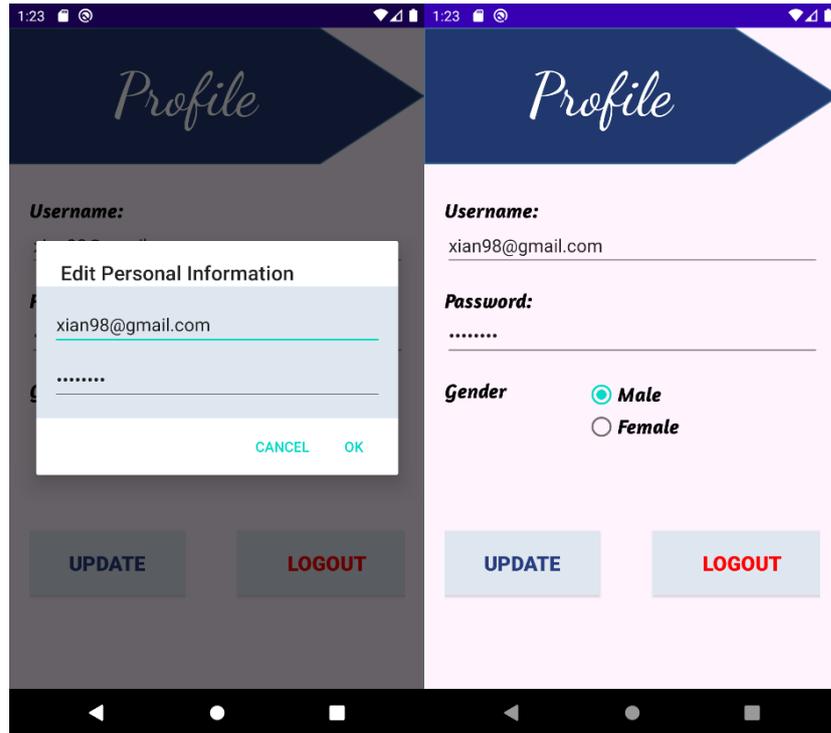


Figure 0.31 *Enter valid information*

6.2.8.2 Logout Activity

Lastly, when the users click on the “Logout” button, the users will be asked to affirm their activity (Figure 6.33). If the users press on “No” button, it will back to the profile page, else the application will redirect the users to the main activity.

```
logoutBtn.setOnClickListener((view) -> {

    AlertDialog.Builder builder = new AlertDialog.Builder( context: ProfileActivity.this);
    final View sureAlert = getLayoutInflater().inflate(R.layout.activity_sure_alert, root: null);
    builder.setView(sureAlert);
    final AlertDialog dialog = builder.create();
    dialog.show();

    yesBtn = sureAlert.findViewById(R.id.yesBtn);
    noBtn = sureAlert.findViewById(R.id.noBtn);

    yesBtn.setOnClickListener((view) -> {
        Intent i = new Intent( packageContext: ProfileActivity.this, MainActivity.class);
        startActivity(i);
    });

    noBtn.setOnClickListener((view) -> { dialog.dismiss(); });
});
```

Figure 0.32 Code snippet for logout activity

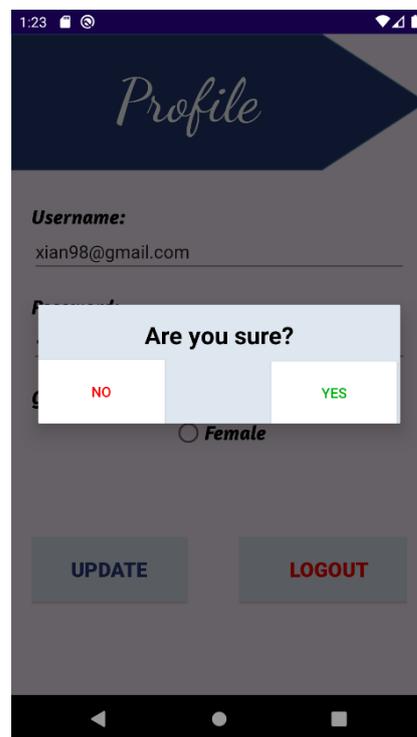


Figure 0.33 Alert Confirm Logout

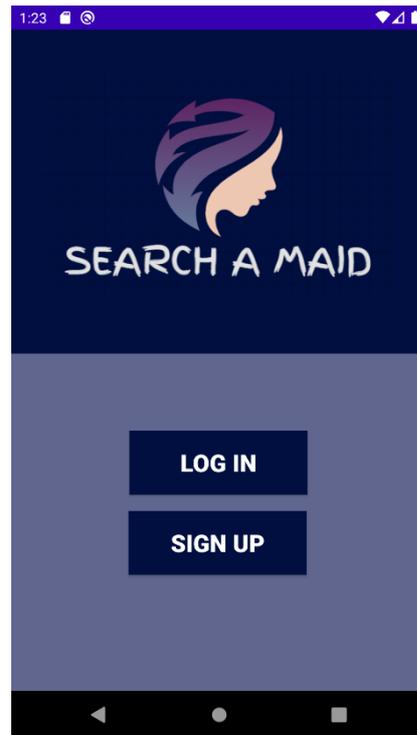


Figure 0.34 *Back to main activity*

CHAPTER 7

System Testing

7.0 Introduction

In this chapter, to ensure that the mobile application meets the scope of all requirements, this application will perform five different types of tests, such as unit testing, integration testing, system testing, user acceptance testing (UAT) and usability testing. The aim of testing is to seek out as several errors as doable to enhance product quality and fix the errors found. During this project, the testing method is performed by developers and the end users.

7.1 Testing Objective

There are several objectives that must be achieved after the completion of the testing phase, such as:

- Ensure that users can log in with registered information.
- Ensure that users can search for ideal maid using set preferences.
- Ensure that users can add maids as favourites or remove maids from favourites.
- Ensure that users can view their favourite maids.
- Ensure that users can set and delete reminders.
- Ensure that users can edit their personal information.

7.2 Testing Type

Table 22 *Type of testing*

Unit Testing	During the development phase, unit testing will be performed to ensure that defects are found and resolved. Unit tests are performed by testing individual program units or methods to ensure that they operate as expected.
Integration Testing	Pearson (2015) pointed out that integration testing is to logically combine all modules and perform overall testing to test whether there are any errors between functions. This test aims to expose defects in interfaces and data communication between the integrated components.
System Testing	The system test is completed after the integration test is completed. System testing is used to verify complete and fully integrated software products, and to evaluate whether the system meets all specified requirements by testing the entire application (Guru99, 2019).
User Acceptance Testing	User acceptance testing (UAT) will allow users to verify that the application is satisfactory. UAT is also known as Beta testing, which is used to test the use of the software by the target audience, and to record and correct any defects found. It allows users to interact with the software and determine whether everything is working as expected (Setter, 2015).
Usability Testing	Usability testing refers to the evaluation of products or services by testing with representative users to determine participants' satisfaction with the product. Participants are requested to complete typical tasks while researchers are observing them. The goal is to identify any usability issues that are experiencing problems and are confused. If more people encounter similar problems, suggestions will be made to overcome these usability problems (Usability.gov, 2020).

7.3 Test Cases and Results

7.3.1 Unit Testing

In the unit testing, the system is assigned to different units and tested to ensure that each unit can function normally. At this stage, 17 unit test cases were tested.

Table 23 *Login Authentication (Unit Testing)*

Test Case ID	001	Test Case Name	Login authentication
Designed by	Ong Shu Xian	Design Date	15-7-2020
Executed by	Ong Shu Xian	Execution Date	22-7-2020
Pre-Conditions			
User should have a registered username and password to login the application.			
Test Case description	Procedure	Expected results	Actual result
Enter the both registered email address and password	1. Enter valid username.	Login successful and redirect to the homepage.	Login successful and redirect to the homepage.
	2. Enter valid password.		
	3. Click "Login" button.		
Enter the both unregistered email address and password	1. Enter invalid username.	Login failed and remain at login page. Error message with "Wrong Username and Password" will be displayed.	Login failed and error message is showed.
	2. Enter invalid password.		
	3. Click "Login" button.		
Enter the unregistered email address and registered password	4. Enter invalid username.	Login failed and remain at login page. Error message with "Wrong Username and Password" will be displayed.	Login failed and error message is showed.
	5. Enter valid password.		
	6. Click "Login" button.		
			Status
			Pass
			Pass
			Pass

Enter the registered email address and unregistered password	7. Enter valid username.	Login failed and remain at login page. Error message with “Wrong Username and Password” will be displayed.	Login failed and error message is showed.	Pass
	8. Enter invalid password.			
	9. Click “Login” button.			
Username or password column is empty.	1. Do not enter any value in username column or password column or both.	Login failed and warning message with “Please fill in this field” on each unfilled column.	Login failed and error message is showed.	Pass
	2. Click “Login” button.			

Table 24 Register Activity (Unit Testing)

Test Case ID	002	Test Case Name	Register Activity	
Designed by	Ong Shu Xian	Design Date	15-7-2020	
Executed by	Ong Shu Xian	Execution Date	22-7-2020	
Pre-Conditions				
<ul style="list-style-type: none"> No conditions. 				
Test Case description	Procedure	Expected results	Actual result	Status
Enter unregistered username, password and password confirmation match.	1. Enter an unregistered username	Register Successful and navigate to login page.	Register Successful and navigate to login page.	Pass
	2. Enter password.			
	3. Enter password confirmation.			
	4. Select gender			

	5. Click “Register” button.			
Enter registered username	1. Enter registered username	Failed to register. An error message with “Username Taken” is displayed.	Register failed and error message is showed.	Pass
	2. Enter password.			
	3. Enter password confirmation.			
	4. Select gender			
	5. Click “Register” button.			
Username, password or confirm password column is empty.	1. Do not enter any value in username column, password, confirm password column or all of the column.	Register failed and warning message with “Please fill in this field” on each unfilled column.	Register failed and error message is showed.	Pass
	2. Click “Register” button.			
Enter different password in password and confirm password column.	1. Enter an unregistered username	Register failed and error message with “Password not match” is displayed.	Register failed and error message is showed.	Pass
	2. Enter password.			
	3. Enter different value for password confirmation.			
	4. Select gender			
	5. Click “Register” button.			

Enter password that not more than eight words.	1. Enter an unregistered username	Register failed and error message with “Password not more than 8 words” is displayed	Register failed and error message is showed.	Pass
	2. Enter password not more than 8 words.			
	3. Enter different value for password confirmation.			
	4. Select gender			
	5. Click “Register” button.			

