MOBILE FEEDBACK SYSTEM FOR IMPROVING FACILITIES IN UTAR CAMPUS

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MOBILE FEEDBACK SYSTEM FOR IMPROVING FACILITIES IN UTAR CAMPUS

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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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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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APPROVAL FOR SUBMISSION

I certify that this project report entitled **"MOBILE FEEDBACK SYSTEM FOR IMPROVING FACILITIES IN UTAR CAMPUS"** was prepared by **CHONG ZI MING** has met the required standard for submission in partial fulfilment of the requirements for the award of Bachelor of Science (Hons) Software Engineering at Universiti Tunku Abdul Rahman.

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ABSTRACT

Although there is an existing feedback system in University Tunku Abdul Rahman to collect students' feedbacks on the facilities, there are still some limitations on it. These limitations have caused the decreasing of students to give feedback on the facilities. In order to improve UTAR images, broken facilities should be reported and fixed on time. It is important that a good study environment can help students to enjoy their university life and improve their academic results. Therefore, a mobile feedback application is developed to identify problems with existing feedback system, helping students/academic staffs lodging complaints/feedback against the defects on facilities in the campus and displaying the feedback progress.

      With the implementations of the mobile application, the categories are listed and easy for students or academic staffs (reporters) to choose. All the progress of feedbacks reported will be tracked by reporters. Reporters will receive an email as a notification when the progress of the feedback is updated. Reporters will be able to give rating on the staff's performance. For staffs, it provides a filtering function to filter out the feedbacks according to their progress. Admin of the mobile application can assign the feedbacks to any staffs and able to follow up the monthly feedbacks reported or updated and staffs' performance. These features resolve the problems faced by reporters and helped admin to catch up the staffs' performance and work easily.

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CHAPTER 1

INTRODUCTION

1.1   Introduction

There are seven sections in this chapter, Section 1.2 is about the background of the project while section 1.3 is about the problem statement of this project. Section 1.4 was about the objectives of this project. Section 1.5 and section 1.6 were about the proposed solution and proposed approach respectively. The last section, section 1.7 was about the project scope.

1.2   Background

"Feedback is a circular process of influence where an action has affected on an actor" (New England Complex System Institute, n.d.). It is very important for developers, organisers and staff to make improvements in usability of the facilities, services, applications or products. By asking for feedback, employees could continually learn and improve themselves from their experiences. In addition, feedback system is also used to track the users' experiences on certain products and services. Feedback such as positive feedback from customers or managers can motivate employees to work harder and give better performances and results (E. DeFranzo, 2015).

In University Tunku Abdul Rahman (UTAR), there is already a feedback form in the UTAR portal which is used to collect different kind of information with categories such as facilities, timetable and so on. However, it can be improved further so that students or users can used it wisely and easily. As the feedback form is allocated in the UTAR portal, students need to login to fill in the form whenever there is an incident. It will take time to report an issue. Thus, only few students use the feedback form. They would prefer someone else to report to staff when an incident happened.

By developing a mobile feedback system, it will be more convenient for students to give feedback to staff. Students will be able to report problems instantly

with their mobile phone. Progress of reported incident can be informed to the student who reported.

1.3   Problem Statement

An interview was held on 17 June 2019 to collect the problems found by UTAR students when using the feedback form in portal. There were 6 students participating this interview. The students were chosen randomly in UTAR Sungai Long Campus. Interview questions and responses are attached in the appendix.

Filling up surveys has been known as a waste of time by most people. In UTAR, many students do not fill in the survey forms. From the responses, there were 4 students who did not use the students' feedback form in the portal before. They said that they are lazy to login the portal. Only 2 students thought that it is their responsibility to report when issues occurred. Thus, it could be found that the first challenge of this project is that students would think that it will be a waste of time to report issues as they need to login to portal every time they need to report somethings. Thus, it will be troublesome for students or staff to fill in the feedback form of UTAR.

Besides, the current students' feedback system will not send any notifications such as email to inform or update the progress of the defects. The 2 students who did the feedback form before said that they have to check the progress manually on the portal every day. It has been a waste of time on checking the status every day. Thus, it could be concluded that without sending notifications such as email will lead to inconvenient for students. Then, the number of students who will fill in the feedback form will be decrease.

In addition, some students said that the feedback back type is too many in the feedback form. Thus, it has confused them to report the defects. It is a kind of design problems which may cause students do not want to report as it may be too difficult for them to distinguish the defects type. Besides, the feedback type is not categorised well. It may be also one of the problems that confused students to distinguish the type of defects or feedback.