Table 25 Homepage Activity (Unit Testing)

Test Case ID	003	Test Case Name	Homepage activity	
Designed by	Ong Shu Xian	Design Date	15-7-2020	
Executed by	Ong Shu Xian	Execution Date	22-7-2020	
Pre-Conditions				
User needs to log in to use the application.				
Test Case description	Procedure	Expected results	Actual result	Status
Navigate to Search Maid Page.	1. Click “Search” Icon	Redirect to search maid page.	Redirect to search maid page.	Pass
Navigate to Favourite Page.	2. Click “Favourite List” Icon	Redirect to favourite page.	Redirect to favourite page.	Pass

Navigate to Reminder Page.	3. Click “Reminder” Icon	Redirect to reminder page.	Redirect to reminder page.	Pass
Navigate to ProfilePage.	4. Click “Profile” Icon	Redirect to profile page.	Redirect to profile page.	Pass

Table 26 View Maid (Unit Testing)

Test Case ID	004	Test Case Name	View Maid.	
Designed by	Ong Shu Xian	Design Date	15-7-2020	
Executed by	Ong Shu Xian	Execution Date	22-7-2020	
Pre-Conditions				
User needs to log in to use the application.				
Test Case description	Procedure	Expected results	Actual result	Status
Retrieve maid list from database and display.	1. When click on “Search” maid button on the homepage.	Maid list will be displayed.	Maid list is displayed.	Pass

Table 27 Search Maid (Unit Testing)

Test Case ID	005	Test Case Name	Search Maid.	
Designed by	Ong Shu Xian	Design Date	15-7-2020	
Executed by	Ong Shu Xian	Execution Date	22-7-2020	
Pre-Conditions				
User needs to log in to use the application.				
Test Case description	Procedure	Expected results	Actual result	Status
Search maid by setting preferences.	1. Click on “Set preferences” icon.	Search result will be displayed at the view maid list page.	Search result is displayed at the view maid list page.	Pass
	2. Select preferred characteristics.			
	3. Click “Done” button.			

Table 28 View Maid Information (Unit Testing)

Test Case ID	006	Test Case Name	View maid information.	
Designed by	Ong Shu Xian	Design Date	15-7-2020	
Executed by	Ong Shu Xian	Execution Date	22-7-2020	
Pre-Conditions				
User needs to log in to use the application.				
Test Case description	Procedure	Expected results	Actual result	Status
View maid information.	1. Click on the card view of the maid.	Redirect to view detail information of maid in show page.	Redirect to view detail information of maid in show page.	Pass

Table 29 *Send Reservation for maid (Unit Testing)*

Test Case ID	007	Test Case Name	Send Reservation for maid.	
Designed by	Ong Shu Xian	Design Date	15-7-2020	
Executed by	Ong Shu Xian	Execution Date	22-7-2020	
Pre-Conditions				
User needs to log in to use the application.				
Test Case description	Procedure	Expected results	Actual result	Status
Send reservation	1. Click “Send” icon beside the image.	A message with “Successful sent reservation” will be displayed.	Message is displayed.	Pass

Table 30 *View Preferences (Unit Testing)*

Test Case ID	008	Test Case Name	View preferences.	
Designed by	Ong Shu Xian	Design Date	15-7-2020	
Executed by	Ong Shu Xian	Execution Date	22-7-2020	
Pre-Conditions				
User needs to log in to use the application.				
Test Case description	Procedure	Expected results	Actual result	Status
View preference	1. Click “View” icon beside the image.	A pop up window with the user’s preferences will be showed.	A pop up window with the user’s preferences is showed.	Pass

Table 31 Add favourite maid (Unit Testing)

Test Case ID	009	Test Case Name	Add favourite maid	
Designed by	Ong Shu Xian	Design Date	15-7-2020	
Executed by	Ong Shu Xian	Execution Date	22-7-2020	
Pre-Conditions				
User needs to log in to use the application.				
Test Case description	Procedure	Expected results	Actual result	Status
Add maids to favourite list.	1. Click black border “Favourite” icon beside the image of maid on the show page.	The icon will change to red-color filled favourite icon and a message with “Successful Added” will be displayed.	The icon changed to red-color filled favourite icon and a message with “Successful Added” is displayed.	Pass

Table 32 Remove favourite maid (Unit Testing)

Test Case ID	010	Test Case Name	Remove favourite maid	
Designed by	Ong Shu Xian	Design Date	15-7-2020	
Executed by	Ong Shu Xian	Execution Date	22-7-2020	
Pre-Conditions				
User needs to log in to use the application.				
User should have at least one favourite maid.				
Test Case description	Procedure	Expected results	Actual result	Status
Remove maids from the favourite list.	1. Click red-color filled “Favourite” icon beside the image of	The icon will change to black border favourite icon and a message with “Successful	The icon changed to black border favourite icon and a message with “Successful	Pass

	maid on the show page.	Remove” will be displayed.	Remove” is displayed.	
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Table 33 *View Favourite List*

Test Case ID	011	Test Case Name	View Favourite List	
Designed by	Ong Shu Xian	Design Date	15-7-2020	
Executed by	Ong Shu Xian	Execution Date	22-7-2020	
Pre-Conditions				
User needs to log in to use the application.				
Test Case description	Procedure	Expected results	Actual result	Status
Retrieve favourite maid list from database and display.	1. When click on “Favourite list” button on the homepage.	Favourite maid list will be displayed.	Favourite maid list is displayed.	Pass

Table 34 *View Reminder (Unit Testing)*

Test Case ID	012	Test Case Name	View Reminder	
Designed by	Ong Shu Xian	Design Date	15-7-2020	
Executed by	Ong Shu Xian	Execution Date	22-7-2020	
Pre-Conditions				
User needs to log in to use the application.				
Test Case description	Procedure	Expected results	Actual result	Status
Retrieve reminder list from database and display.	1. When click on “Reminder” button on the homepage.	Reminder list will be displayed.	Reminder list is displayed.	Pass

Table 35 Add Reminder (Unit Testing)

Test Case ID	013	Test Case Name	Add reminder	
Designed by	Ong Shu Xian	Design Date	15-7-2020	
Executed by	Ong Shu Xian	Execution Date	22-7-2020	
Pre-Conditions				
User needs to log in to use the application.				
Test Case description	Procedure	Expected results	Actual result	Status
Add reminder	1. Click “+” floating button.	The reminder is saved to database.	The reminder is saved to database.	Pass
	2. Select date and time.			
	3. Insert title of the reminder.			
	4. Click “Add” button.			

Table 36 Remove reminder (Unit Testing)

Test Case ID	014	Test Case Name	Remove reminder	
Designed by	Ong Shu Xian	Design Date	15-7-2020	
Executed by	Ong Shu Xian	Execution Date	22-7-2020	
Pre-Conditions				
User needs to log in to use the application.				
User should have at least one reminder in database.				
Test Case description	Procedure	Expected results	Actual result	Status
Remove reminder	1. Click “x” button on the card view of the reminder.	The reminder is delete from the database. The reminder page is will be refresh.	The reminder is delete from the database. The reminder page is will be refresh.	Pass

Table 37 Profile Activity (Unit Testing)

Test Case ID	015	Test Case Name	Profile Activity	
Designed by	Ong Shu Xian	Design Date	15-7-2020	
Executed by	Ong Shu Xian	Execution Date	22-7-2020	
Pre-Conditions				
User needs to log in to use the application.				
Test Case description	Procedure	Expected results	Actual result	Status
Retrieve user information from database and display.	1. When click on “Profile” button on the homepage.	User’s information will be displayed.	User’s information is displayed.	Pass

Table 38 *Edit Personal Information (Unit Testing)*

Test Case ID	016	Test Case Name	Edit Personal Information	
Designed by	Ong Shu Xian	Design Date	15-7-2020	
Executed by	Ong Shu Xian	Execution Date	22-7-2020	
Pre-Conditions				
User needs to log in to use the application.				
Test Case description	Procedure	Expected results	Actual result	Status
Update user's username and password.	1. Click "Update" button.	Personal information will successfully modified.	Personal information is successfully modified.	Pass
	2. Enter username.			
	3. Enter password.			
	4. Click "Done" button.			
Empty field on both column.	1. Click "Update" button.	Update failed. An error message with "Invalid input" will be displayed.	Update failed. An error message with "Invalid input" is displayed.	Pass
	2. Empty field on username column or password column or both.			
	3. Click "Done" button.			
Enter password that not more than eight words.	1. Click "Update" button.	Update failed and error message with "Invalid	Register failed and error message is showed.	Pass
	2. Enter password not more than 8 words.			

	3. Click “Done” button.	Password” is displayed		
Discard to edit personal information.	1. Click “Update” button.	Personal information will not be edited. Remain in profile page.	Personal information will not be edited. Remain in profile page.	Pass
	2. Click “Cancel” button.			

Table 39 Logout Activity (Unit Testing)

Test Case ID	017	Test Case Name	Logout activity	
Designed by	Ong Shu Xian	Design Date	15-7-2020	
Executed by	Ong Shu Xian	Execution Date	22-7-2020	
Pre-Conditions				
User needs to login to use the application.				
Test Case description	Procedure	Expected results	Actual result	Status
Logout application.	1. Click “Logout” button.	User logout successfully. Redirect to main page.	User logout successfully. Redirect to main page.	Pass
	2. Click “Yes” button.			
Discard to logout.	1. Click “Logout” button.	User will not be logout and remain in the profile page.	User will not logout and remain in the profile page.	Pass
	2. Click “No” button.			

7.3.2 Integration Testing

In integration testing, the units of unit test cases are integrated into multiple modules to ensure good interface communication between functions. At this stage, five test cases will be tested.

Table 40 *Register an account and login (Integration Testing)*

Test Case ID	I01		
Designed by	Ong Shu Xian	Design Date	15-7-2020
Executed by	Ong Shu Xian	Execution Date	22-7-2020
Test Case Name	Register an account and login.		
Modules involved	Login authentication Register activity		
Test Procedure	<ol style="list-style-type: none"> 1. Click “Register” button in the main page. 2. Enter username, password, confirmation password, and select gender. 3. Click “Register” button after entering the information. 4. Login the application with the registered account. 		
Expected Outputs	Login successfully and navigate to homepage of the application.		
Pass/Fail	Pass		

Table 41 *Search and view maid list (Integration Testing)*

Test Case ID	I02		
Designed by	Ong Shu Xian	Design Date	15-7-2020
Executed by	Ong Shu Xian	Execution Date	22-7-2020
Test Case Name	Search maid through view maid list and view the detail information of a maid.		
Modules involved	Homepage activity View maid Search maid View maid information Add favourite maid Send reservation for maid		

	View preferences
Test Procedure	<ol style="list-style-type: none"> 1. User clicks on “Search” maid icon on the homepage. 2. User clicks “Set preference” icon on the view page. 3. User selects preferred characteristics of maid. 4. User presses on “Done” button. 5. After search result is displayed, user presses on the maid that wish to view the detail information. 6. User clicks on the black border “favourite” icon. 7. User clicks on “sent” icon. 8. User compares preference with the information of maid by clicking on “view” icon.
Expected Outputs	<p>The search result displayed correctly.</p> <p>The maid’s detail information displayed correctly.</p> <p>The maid is saved to the database.</p>
Pass/Fail	Pass

Table 42 *View and remove favourite maid (Integration Testing)*

Test Case ID	I03		
Designed by	Ong Shu Xian	Design Date	15-7-2020
Executed by	Ong Shu Xian	Execution Date	22-7-2020
Test Case Name	View the favourite list and remove the favourite maid from database.		
Modules involved	Homepage activity View favourite list Remove favourite maid		
Test Procedure	<ol style="list-style-type: none"> 1. User clicks on “Favourite list” icon on the homepage. 2. After the favourite maid list is displayed, the user presses on the maid that wish to view the detail information. 3. User clicks on the red-color filled “favourite” icon. 		
Expected Outputs	<p>The maid list displayed correctly.</p> <p>The maid’s detail information displayed correctly.</p> <p>The favourite maid is remove from the database.</p>		
Pass/Fail	Pass		

Table 43 *View, add, and remove reminder (Integration Testing)*

Test Case ID	I04		
Designed by	Ong Shu Xian	Design Date	15-7-2020
Executed by	Ong Shu Xian	Execution Date	22-7-2020
Test Case Name	View the reminder list, add and remove reminder.		
Modules involved	Homepage activity View reminder Add reminder Remove reminder		
Test Procedure	<ol style="list-style-type: none"> 1. User clicks on “Reminder list” icon on the homepage. 2. After the reminder list is displayed, the user presses on the “x” button to remove the reminder. 3. User clicks on the “+” floating button to add reminder. 		

	<ol style="list-style-type: none"> 4. User selects date and time. 5. User enters the title of the reminder.
Expected Outputs	<p>The reminder list displayed correctly.</p> <p>The reminder removed from the database.</p> <p>A new reminder is added to the database.</p>
Pass/Fail	Pass

Table 44 *View, edit profile, and logout (Integration Testing)*

Test Case ID	I05		
Designed by	Ong Shu Xian	Design Date	15-7-2020
Executed by	Ong Shu Xian	Execution Date	22-7-2020
Test Case Name	View, edit the profile and logout the application.		
Modules involved	<p>Homepage activity</p> <p>Profile Activity</p> <p>Edit personal information</p> <p>Logout Activity</p>		
Test Procedure	<ol style="list-style-type: none"> 1. User clicks on “Profile” icon on the homepage. 2. After the profile displayed, user presses on the “Update” button to update the username and password. 3. User clicks on the “Done” button and indicate edit completely. 4. User clicks on the “Logout” button to logout the application. 5. User clicks “Yes” button. 		
Expected Outputs	<p>The profile information displayed correctly.</p> <p>The edited information updated correctly.</p> <p>User logout successfully.</p>		
Pass/Fail	Pass		

7.3.3 System Testing

In system testing, the modules that integrated during integration testing will be combined to ensure all the functions are functional. In this stage, only one test case which indicates a full process for the application.

Table 45 *Full process for application (System Testing)*

Designed by	Ong Shu Xian	Design Date	15-7-2020
Executed by	Ong Shu Xian	Execution Date	22-7-2020
Test Case Name	Full process for application		
Test Procedure	<ol style="list-style-type: none"> 1. Able to register and login. 2. Able to view and search the maids. 3. Able to set the preferences. 4. Able to view the detail information of a maid. 5. Able to bookmark the maids. 6. Able to view bookmark list. 7. Able to set a reminder and delete the reminder. 8. Able to view profile. 9. Able to edit personal information. 10. Able to logout. 		
Expected Outputs	<p>Register and login successfully.</p> <p>The search results are shown properly.</p> <p>The bookmark list successfully retrieves and deletes.</p> <p>The reminder has successfully retrieved and deleting.</p> <p>The personal information successfully edited.</p> <p>Logout successfully.</p>		
Pass/Fail	Pass		

7.3.4 User Acceptance Testing

In User Acceptance Testing (UAT), eight participants are invited to participate in the prototype design study. The purpose of this UAT test is to get feedback from participants and ensure the mobile application is ready to release. The following shows the template for UAT:

Table 46 *Template for User Acceptance Testing*

Tester			
Testing date			
Testing start time			
Testing end time			
Test module	Test Scenario	Status	Feedbacks
Register	<ol style="list-style-type: none"> 1. User clicks on “Register” button on the main page. 2. User enters the information without empty field. 3. User clicks on “Register” button. 		
Login	<ol style="list-style-type: none"> 1. User clicks on “Login” button on the main page. 2. User enters registered account. <ul style="list-style-type: none"> • Username: xian98@gmail.com • Password: xian3625 3. User clicks on “Login” button. 		
View and Search Maid	<p><u>View Maid</u></p> <ol style="list-style-type: none"> 1. User clicks on “Search” button on the homepage. 		

	<p><u>Search Maid</u></p> <ol style="list-style-type: none"> 1. User clicks on “set preferences” icon. 2. User selects their preferred characteristics of maid. 3. User clicks on “done” button. <p><u>View detail information of maid</u></p> <ol style="list-style-type: none"> 1. User presses on one of the maid. 2. User can scroll down to look the detail information of maid. <p><u>Add favourite maid</u></p> <ol style="list-style-type: none"> 1. User clicks on black border “favourite” icon. <p><u>Send reservation for maid.</u></p> <ol style="list-style-type: none"> 1. User clicks on “send” icon. <p><u>View preferences</u></p> <ol style="list-style-type: none"> 1. User click on “view” icon. 		
View Bookmark List	<p><u>View Bookmark List</u></p> <ol style="list-style-type: none"> 1. User clicks on “Bookmark list” button on the homepage. <p><u>View detail information of favourite maid</u></p> <ol style="list-style-type: none"> 1. User presses on one of the favourite maid. 		

	<p>2. User can scroll down to look the detail information of favourite maid.</p> <p><u>Remove favourite maid</u></p> <p>1. User clicks on the red-color filled “favourite” icon.</p>		
Reminder	<p><u>View Reminder</u></p> <p>1. User clicks on “Reminder” button on the homepage.</p> <p><u>Add reminder</u></p> <p>1. User clicks on “+” floating button at the lower right corner.</p> <p>2. User selects date and times.</p> <p>3. User enter title of the reminder.</p> <p>4. User clicks on “Add” button.</p> <p><u>Remove reminder</u></p> <p>1. User clicks on “x” button.</p>		
Profile	<p><u>View Profile</u></p> <p>1. User clicks on “Profile” button on the homepage.</p> <p><u>Edit Profile</u></p> <p>1. User clicks on “Update” button.</p> <p>2. User enters the information.</p>		

	<p>3. User clicks on “Done” button.</p> <p><u>Logout</u></p> <p>1. User clicks on “Logout” button.</p> <p>2. User clicks on “Yes” button.</p>		
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7.3.4.1 Result of User Acceptance Test (UAT)

Each test module was tested by eight participants. All participants passed the test. The following table shows the test results of the User Acceptance Test (UAT) performed by eight users.

Table 47 *Result of UAT*

Test Modules	Number of test conducted	Number of test passed	Feedbacks
Register	8	8	-
Login	8	8	-
View and Search Maid	8	8	-
View Bookmark List	8	8	-
Reminder	8	8	-
Profile	8	8	-

7.3.5 Usability Testing

In the usability test, participants are invited to test the application to determine their satisfaction with the application. In addition, the similarity measure of the search method will be selected based on the votes of the majority of participants. At this stage, participants are required to complete typical tasks while the researchers observe them. The following shows the template for usability testing:

Table 48 *Template for usability testing*

Participant #_____ (type: novice/ expert)					
Name:			Gender:		
Age:			Occupation:		
<i>User Satisfaction survey (adapted from System Usability Scale, Brooke, J. (1986))</i>					
	Strongly Disagree 1	2	3	4	Strongly Agree 5
1. I think that I would like to use this application for searching maids.					
2. I found the application unnecessarily complex.					
3. I thought the application was easy to use.					
4. I think that I would need the support of a technical person to be able to use this application.					
5. I found this application was easily moved through without a lot of backtracking or data re-entry.					
6. I thought there was too much inconsistency in this application.					
7. I would imagine that most people would learn to use this application very quickly.					
8. I found the application very awkward to use.					
9. I felt very confident using the application.					

10. I needed to learn a lot of things before I could get going with this application.

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1. Regarding the results of the top five/ top ten, how many of these five / ten maids are suitable for your preferences?

	TOP 5	TOP 10
Euclidean Distance		
Manhattan Distance		
Minkowski Distance		
Jaccard Coefficient		
Cosine Similarity		

2. Among the five methods, which one do you think is the best way to search for an ideal maid?

Euclidean Distance	
Manhattan Distance	
Minkowski Distance	
Jaccard Coefficient	
Cosine Similarity	

3. Does the maid information provided help you search for maids?

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
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4. What did you like the best in the application?

10	2	2	2	3	2	2	3	1	2.125
Total	35	33	33	28	32	33	31	32	32.125
SUS score	87.5	82.5	82.5	70	80	82.5	77.5	80	80.31

- The following table shows the similarity measure that users voted for when looking for more accurate results of maids.

Table 50 *Abbreviation form for similarity measure*

Euclidean Distance	Euc
Manhattan Distance	Man
Minkowski Distance	Min
Jaccard Coefficient	Jacc
Cosine Similarity	Cos

Table 51 *Result for Usability Testing*

User	Similarity Measures										Preferred Similarity Measure
	Top Five					Top Ten					
	Euc	Man	Min	Jacc	Cos	Euc	Man	Min	Jacc	Cos	
1	4	4	1	3	3	6	7	4	6	5	Manhattan
2	2	5	2	5	3	5	7	5	7	6	Jaccard
3	3	4	3	2	2	5	7	5	5	4	Manhattan
4	3	3	3	4	2	5	6	5	7	4	Jaccard
5	5	5	5	5	3	6	7	6	8	6	Jaccard
6	4	4	4	4	4	5	6	5	7	6	Jaccard
7	2	3	2	4	3	6	6	6	7	6	Jaccard
8	4	4	2	3	4	7	6	5	6	6	Euclidean

CHAPTER 8

Conclusion

8.0 Conclusion

In this project, Intelligent Mobile Maid Matching using Similarity Search was successfully developed in Android Platform. The project's objectives were achieved which are (i) to design a mobile application for searching ideal maids ,and (ii) to provide a better maid searching using a similarity measure. The method of requirement gathering is collected through the use of questionnaires, which had been answered by people from different age group. Then, the results collected by the questionnaires are analyzed and generate functional and non-functional requirements.