1.4 Objectives

The objective of mobile feedback system is to improve facilities in UTAR campus.

- To identify problems with existing feedback system in UTAR.
- To develop a mobile application that helps students/academic staffs lodging complaints/feedback against the defects on facilities in the campus.
- To develop a mobile application that displays feedback progress for students/academic staffs.

1.5 Proposed Solution
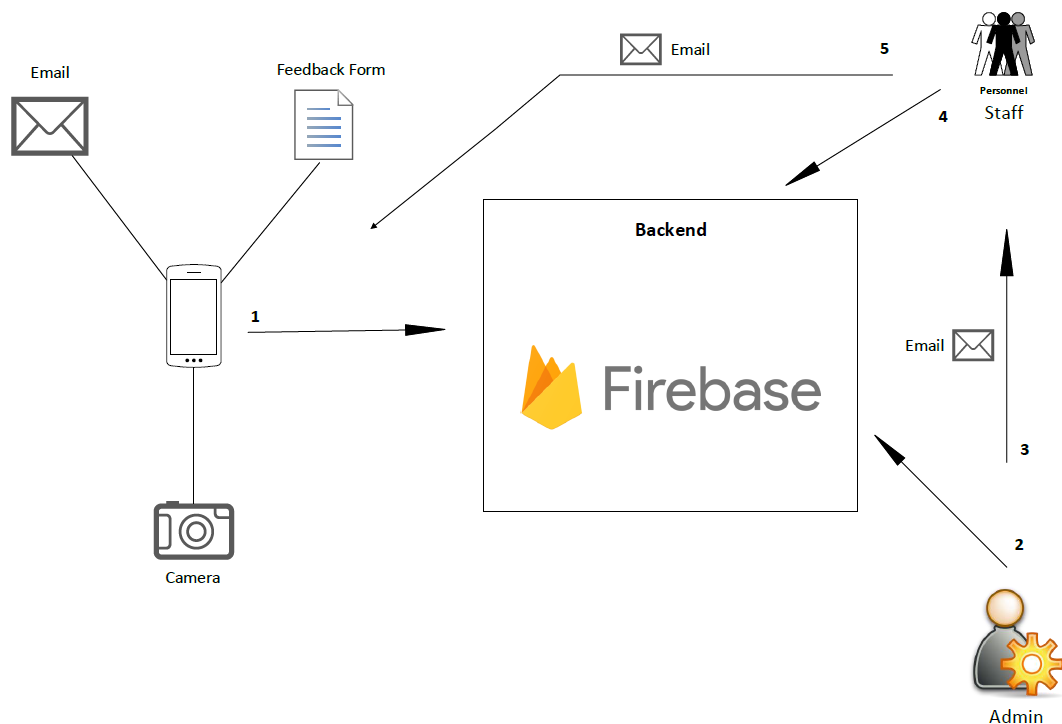
Figure 1.1: High-Level Architecture View of Mobile Feedback Application

The problems mentioned in section above were solved by developing a mobile feedback application which would meet the requirements of UTAR students.

Figure 1.1 shows a high-level architecture view of mobile feedback application. It provided a feedback form for students to report issues on the spot without login to the portal. Students were required to login to the application with student id once only when the application was installed on their mobile phone. It would reduce the time to report an issue.

Besides, it was convenient to report or give feedback as mobile phone was always with us but laptop or computer were not. Lecturers or staff could ask students to fill in the feedback form by using mobile phone immediately in the class or at the spot. In addition, this mobile feedback application could help admin staff to send notifications by using email or messages. When the admin staff solved or handling the defects, he was able to send notifications and update the progress of the defects.

Figure 1.1 shows the briefly workflow of using the application. When defects occurred, students can use the application to report or giving feedback. The form was stored in a database. At the same time, it sent a notification (email) to admin staff so that they will access to the database to check the new feedback or defects. The admin staff can update the progress of the defects in the database when the defects are handling or solved. It would send a notification to students who report when the progress is updated.

This mobile feedback application was developed with React-Native framework and Firebase as the cloud database while AsyncStorage as the local database.