There are five testing methods were accomplished to ensure the application is functional, usable, user friendly, and met the project requirements. The similarity measure implemented in this application is Jaccard coefficient because majority of the participants voted for Jaccard coefficient. This is because the search results are closer to the preferences they set during the usability testing.

By using the application, the users are allowed to search maid, add reminder, and use the bookmark list function. The users can search maid by setting age, height, weight, gender, marital status, nationality, religion, language is spoken, type of maid, working experience, and previous workplace as their preferences. In addition, users can set reminders in the application to remind them of things to do.

8.1 Limitations and Recommendations

No application is perfect. Although this application has successfully met all the required requirements and goals, there are still some limitations. Some recommendations are given to resolve these limitations and for future enhancement.

First of all, this application is only available on the Android platform. This is not convenient for maid seekers who want to search for maids using IOS devices. Therefore, the application can be developed as a cross-platform application in the future.

Second, the search method of this application may not support the multiple selection. In the future, developers may propose a new similarity method that can calculate the similarity between two objects and provide multiple options for each feature.

Third, the maid seekers are unable to communicate with maids in this application. In the future, developers can create a feature that is a chat forum that allows maid seekers to interact with maids. Therefore, the maid seekers can learn more about maids as a personal attitude can be observed through chat.

Fourth, maid seekers cannot edit reminders. In the future, developers can add a feature that allows users to edit reminders so they don't need to delete and add reminders again.

Fifth, the evaluation of previous employers should be added to record the characteristics of maids. For this application, it does not include this characteristic because the information is difficult to collect. In the future, developers can collect this information and implement it in the application. Therefore, those who are looking for a maid can learn more about the workability of the maid.

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APPENDICES

Appendix 1: Questionnaire

Intelligent Mobile Maid Service Agency

Dear respondent,

I am Ong Shu Xian, a final year student of Bachelor of Science (HONS) Software Engineering at University Tunku Abdul Rahman (UTAR), Sungai Long. As partial fulfillment for the completion of my degree programme.

In order to make this study successful, your participation in this research is greatly appreciated. There is no right or wrong answers to the questionnaire as the study is on individual perceptions. This questionnaire would take a few minutes of your valuable time to complete answering all the questions.

Your personal particular will remain anonymous and will be treated as strictly confidential. The data collected is only used for the purpose of this academic research and only aggregate data will be used in my FYP report. Once again, thank you very much for your participation.

* Required

Section A: Respondent Profile

1. Name *

2. Age *

Mark only one oval.

- less than 30 years old
 31 - 40 years old
 41 - 50 years old
 more than 50 years old

3. Gender *

Mark only one oval.

- Male
 Female

Section B: Perspectives on Maid Service Mobile Application

4. Have you ever use the online maid hiring application before? (No matter online or mobile application) *

Mark only one oval.

- Yes
 No

5. If you have a chance to use it, will you use web application or mobile application? *

Mark only one oval.

- Web Application
 Mobile Application

6. If your answer is "Mobile Application", what is the factor you choose it as a platform to search for a maid? *

Mark only one oval.

- More convenient
 More user friendly
 Safer
 Save time
 Other: _____

7. Which feature do you most want to apply to the application? (Please select at most 3 features) *

Check all that apply.

- Setting more preferences when performing maid matching
 Set reminder (To remember maid's arrival date)
 Bookmark List
 View Maids list without perform matching
 Provide Guideline
 Translation tool

Other: _____

8. Which characteristics do you want to set your preference to search a maid? *

Check all that apply.

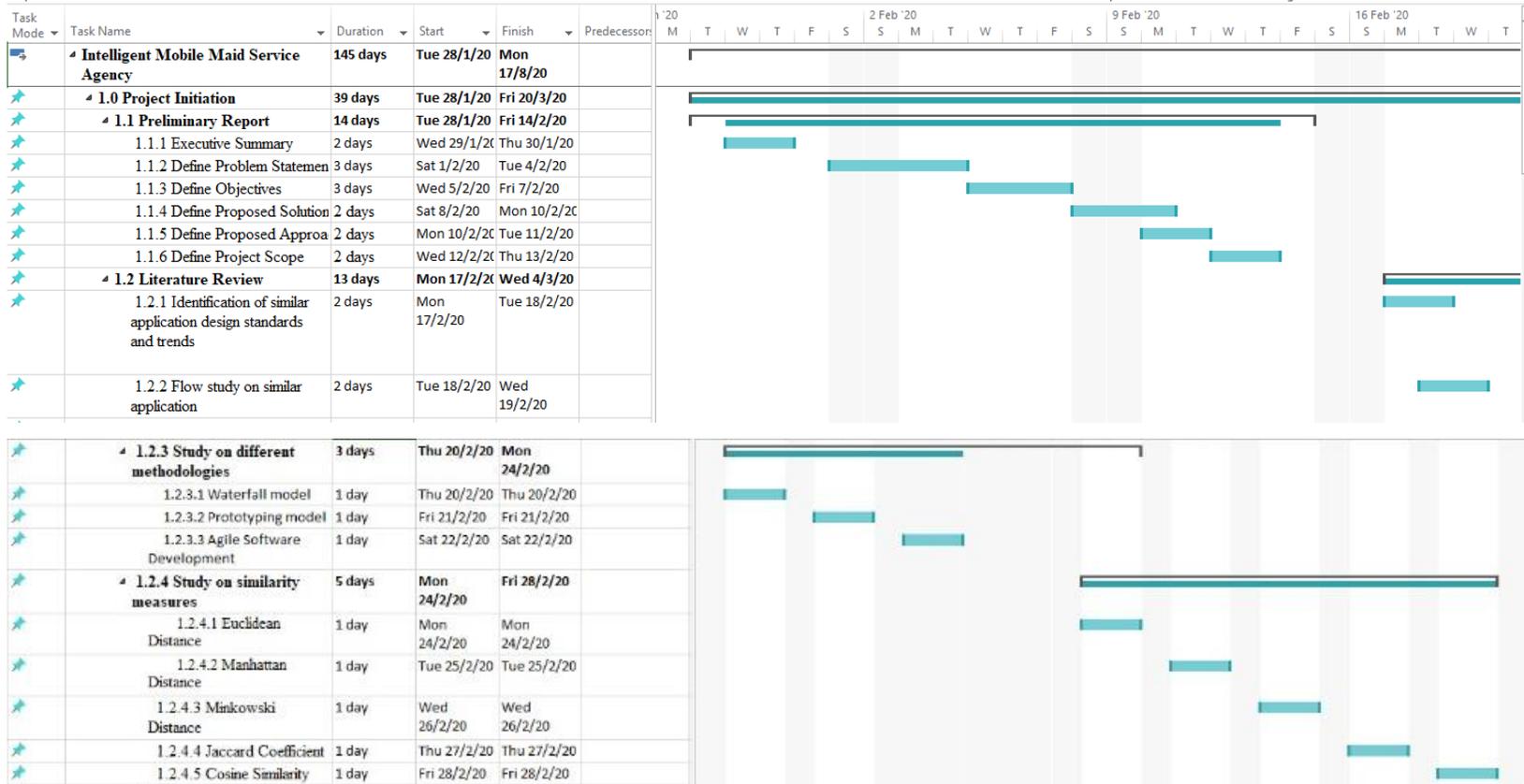
- Age
- Height & Weight
- Marital Status
- Nationality
- Religion
- Language Spoken
- Working Experience (years)
- Previous Workplace
- Education Level

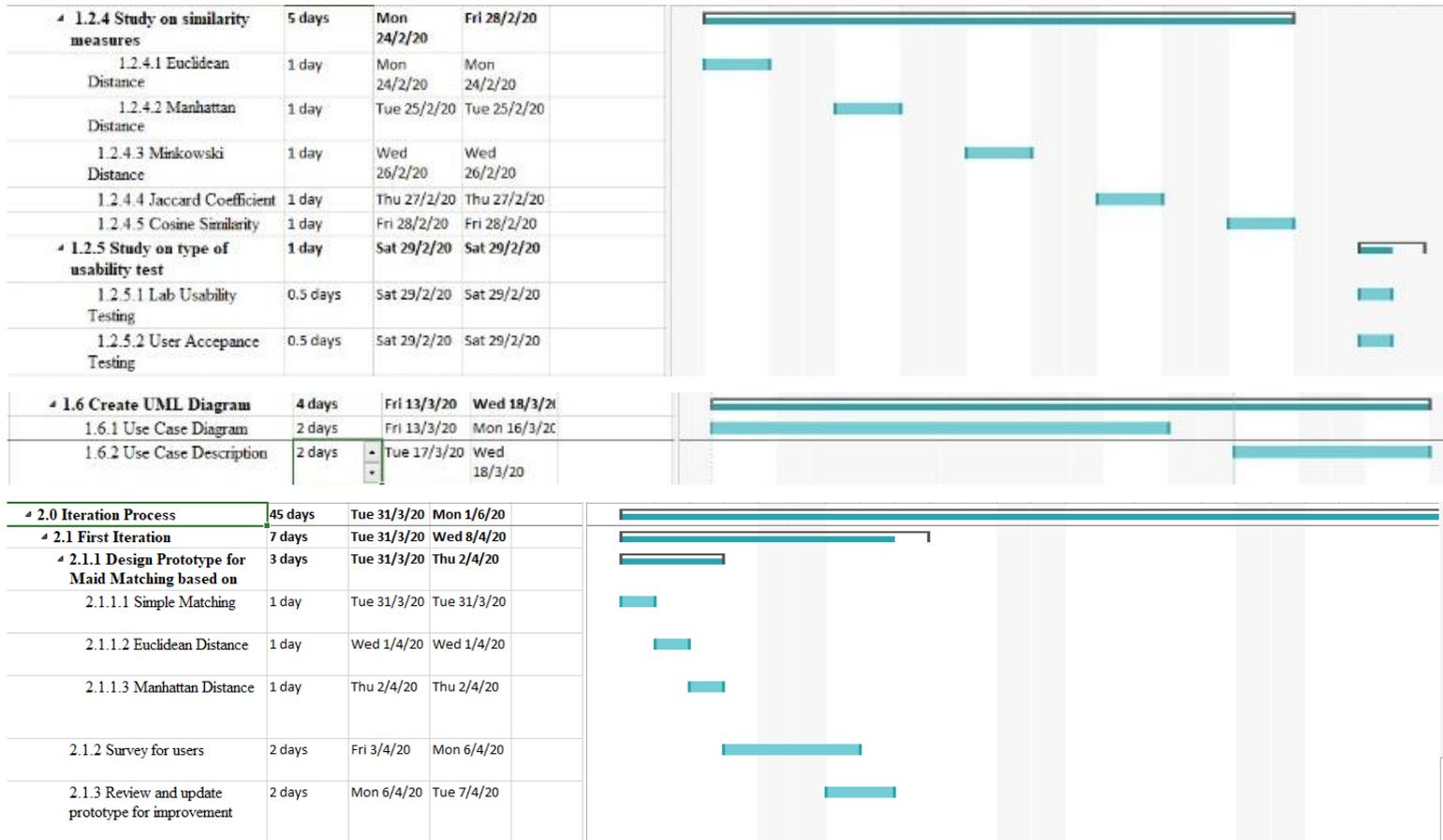
9. Is there anything else that you would like to apply on the application? *

This content is neither created nor endorsed by Google.

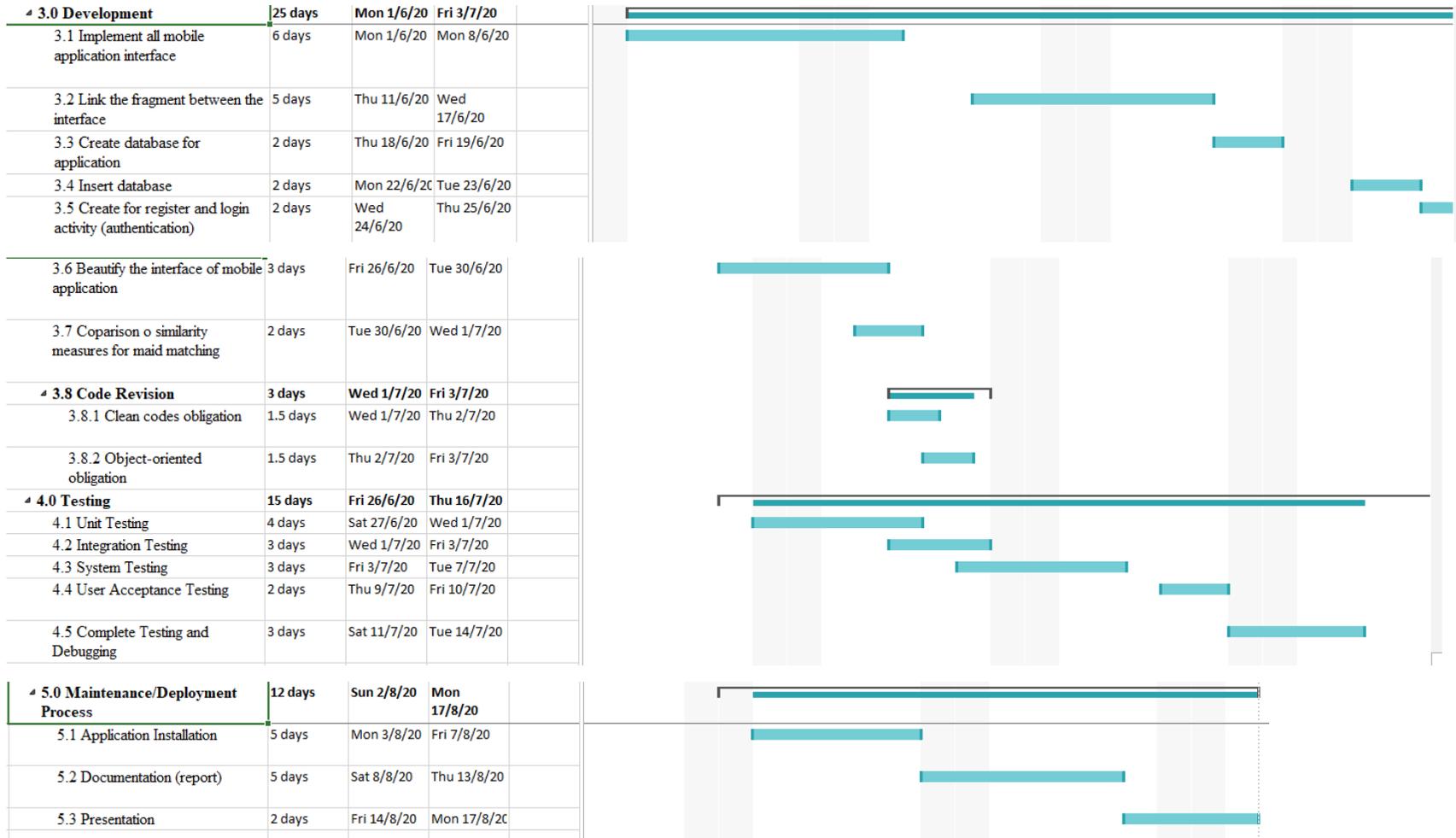
Google Forms

Appendix 2: Gantt Chart





2.2 Second Iteration	10 days	Sun 3/5/20	Thu 14/5/20		
2.2.1 Design Prototype for Maid Matching based on	3 days	Mon 4/5/20	Wed 6/5/20		
2.2.1.1 Minkowski Distance	1 day	Mon 4/5/20	Mon 4/5/20		
2.2.1.2 Jaccard Coefficient	1 day	Tue 5/5/20	Tue 5/5/20		
2.2.1.3 Cosine Similarity	1 day	Wed 6/5/20	Wed 6/5/20		
2.2.2 Design prototype for reminder feature	2 days	Tue 5/5/20	Wed 6/5/20		
2.2.3 Design prototype for bookmark feature	2 days	Thu 7/5/20	Fri 8/5/20		
2.2.4 Survey for users	2 days	Sat 9/5/20	Mon 11/5/20		
2.2.5 Review and Update prototype for improvement	2 days	Tue 12/5/20	Wed 13/5/20		
2.3 Third Iteration	10 days	Thu 14/5/20	Wed 27/5/20		
2.3.1 Design prototype for	6 days	Thu 14/5/20	Thu 21/5/20		
2.3.1.1 View Maids' list	2 days	Fri 15/5/20	Mon 18/5/20		
2.3.1.2 Login/Register	2 days	Mon 18/5/20	Tue 19/5/20		
2.3.1.3 HomePage design	2 days	Wed 20/5/20	Thu 21/5/20		
2.3.2 Survey for users	2 days	Tue 19/5/20	Wed 20/5/20		
2.3.3 Review and Update Prototype for Improvement	2 days	Thu 21/5/20	Fri 22/5/20		



Appendix 3: Result for UAT

Tester	Low Poh Yang		
Testing date	9/7/2020		
Testing start time	11.00 am		
Testing end time	11.20 am		
Test module	Test Scenario	Status	Feedbacks
Register	<ol style="list-style-type: none"> 1. User clicks on “Register” button on the main page. 2. User enters the information without empty field. 3. User clicks on “Register” button. 	Pass	
Login	<p>er clicks on “Login” button on the in page.</p> <p>er enters registered account.</p> <ul style="list-style-type: none"> • Username: xian98@gmail.com • Password: xian3625 <p>er clicks on “Login” button.</p>	Pass	
View and Search Maid	<p><u>View Maid</u></p> <ol style="list-style-type: none"> 1. User clicks on “Search” button on the homepage. <p><u>Search Maid</u></p> <ol style="list-style-type: none"> 1. User clicks on “set preferences” icon. 2. User selects their preferred characteristics of maid. 3. User clicks on “done” button. <p><u>View detail information of maid</u></p> <ol style="list-style-type: none"> 1. User presses on one of the maid. 2. User can scroll down to look the detail information of maid. <p><u>Add favourite maid</u></p>	Pass	

		<p>1. User clicks on black border “favourite” icon.</p> <p><u>Send reservation for maid.</u></p> <p>1. User clicks on “send” icon.</p> <p><u>View preferences</u></p> <p>1. User click on “view” icon.</p>		
View Bookmark List		<p><u>View Bookmark List</u></p> <p>1. User clicks on “Bookmark list” button on the homepage.</p> <p><u>View detail information of favourite maid</u></p> <p>1. User presses on one of the favourite maid.</p> <p>2. User can scroll down to look the detail information of favourite maid.</p> <p><u>Remove favourite maid</u></p> <p>1. User clicks on the red-color filled “favourite” icon.</p>	Pass	
Reminder		<p><u>View Reminder</u></p> <p>1. User clicks on “Reminder” button on the homepage.</p> <p><u>Add reminder</u></p> <p>1. User clicks on “+” floating button at the lower right corner.</p> <p>2. User selects date and times.</p> <p>3. User enter title of the reminder.</p> <p>4. User clicks on “Add” button.</p> <p><u>Remove reminder</u></p> <p>1. User clicks on “x” button.</p>	Pass	

Profile	<p><u>View Profile</u></p> <ol style="list-style-type: none">1. User clicks on “Profile” button on the homepage. <p><u>Edit Profile</u></p> <ol style="list-style-type: none">1. User clicks on “Update” button.2. User enters the information.3. User clicks on “Done” button. <p><u>Logout</u></p> <ol style="list-style-type: none">1. User clicks on “Logout” button.2. User clicks on “Yes” button.	Pass	
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Tester	Ong Chun Jye		
Testing date	12/7/2020		
Testing start time	2.15 pm		
Testing end time	2.25 pm		
Test module	Test Scenario	Status	Feedbacks
Register	<ol style="list-style-type: none"> 1. User clicks on “Register” button on the main page. 2. User enters the information without empty field. 3. User clicks on “Register” button. 	Pass	
Login	<ol style="list-style-type: none"> 1. User clicks on “Login” button on the main page. 2. User enters registered account. <ul style="list-style-type: none"> • Username: xian98@gmail.com • Password: xian3625 3. User clicks on “Login” button. 	Pass	
View and Search Maid	<p><u>View Maid</u></p> <ol style="list-style-type: none"> 1. User clicks on “Search” button on the homepage. <p><u>Search Maid</u></p> <ol style="list-style-type: none"> 1. User clicks on “set preferences” icon. 2. User selects their preferred characteristics of maid. 3. User clicks on “done” button. <p><u>View detail information of maid</u></p> <ol style="list-style-type: none"> 1. User presses on one of the maid. 	Pass	

		<p>2. User can scroll down to look the detail information of maid.</p> <p><u>Add favourite maid</u></p> <p>1. User clicks on black border “favourite” icon.</p> <p><u>Send reservation for maid.</u></p> <p>1. User clicks on “send” icon.</p> <p><u>View preferences</u></p> <p>1. User click on “view” icon.</p>		
View Bookmark List		<p><u>View Bookmark List</u></p> <p>1. User clicks on “Bookmark list” button on the homepage.</p> <p><u>View detail information of favourite maid</u></p> <p>1. User presses on one of the favourite maid.</p> <p>2. User can scroll down to look the detail information of favourite maid.</p> <p><u>Remove favourite maid</u></p> <p>1. User clicks on the red-color filled “favourite” icon.</p>	Pass	
Reminder		<p><u>View Reminder</u></p> <p>1. User clicks on “Reminder” button on the homepage.</p> <p><u>Add reminder</u></p> <p>1. User clicks on “+” floating button at the lower right corner.</p> <p>2. User selects date and times.</p> <p>3. User enter title of the reminder.</p>	Pass	