1.6   Proposed Approach
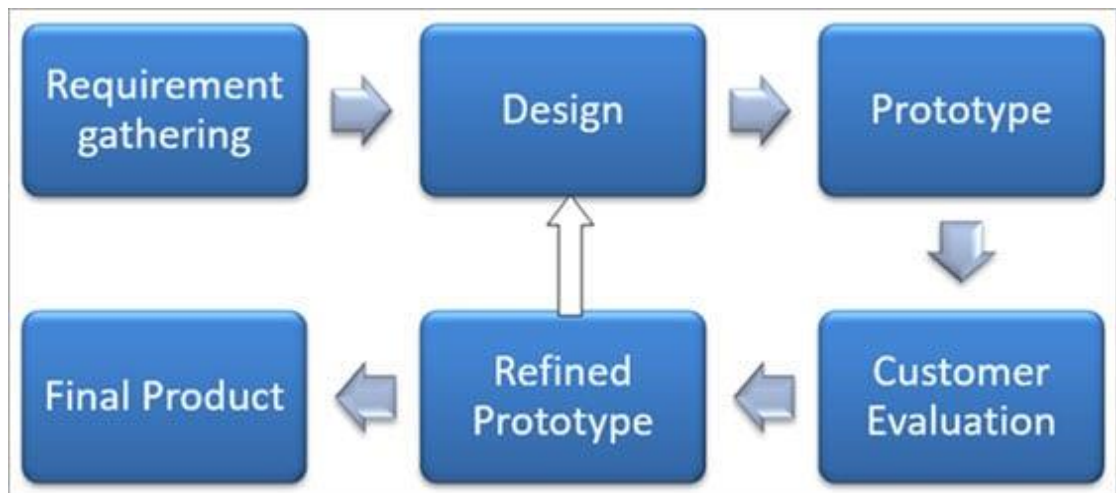
Figure 1.2: Prototype Approach SDLC (Khalid, H., 2018)

The proposed software development life cycle model was Prototyping Model. Its life cycle is shown in figure 1.2. It was used for developing prototypes to clarify user requirements. The prototypes were built prior to the actual system to get some valuable feedback from end users. The initial state of this approach was to gather requirements of the project. Once it was done, there would be a looping among 4 phases which were design, prototype, customer evaluation and refined prototype. These phases will be repeated until the project is approved by the end users. Then only the final prototype can be used as the requirement for building an actual software. Finally, the final product was done and ready for testing. After testing, it is ready to be deployed.

Thus, the Prototyping Model was chosen for this project approach. As the end users are students in UTAR, it was easier to collect some feedback of this project by developing a prototype. Missing functionality, confusing function or errors could also be identified immediately. The user interface could be designed more user friendly according to their feedback.

1.7   Scope of The Project

1.7.1   Target Users

The target users of this mobile feedback application were all UTAR students/academic staffs, staffs and admin who handle the feedbacks, reports or complaints from students. Students/academic staffs were able to report and check the status of the defects.

1.7.2   Modules Covered

Here were modules that shall be provided in the mobile feedback application to achieve the project objectives.

(i) Displaying feedback form

This mobile application provided a form for students to fill in the details and description of issues or comments. It would provide several feedback types for students to choose.

(ii) Allow students to take photo

The application allowed students to take photo of defects on the spot and attach to the form. Besides, the application could also allow students to choose photo from gallery in their mobile phone and attach to the form.

(iii) Sending notification to students and admin staff

This application sent the feedbacks to the personnel in charge through email. After the feedbacks were sent, students who report the defects will be updated on the progress of the feedback. This application updated the progress done to the students. The progress was updated by the person who handled or resolved the problem. Notifications were sent to students when progress had been updated or done. The status of the progress was either pending, handling or resolved.

CHAPTER 2

LITERATURE REVIEW

2.1   Introduction

In this chapter, it provided the researches and reviews on the existing applications. Section 2.2 was discussing about the studies and reviews of different concepts and issues.

2.2   Literature Review

2.2.1   Issues of Collecting Feedback from Students

An interview was held to collect problems found by UTAR students when using the feedback form in the portal. Thus, it showed that most of the students in UTAR are not using the feedback form to report issues. Powton (2017) had highlighted some reasons of people not taking surveys or feedback form. One of the reasons stated was that surveys or feedback form was boring. For example, having a conversation between people must be more interesting than having a conversation between papers and questions because questions did not give any response but people did. Besides, it was faster when giving feedback face-to-face than filling in and sending a feedback form or surveys. Face-to-face reporting would be easier to describe issues.