	<p>4. User clicks on “Add” button.</p> <p><u>Remove reminder</u></p> <p>1. User clicks on “x” button.</p>		
Profile	<p><u>View Profile</u></p> <p>1. User clicks on “Profile” button on the homepage.</p> <p><u>Edit Profile</u></p> <p>1. User clicks on “Update” button.</p> <p>2. User enters the information.</p> <p>3. User clicks on “Done” button.</p> <p><u>Logout</u></p> <p>1. User clicks on “Logout” button.</p> <p>2. User clicks on “Yes” button.</p>	Pass	

Tester	Ong Shu Rou		
Testing date	12/7/2020		
Testing start time	2.30 pm		
Testing end time	2.42 pm		
Test module	Test Scenario	Status	Feedbacks
Register	<ol style="list-style-type: none"> 1. User clicks on “Register” button on the main page. 2. User enters the information without empty field. 3. User clicks on “Register” button. 	Pass	
Login	<ol style="list-style-type: none"> 1. User clicks on “Login” button on the main page. 2. User enters registered account. <ul style="list-style-type: none"> • Username: xian98@gmail.com • Password: xian3625 3. User clicks on “Login” button. 	Pass	
View and Search Maid	<p><u>View Maid</u></p> <ol style="list-style-type: none"> 1. User clicks on “Search” button on the homepage. <p><u>Search Maid</u></p> <ol style="list-style-type: none"> 1. User clicks on “set preferences” icon. 2. User selects their preferred characteristics of maid. 3. User clicks on “done” button. <p><u>View detail information of maid</u></p> <ol style="list-style-type: none"> 1. User presses on one of the maid. 	Pass	

		<p>2. User can scroll down to look the detail information of maid.</p> <p><u>Add favourite maid</u></p> <p>1. User clicks on black border “favourite” icon.</p> <p><u>Send reservation for maid.</u></p> <p>1. User clicks on “send” icon.</p> <p><u>View preferences</u></p> <p>1. User click on “view” icon.</p>		
View Bookmark List		<p><u>View Bookmark List</u></p> <p>1. User clicks on “Bookmark list” button on the homepage.</p> <p><u>View detail information of favourite maid</u></p> <p>1. User presses on one of the favourite maid.</p> <p>2. User can scroll down to look the detail information of favourite maid.</p> <p><u>Remove favourite maid</u></p> <p>1. User clicks on the red-color filled “favourite” icon.</p>	Pass	
Reminder		<p><u>View Reminder</u></p> <p>1. User clicks on “Reminder” button on the homepage.</p> <p><u>Add reminder</u></p> <p>1. User clicks on “+” floating button at the lower right corner.</p> <p>2. User selects date and times.</p> <p>3. User enter title of the reminder.</p>	Pass	

	<p>4. User clicks on “Add” button.</p> <p><u>Remove reminder</u></p> <p>1. User clicks on “x” button.</p>		
Profile	<p><u>View Profile</u></p> <p>1. User clicks on “Profile” button on the homepage.</p> <p><u>Edit Profile</u></p> <p>1. User clicks on “Update” button.</p> <p>2. User enters the information.</p> <p>3. User clicks on “Done” button.</p> <p><u>Logout</u></p> <p>1. User clicks on “Logout” button.</p> <p>2. User clicks on “Yes” button.</p>	Pass	

Tester	Wong Xiao Xian		
Testing date	12/7/2020		
Testing start time	3.45 pm		
Testing end time	3.55 pm		
Test module	Test Scenario	Status	Feedbacks
Register	<ol style="list-style-type: none"> 1. User clicks on “Register” button on the main page. 2. User enters the information without empty field. 3. User clicks on “Register” button. 	Pass	
Login	<ol style="list-style-type: none"> 1. User clicks on “Login” button on the main page. 2. User enters registered account. <ul style="list-style-type: none"> • Username: xian98@gmail.com • Password: xian3625 3. User clicks on “Login” button. 	Pass	
View and Search Maid	<p><u>View Maid</u></p> <ol style="list-style-type: none"> 1. User clicks on “Search” button on the homepage. <p><u>Search Maid</u></p> <ol style="list-style-type: none"> 1. User clicks on “set preferences” icon. 2. User selects their preferred characteristics of maid. 3. User clicks on “done” button. <p><u>View detail information of maid</u></p> <ol style="list-style-type: none"> 1. User presses on one of the maid. 	Pass	

		<p>2. User can scroll down to look the detail information of maid.</p> <p><u>Add favourite maid</u></p> <p>1. User clicks on black border “favourite” icon.</p> <p><u>Send reservation for maid.</u></p> <p>1. User clicks on “send” icon.</p> <p><u>View preferences</u></p> <p>1. User click on “view” icon.</p>		
View Bookmark List		<p><u>View Bookmark List</u></p> <p>1. User clicks on “Bookmark list” button on the homepage.</p> <p><u>View detail information of favourite maid</u></p> <p>1. User presses on one of the favourite maid.</p> <p>2. User can scroll down to look the detail information of favourite maid.</p> <p><u>Remove favourite maid</u></p> <p>1. User clicks on the red-color filled “favourite” icon.</p>	Pass	
Reminder		<p><u>View Reminder</u></p> <p>1. User clicks on “Reminder” button on the homepage.</p> <p><u>Add reminder</u></p> <p>1. User clicks on “+” floating button at the lower right corner.</p> <p>2. User selects date and times.</p> <p>3. User enter title of the reminder.</p>	Pass	

	<p>4. User clicks on “Add” button.</p> <p><u>Remove reminder</u></p> <p>1. User clicks on “x” button.</p>		
Profile	<p><u>View Profile</u></p> <p>1. User clicks on “Profile” button on the homepage.</p> <p><u>Edit Profile</u></p> <p>1. User clicks on “Update” button.</p> <p>2. User enters the information.</p> <p>3. User clicks on “Done” button.</p> <p><u>Logout</u></p> <p>1. User clicks on “Logout” button.</p> <p>2. User clicks on “Yes” button.</p>	Pass	

Tester	Low Poh Choo		
Testing date	16/7/2020		
Testing start time	1.24 pm		
Testing end time	1.39 pm		
Test module	Test Scenario	Status	Feedbacks
Register	<ol style="list-style-type: none"> 1. User clicks on “Register” button on the main page. 2. User enters the information without empty field. 3. User clicks on “Register” button. 	Pass	
Login	<ol style="list-style-type: none"> 1. User clicks on “Login” button on the main page. 2. User enters registered account. <ul style="list-style-type: none"> • Username: xian98@gmail.com • Password: xian3625 3. User clicks on “Login” button. 	Pass	
View and Search Maid	<p><u>View Maid</u></p> <ol style="list-style-type: none"> 1. User clicks on “Search” button on the homepage. <p><u>Search Maid</u></p> <ol style="list-style-type: none"> 1. User clicks on “set preferences” icon. 2. User selects their preferred characteristics of maid. 3. User clicks on “done” button. <p><u>View detail information of maid</u></p> <ol style="list-style-type: none"> 1. User presses on one of the maid. 	Pass	

		<p>2. User can scroll down to look the detail information of maid.</p> <p><u>Add favourite maid</u></p> <p>1. User clicks on black border “favourite” icon.</p> <p><u>Send reservation for maid.</u></p> <p>1. User clicks on “send” icon.</p> <p><u>View preferences</u></p> <p>1. User click on “view” icon.</p>		
View Bookmark List		<p><u>View Bookmark List</u></p> <p>1. User clicks on “Bookmark list” button on the homepage.</p> <p><u>View detail information of favourite maid</u></p> <p>1. User presses on one of the favourite maid.</p> <p>2. User can scroll down to look the detail information of favourite maid.</p> <p><u>Remove favourite maid</u></p> <p>1. User clicks on the red-color filled “favourite” icon.</p>	Pass	
Reminder		<p><u>View Reminder</u></p> <p>1. User clicks on “Reminder” button on the homepage.</p> <p><u>Add reminder</u></p> <p>1. User clicks on “+” floating button at the lower right corner.</p> <p>2. User selects date and times.</p> <p>3. User enter title of the reminder.</p>	Pass	

	<p>4. User clicks on “Add” button.</p> <p><u>Remove reminder</u></p> <p>1. User clicks on “x” button.</p>		
Profile	<p><u>View Profile</u></p> <p>1. User clicks on “Profile” button on the homepage.</p> <p><u>Edit Profile</u></p> <p>1. User clicks on “Update” button.</p> <p>2. User enters the information.</p> <p>3. User clicks on “Done” button.</p> <p><u>Logout</u></p> <p>1. User clicks on “Logout” button.</p> <p>2. User clicks on “Yes” button.</p>	Pass	

Tester	Yoo Geik Yen		
Testing date	19/7/2020		
Testing start time	6.24 pm		
Testing end time	6.38 pm		
Test module	Test Scenario	Status	Feedbacks
Register	<ol style="list-style-type: none"> 1. User clicks on “Register” button on the main page. 2. User enters the information without empty field. 3. User clicks on “Register” button. 	Pass	
Login	<ol style="list-style-type: none"> 1. User clicks on “Login” button on the main page. 2. User enters registered account. <ul style="list-style-type: none"> • Username: xian98@gmail.com • Password: xian3625 3. User clicks on “Login” button. 	Pass	
View and Search Maid	<p><u>View Maid</u></p> <ol style="list-style-type: none"> 1. User clicks on “Search” button on the homepage. <p><u>Search Maid</u></p> <ol style="list-style-type: none"> 1. User clicks on “set preferences” icon. 2. User selects their preferred characteristics of maid. 3. User clicks on “done” button. <p><u>View detail information of maid</u></p> <ol style="list-style-type: none"> 1. User presses on one of the maid. 	Pass	

		<p>2. User can scroll down to look the detail information of maid.</p> <p><u>Add favourite maid</u></p> <p>1. User clicks on black border “favourite” icon.</p> <p><u>Send reservation for maid.</u></p> <p>1. User clicks on “send” icon.</p> <p><u>View preferences</u></p> <p>1. User click on “view” icon.</p>		
View Bookmark List		<p><u>View Bookmark List</u></p> <p>1. User clicks on “Bookmark list” button on the homepage.</p> <p><u>View detail information of favourite maid</u></p> <p>1. User presses on one of the favourite maid.</p> <p>2. User can scroll down to look the detail information of favourite maid.</p> <p><u>Remove favourite maid</u></p> <p>1. User clicks on the red-color filled “favourite” icon.</p>	Pass	
Reminder		<p><u>View Reminder</u></p> <p>1. User clicks on “Reminder” button on the homepage.</p> <p><u>Add reminder</u></p> <p>1. User clicks on “+” floating button at the lower right corner.</p> <p>2. User selects date and times.</p> <p>3. User enter title of the reminder.</p>	Pass	

	<p>4. User clicks on “Add” button.</p> <p><u>Remove reminder</u></p> <p>1. User clicks on “x” button.</p>		
Profile	<p><u>View Profile</u></p> <p>1. User clicks on “Profile” button on the homepage.</p> <p><u>Edit Profile</u></p> <p>1. User clicks on “Update” button.</p> <p>2. User enters the information.</p> <p>3. User clicks on “Done” button.</p> <p><u>Logout</u></p> <p>1. User clicks on “Logout” button.</p> <p>2. User clicks on “Yes” button.</p>	Pass	

Tester	Sherwin Ooi		
Testing date	19/7/2020		
Testing start time	9.45 am		
Testing end time	9.59 am		
Test module	Test Scenario	Status	Feedbacks
Register	<ol style="list-style-type: none"> 1. User clicks on “Register” button on the main page. 2. User enters the information without empty field. 3. User clicks on “Register” button. 	Pass	
Login	<ol style="list-style-type: none"> 1. User clicks on “Login” button on the main page. 2. User enters registered account. <ul style="list-style-type: none"> • Username: xian98@gmail.com • Password: xian3625 3. User clicks on “Login” button. 	Pass	
View and Search Maid	<p><u>View Maid</u></p> <ol style="list-style-type: none"> 1. User clicks on “Search” button on the homepage. <p><u>Search Maid</u></p> <ol style="list-style-type: none"> 1. User clicks on “set preferences” icon. 2. User selects their preferred characteristics of maid. 3. User clicks on “done” button. <p><u>View detail information of maid</u></p> <ol style="list-style-type: none"> 1. User presses on one of the maid. 	Pass	

		<p>2. User can scroll down to look the detail information of maid.</p> <p><u>Add favourite maid</u></p> <p>1. User clicks on black border “favourite” icon.</p> <p><u>Send reservation for maid.</u></p> <p>1. User clicks on “send” icon.</p> <p><u>View preferences</u></p> <p>1. User click on “view” icon.</p>		
View Bookmark List		<p><u>View Bookmark List</u></p> <p>1. User clicks on “Bookmark list” button on the homepage.</p> <p><u>View detail information of favourite maid</u></p> <p>1. User presses on one of the favourite maid.</p> <p>2. User can scroll down to look the detail information of favourite maid.</p> <p><u>Remove favourite maid</u></p> <p>1. User clicks on the red-color filled “favourite” icon.</p>	Pass	
Reminder		<p><u>View Reminder</u></p> <p>1. User clicks on “Reminder” button on the homepage.</p> <p><u>Add reminder</u></p> <p>1. User clicks on “+” floating button at the lower right corner.</p> <p>2. User selects date and times.</p> <p>3. User enter title of the reminder.</p>	Pass	

	<p>4. User clicks on “Add” button.</p> <p><u>Remove reminder</u></p> <p>1. User clicks on “x” button.</p>		
Profile	<p><u>View Profile</u></p> <p>1. User clicks on “Profile” button on the homepage.</p> <p><u>Edit Profile</u></p> <p>1. User clicks on “Update” button.</p> <p>2. User enters the information.</p> <p>3. User clicks on “Done” button.</p> <p><u>Logout</u></p> <p>1. User clicks on “Logout” button.</p> <p>2. User clicks on “Yes” button.</p>	Pass	

Tester	Lily Low		
Testing date	25/7/2020		
Testing start time	2.18 pm		
Testing end time	2.30 pm		
Test module	Test Scenario	Status	Feedbacks
Register	<ol style="list-style-type: none"> 1. User clicks on “Register” button on the main page. 2. User enters the information without empty field. 3. User clicks on “Register” button. 	Pass	
Login	<ol style="list-style-type: none"> 1. User clicks on “Login” button on the main page. 2. User enters registered account. <ul style="list-style-type: none"> • Username: xian98@gmail.com • Password: xian3625 3. User clicks on “Login” button. 	Pass	
View and Search Maid	<p><u>View Maid</u></p> <ol style="list-style-type: none"> 1. User clicks on “Search” button on the homepage. <p><u>Search Maid</u></p> <ol style="list-style-type: none"> 1. User clicks on “set preferences” icon. 2. User selects their preferred characteristics of maid. 3. User clicks on “done” button. <p><u>View detail information of maid</u></p> <ol style="list-style-type: none"> 1. User presses on one of the maid. 	Pass	

		<p>2. User can scroll down to look the detail information of maid.</p> <p><u>Add favourite maid</u></p> <p>1. User clicks on black border “favourite” icon.</p> <p><u>Send reservation for maid.</u></p> <p>1. User clicks on “send” icon.</p> <p><u>View preferences</u></p> <p>1. User click on “view” icon.</p>		
View Bookmark List		<p><u>View Bookmark List</u></p> <p>1. User clicks on “Bookmark list” button on the homepage.</p> <p><u>View detail information of favourite maid</u></p> <p>1. User presses on one of the favourite maid.</p> <p>2. User can scroll down to look the detail information of favourite maid.</p> <p><u>Remove favourite maid</u></p> <p>1. User clicks on the red-color filled “favourite” icon.</p>	Pass	
Reminder		<p><u>View Reminder</u></p> <p>1. User clicks on “Reminder” button on the homepage.</p> <p><u>Add reminder</u></p> <p>1. User clicks on “+” floating button at the lower right corner.</p> <p>2. User selects date and times.</p> <p>3. User enter title of the reminder.</p>	Pass	

	<p>4. User clicks on “Add” button.</p> <p><u>Remove reminder</u></p> <p>1. User clicks on “x” button.</p>		
Profile	<p><u>View Profile</u></p> <p>1. User clicks on “Profile” button on the homepage.</p> <p><u>Edit Profile</u></p> <p>1. User clicks on “Update” button.</p> <p>2. User enters the information.</p> <p>3. User clicks on “Done” button.</p> <p><u>Logout</u></p> <p>1. User clicks on “Logout” button.</p> <p>2. User clicks on “Yes” button.</p>	Pass	

Appendix 4: Result for Usability Testing

Participant #_1__novice____ (type: novice/ expert)

Name: Low Poh Yang

Gender: Female

Age: 55

Occupation: House wife

User Satisfaction survey (adapted from System Usability Scale, Brooke, J. (1986))

	Strongly Disagree 1	2	3	4	Strongly Agree 5
1. I think that I would like to use this application for searching maids.				√	
2. I found the application unnecessarily complex.	√				
3. I thought the application was easy to use					√
4. I think that I would need the support of a technical person to be able to use this application.	√				
5. I found this application was easily moved through without a lot of backtracking or data re-entry.				√	
6. I thought there was too much inconsistency in this application.		√			
7. I would imagine that most people would learn to use this application very quickly.					√
8. I found the application very awkward to use.	√				

9. I felt very confident using the application.				√	
10. I needed to learn a lot of things before I could get going with this application.		√			

POST-TESTING QUESTION

1. Regarding the results of the top five/ top ten, how many of these five / ten maids are suitable for your preferences?

	TOP 5	TOP 10
Euclidean Distance	4	6
Manhattan Distance	4	7
Minkowski Distance	1	4
Jaccard Coefficient	3	6
Cosine Similarity	3	5

2. Among the five methods, which one do you think is the best way to search for an ideal maid? (Select one only)

Euclidean Distance	
Manhattan Distance	√
Minkowski Distance	
Jaccard Coefficient	
Cosine Similarity	

3. Does the maid information provided help you search for maids?

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
-------------------	----------	---------	-------	----------------

4. What did you like the best in the application? (Select one only)
can set more preferences when search for maid

5. What did you like the least in the application? (Select one only)
image on view activity not consistent

6. Do you have any suggestions?

Maid information should provide more about family background

Participant #_2__expert____ (type: novice/ expert)

Name: Ong Chun Jye

Gender: Male

Age: 28

Occupation: QS

User Satisfaction survey (adapted from System Usability Scale, Brooke, J. (1986))

	Strongly Disagree 1	2	3	4	Strongly Agree 5
1. I think that I would like to use this application for searching maids.				√	
2. I found the application unnecessarily complex.	√				
3. I thought the application was easy to use					√
4. I think that I would need the support of a technical person to be able to use this application.		√			
5. I found this application was easily moved through without a lot of backtracking or data re-entry.				√	
6. I thought there was too much inconsistency in this application.			√		
7. I would imagine that most people would learn to use this application very quickly.					√

8. I found the application very awkward to use.	√				
9. I felt very confident using the application.				√	
10. I needed to learn a lot of things before I could get going with this application.		√			

POST-TESTING QUESTION

1. Regarding the results of the top five/ top ten, how many of these five / ten maids are suitable for your preferences?

	TOP 5	TOP 10
Euclidean Distance	2	5
Manhattan Distance	5	7
Minkowski Distance	2	5
Jaccard Coefficient	5	7
Cosine Similarity	3	6

2. Among the five methods, which one do you think is the best way to search for an ideal maid? (Select one only)

Euclidean Distance	
Manhattan Distance	
Minkowski Distance	
Jaccard Coefficient	√
Cosine Similarity	

3. Does the maid information provided help you search for maids?

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
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4. What did you like the best in the application? (Select one only)

Application is easy to use.

5. What did you like the least in the application? (Select one only)

Only can choose 1 preference for 1 category.

6. Do you have any suggestions?

Preference should be multiple selection.

Participant #_3__novice____ (type: novice/ expert)

Name: Ong Shu Rou

Gender: Female

Age: 26

Occupation: Clerk

User Satisfaction survey (adapted from System Usability Scale, Brooke, J. (1986))

	Strongly Disagree 1	2	3	4	Strongly Agree 5
1. I think that I would like to use this application for searching maids.				√	
2. I found the application unnecessarily complex.	√				
3. I thought the application was easy to use					√
4. I think that I would need the support of a technical person to be able to use this application.	√				
5. I found this application was easily moved through without a lot of backtracking or data re-entry.			√		
6. I thought there was too much inconsistency in this application.		√			
7. I would imagine that most people would learn to use this application very quickly.				√	
8. I found the application very awkward to use.	√				
9. I felt very confident using the application.				√	
10. I needed to learn a lot of things before I could get going with this application.		√			

POST-TESTING QUESTION

1. Regarding the results of the top five/ top ten, how many of these five / ten maids are suitable for your preferences?

	TOP 5	TOP 10
Euclidean Distance	3	5
Manhattan Distance	4	7
Minkowski Distance	3	5
Jaccard Coefficient	2	5
Cosine Similarity	2	4

2. Among the five methods, which one do you think is the best way to search for an ideal maid? (Select one only)

Euclidean Distance	
Manhattan Distance	√
Minkowski Distance	
Jaccard Coefficient	
Cosine Similarity	

3. Does the maid information provided help you search for maids?

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
-------------------	----------	----------------	-------	----------------

4. What did you like the best in the application? (Select one only)
Simple to use and can set more preferences.
-

5. What did you like the least in the application? (Select one only)
Maid's information should have previous employer.

6. Do you have any suggestions?

Should add online chat function with the maids.