Not at all, people nowadays were realism. By giving real reward after filling in the feedback form or surveys, people would be attracted. It would give people an extra push to complete the feedback form (Formassembly, n.d.). It could be seen that people would tend to ignore feedback form or survey just because there was absence of benefits to them. It was same to university students. There must be different when benefits or gifts are provided to students who had used the feedback form. To make sure that students had filled in the feedback form given by school, some teachers would threaten their students by not giving their result of examinations. It may be a good way to collect feedback but it would also give a bad impression to student on filling in feedback form at the same time, causing teachers or school hard to collect feedback from them.

2.2.2   Effectiveness of Feedback

To avoid issues stated in previous section, feedback questions must be designed well so that the data return would more effectively. Effective feedback was that receiver was able to receive information which arrived with improvements on somethings such as services, facilities, attitudes and so on.

Before studying on how to determine an effective feedback, it was more important to know that how to design feedback questions well. Bolton, H. (2015) mentioned that there are 9 tips for designing feedback forms to get more responses.

9 tips for designing feedback forms:
1) Leaving plenty of white space only so that it will be time consuming for people.
2) Placing the label close to the corresponding field to reduces time for users to fill in.
3) Do not forcing users to fill in all questions as a must or stopping them to submit.
4) Marking up the form fields well with logical flow order.
5) Make sure the form is compatible with all mobile devices depending on their screen size.
6) Do not need too many questions. Only a few questions which can specify the goals clearly.
7) Questions about what you want to know or learn.
8) Create consistent rating scales if have.
9) Do not ask questions that are no actual answer.

By designing a good feedback form did not mean that it would come back with effective feedback especially getting students feedback. It was required to take analysis and discussion first before concluding that specific feedback is effective. A study was carried by Poulus, A. and Mahony, M. J. at University of Sydney to gain understanding of significance of feedback for students and the review of 'effective'. Results came with 3 dimensions which related to the effectiveness of feedback.

3 key dimensions related to effectiveness of feedback:

1) Perceptions of feedback.

   Student's perception of feedback related to individual meaning attributed to feedback which means how students recognize somethings as a feedback.

2) Impact of feedback.

   It related to timeliness, significance and first-year experience on students.

3) Useful of feedback.

   Usefulness of feedback was related to students' perceptions themselves.

Besides, analysing data or feedback was necessary after collecting feedback in feedback mechanism to find out effective feedback. However, input measure or external judgement on product quality could indicate that effective feedback were in place but cannot prove that feedback was effective (Price, M., Handley, K., Millar, J. and O'Donovan, B., 2010). Thus, it was hard to analysis effective feedback.

Sometimes, effectiveness of feedback could be reduced due to wrong timing released the feedback form or returning the feedback. Thus, it was hard to say that the feedback was not important at all. A study on investigating effects of student feedback on college instruction was conducted by Centra, J. A. (1973). The result was collected after a semester and shows that student feedback did not affect some changes in instruction over time. However, the teaching plans and attitudes of lecturer was improved. He said that it might be caused by not enough time on making changes or improvements on facilities.

In a nutshell, it might be hard to collect effective feedback to improve facilities of a university even a well feedback form is designed. To define whether the feedback was useful or not, it may need to depend on the experience of staff and also analysis technique.

2.2.3 Feedback Mechanism and Feedback Loop
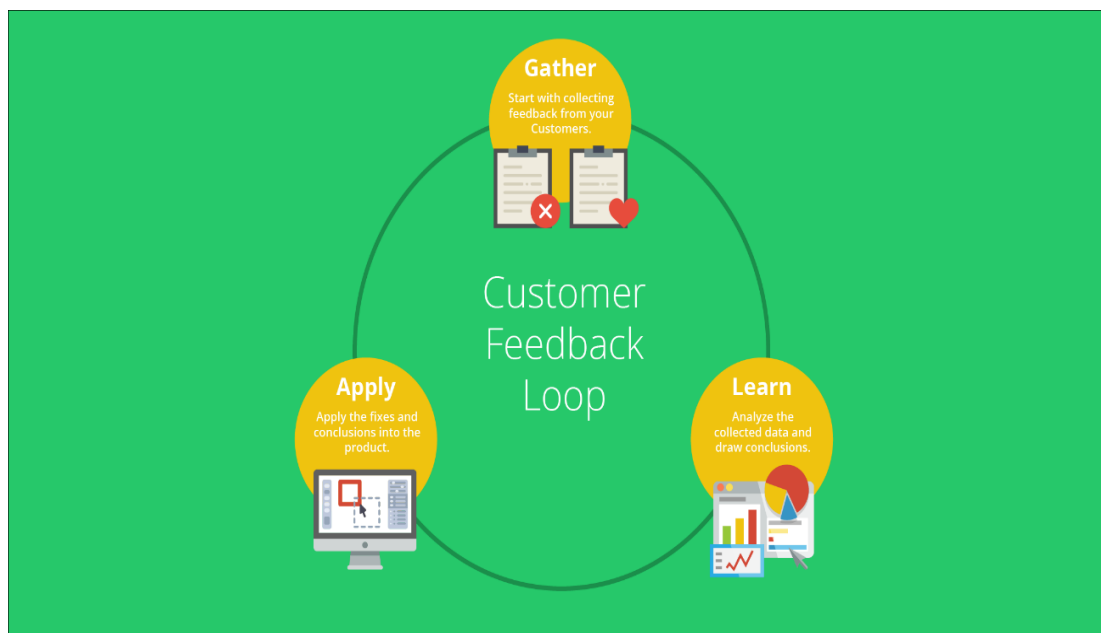
Figure 2.1: Customer Feedback Loop (Kierczak, L., n.d.)