Participant #_4__novice____ (type: novice/ expert)

Name: Wong Xiao Xian

Gender: Female

Age: 39

Occupation: Accountant

User Satisfaction survey (adapted from System Usability Scale, Brooke, J. (1986))

	Strongly Disagree 1	2	3	4	Strongly Agree 5
1. I think that I would like to use this application for searching maids.					√
2. I found the application unnecessarily complex.		√			
3. I thought the application was easy to use				√	
4. I think that I would need the support of a technical person to be able to use this application.		√			
5. I found this application was easily moved through without a lot of backtracking or data re-entry.			√		
6. I thought there was too much inconsistency in this application.			√		
7. I would imagine that most people would learn to use this application very quickly.				√	
8. I found the application very awkward to use.		√			
9. I felt very confident using the application.				√	
10. I needed to learn a lot of things before I could get going with this application.			√		

POST-TESTING QUESTION

1. Regarding the results of the top five/ top ten, how many of these five / ten maids are suitable for your preferences?

	TOP 5	TOP 10
Euclidean Distance	3	5
Manhattan Distance	3	6
Minkowski Distance	3	5
Jaccard Coefficient	4	7
Cosine Similarity	2	4

2. Among the five methods, which one do you think is the best way to search for an ideal maid? (Select one only)

Euclidean Distance	
Manhattan Distance	
Minkowski Distance	
Jaccard Coefficient	√
Cosine Similarity	

3. Does the maid information provided help you search for maids?

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
-------------------	----------	---------	-------	----------------

4. What did you like the best in the application? (Select one only)

5. What did you like the least in the application? (Select one only)
Design layout is not consistent especially is image in view activity.
-

6. Do you have any suggestions?

Might add function that use location to check nearest available maids.

Participant #_5__novice____ (type: novice/ expert)

Name: Low Poh Choo

Gender: Female

Age: 58

Occupation: Grocery shop

User Satisfaction survey (adapted from System Usability Scale, Brooke, J. (1986))

	Strongly Disagree 1	2	3	4	Strongly Agree 5
1. I think that I would like to use this application for searching maids.					√
2. I found the application unnecessarily complex.			√		
3. I thought the application was easy to use					√
4. I think that I would need the support of a technical person to be able to use this application.		√			
5. I found this application was easily moved through without a lot of backtracking or data re-entry.			√		
6. I thought there was too much inconsistency in this application.		√			
7. I would imagine that most people would learn to use this application very quickly.					√
8. I found the application very awkward to use.	√				
9. I felt very confident using the application.				√	
10. I needed to learn a lot of things before I could get going with this application.		√			

POST-TESTING QUESTION

1. Regarding the results of the top five/ top ten, how many of these five / ten maids are suitable for your preferences?

	TOP 5	TOP 10
Euclidean Distance	5	6
Manhattan Distance	5	7
Minkowski Distance	5	6
Jaccard Coefficient	5	8
Cosine Similarity	3	6

2. Among the five methods, which one do you think is the best way to search for an ideal maid? (Select one only)

Euclidean Distance	
Manhattan Distance	
Minkowski Distance	
Jaccard Coefficient	√
Cosine Similarity	

3. Does the maid information provided help you search for maids?

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
-------------------	----------	---------	-------	----------------

4. What did you like the best in the application? (Select one only)
Easier to use.
-

5. What did you like the least in the application? (Select one only)
Some of the image of maid is different with stated information.
-

6. Do you have any suggestions?
Maid's information may contain reviews from the previous employer.
-

Participant #_6_____ (type: novice/ expert)

Name: Yoo Geik Yen

Gender: Female

Age: 47

Occupation: Accountant

User Satisfaction survey (adapted from System Usability Scale, Brooke, J. (1986))

	Strongly Disagree 1	2	3	4	Strongly Agree 5
1. I think that I would like to use this application for searching maids.				√	
2. I found the application unnecessarily complex.	√				
3. I thought the application was easy to use					√
4. I think that I would need the support of a technical person to be able to use this application.	√				
5. I found this application was easily moved through without a lot of backtracking or data re-entry.				√	
6. I thought there was too much inconsistency in this application.			√		
7. I would imagine that most people would learn to use this application very quickly.				√	
8. I found the application very awkward to use.	√				
9. I felt very confident using the application.				√	
10. I needed to learn a lot of things before I could get going with this application.		√			

POST-TESTING QUESTION

1. Regarding the results of the top five/ top ten, how many of these five / ten maids are suitable for your preferences?

	TOP 5	TOP 10
Euclidean Distance	4	5
Manhattan Distance	4	6
Minkowski Distance	4	5
Jaccard Coefficient	4	7
Cosine Similarity	4	6

2. Among the five methods, which one do you think is the best way to search for an ideal maid? (Select one only)

Euclidean Distance	
Manhattan Distance	
Minkowski Distance	
Jaccard Coefficient	√
Cosine Similarity	

3. Does the maid information provided help you search for maids?

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
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4. What did you like the best in the application?
Can select more preferences.
-

5. What did you like the least in the application?
Reminder page working not so smoothly.
-

6. Do you have any suggestions?

The image layout in view activity should be more consistent.

Participant #_7__expert_____ (type: novice/ expert)

Name: Sherwin Ooi

Gender: Female

Age: 31

Occupation: Accountant

User Satisfaction survey (adapted from System Usability Scale, Brooke, J. (1986))

	Strongly Disagree 1	2	3	4	Strongly Agree 5
1. I think that I would like to use this application for searching maids.				√	
2. I found the application unnecessarily complex.	√				
3. I thought the application was easy to use				√	
4. I think that I would need the support of a technical person to be able to use this application.		√			
5. I found this application was easily moved through without a lot of backtracking or data re-entry.				√	
6. I thought there was too much inconsistency in this application.		√			
7. I would imagine that most people would learn to use this application very quickly.					√
8. I found the application very awkward to use.		√			
9. I felt very confident using the application.				√	
10. I needed to learn a lot of things before I could get going with this application.			√		

POST-TESTING QUESTION

1. Regarding the results of the top five/ top ten, how many of these five / ten maids are suitable for your preferences?

	TOP 5	TOP 10
Euclidean Distance	2	6
Manhattan Distance	3	6
Minkowski Distance	2	6
Jaccard Coefficient	4	7
Cosine Similarity	3	6

2. Among the five methods, which one do you think is the best way to search for an ideal maid? (Select one only)

Euclidean Distance	
Manhattan Distance	
Minkowski Distance	
Jaccard Coefficient	√
Cosine Similarity	

3. Does the maid information provided help you search for maids?

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
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4. What did you like the best in the application? (Select one only)
Application is user friendly.
-

5. What did you like the least in the application? (Select one only)
Reminder page without edit but direct delete.
-

6. Do you have any suggestions?

The setting for preferences can be multiple selection.

Participant # 8 expert (type: novice/ expert)

Name: Lily Low

Gender: Female

Age: 38

Occupation: Primary School Teacher

User Satisfaction survey (adapted from System Usability Scale, Brooke, J. (1986))

	Strongly Disagree 1	2	3	4	Strongly Agree 5
1. I think that I would like to use this application for searching maids.			√		
2. I found the application unnecessarily complex.	√				
3. I thought the application was easy to use				√	
4. I think that I would need the support of a technical person to be able to use this application.		√			
5. I found this application was easily moved through without a lot of backtracking or data re-entry.				√	
6. I thought there was too much inconsistency in this application.			√		
7. I would imagine that most people would learn to use this application very quickly.					√
8. I found the application very awkward to use.	√				
9. I felt very confident using the application.				√	
10. I needed to learn a lot of things before I could get going with this application.	√				

POST-TESTING QUESTION

1. Regarding the results of the top five/ top ten, how many of these five / ten maids are suitable for your preferences?

	TOP 5	TOP 10
Euclidean Distance	4	7
Manhattan Distance	4	6
Minkowski Distance	2	5
Jaccard Coefficient	3	6
Cosine Similarity	4	6

2. Among the five methods, which one do you think is the best way to search for an ideal maid? (Select one only)

Euclidean Distance	√
Manhattan Distance	
Minkowski Distance	
Jaccard Coefficient	
Cosine Similarity	

3. Does the maid information provided help you search for maids?

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
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4. What did you like the best in the application?
User friendly.
-

5. What did you like the least in the application?
Preference cannot be multiple selection.
-

6. Do you have any suggestions?
Should improve more on reminder function.
-

Appendix 5 Feedback for Project 1

Project Title	Intelligent Mobile Maid Application		
Student Name	ONG SHU XIAN		
Supervisor	Dr. Too Chian Wen		
Co-Supervisor	Dr. Khor Kok Chin		
Moderator:	Dr. Mohammad		
Key Assessment for Project Proposal	Supervisor Comments/Remarks	Co-Supervisor Comments/Remarks	Moderator Comments/Remarks
Project Description - Is the problem or need to be addressed clearly presented? - Is the proposed approach or solution clearly presented and justified?		guidance had been given before report submission.	No issue.
Project Scope and Objectives - Is the scope of the project clearly defined? - Are the objectives of the project clearly specified? - Are the project scope and objectives appropriate for a final year project?			No issue.
Literature Review / Fact Finding for Benchmarking / Verification of Project - Are sources for literature review / fact finding appropriate? - Is information from literature review / fact finding relevant and adequate? - Is information from literature review / fact finding clearly presented and discussed?			No issue.
Research/Development Methodology and Development Tools - Is the methodology for the project clearly described and discussed? - Are the required development tools clearly described and discussed? - Are the stated methodology and development tools appropriate?			No issue.
Project Plan - Are the phases and tasks of the project properly defined and planned? - Are the phases and tasks consistent with the methodology of the project?			No issue.
Initial Deliverables - Are deliverables (e.g. use case diagrams and descriptions) of initial phases of the project plan included in the report?	can start to put in more effort in your development part!		
Report Structure and References - Is the report organised in a logical structure? - Are references listed in accordance to Harvard format?			
Language and Clarity of Writing - Are the sentences concise and understandable? - Are there spelling and grammar issues?	Need to work harder to improve your writing.		