Feedback loop was a strategy for constant product improvement based on users' suggestion and opinion. There were 3 stages in a customer feedback loop which were gather, learn and apply.

At the beginning of creating feedback loop, customer feedback could be collected through a variety of channels such as surveys, feedback forms, email and so on. Then, once the data was collected, it was time to analyse and study. Finding the issues and list them up which was importance to your organisation. After that, it came with a conclusion on how to improve and fix the issues collected from customer feedback. Finally, the insight gained from the analysis could be used to make changes and improve the products, services and customers experience. Once the improvements are applied, it was the time to collect feedback again (Kierczak, L., n.d.). Fundin, A. P. and Bergman, B. L. S. (2003) had carried out a study on how organisation manage their customer feedback system. When a customer complaint reached an organisation, there was a willingness to satisfy the customer and solve the problems. Organisation would strive to keep communication flow open with customers to make sure that customers will be informed about the progress.

Feedback loop closing was very important. Feedback loop in university for facilities or teaching plan improvements was also required to be closed. Powney, J.

and Hall, S. (1998) said that without closing the feedback loop, students would remain unaware of changes resulting from their informal feedback. Thus, students would not have any effort to give feedback because there was no feedback return to students to inform any progress. They also said that closing a feedback loop can enhance learning and performance of student by implementing an appropriate strategy. Satisfaction on student levels were key indicator to obtain feedback about their learning experience. Improving on the facilities should also be taken into account as a good learning environment was supported by well conditions of facilities such as air-conditions, chairs, speaker and so on.

There were many student feedback mechanisms that were useful in collecting feedback from students. For example, questionnaire, student representative, tutorial and informal feedback (Brennan, J. and Williams, R., 2004). Students and staff would be involved in the process whatever mechanism is chosen. The following table showed the mechanisms with their advantages and disadvantages.

Table 2.1: Advantages and Disadvantages of Mechanisms

(Brennan, J. and Williams, R., 2004)

Mechanisms	Advantages	Disadvantages
Questionnaire	Useful for gathering response Inclusive Provide quantitative and qualitative data Save time on collecting data	Need some specific skills in designing questionnaire. Response rate low Spend time on analysis data Students may not get feedback on results or actions taken Actions may not get taken
Student representative	Actions can be taken immediately Good opportunity for dialogue and testing out new ideas Provides formal dialogue between staff and students. Personal development opportunity is provided	Cost on time to ensure that representatives are effectively trained. Lack of opportunity for representatives to communicate with student population. Possible lack of motivation of students

Tutorial	Useful for student exchange views	Response intensive
		Does not have hard data
	Able to find out how somethings work quickly	
	Problems can be dealt quickly	
	Sensitive issues can be analysed privately	
Informal	Useful for student exchange views	Does not have hard data
	Able to find out how somethings work quickly	
	Problems can be dealt quickly	
	Sensitive issues can be analysed privately	
	Provides formal dialogue between staff and students.	

Based on the table above, questionnaire will be a better mechanism to implement in the mobile feedback system.

2.2.4 System Development Methodology Applied

There were many different development methodologies used to in software development life cycle (SDLC). It could be divided into two groups which were Traditional Methodology and Agile Methodology. The Traditional Methodology included Waterfall approach, Spiral approach, Iterative Approach, Incremental approach, Prototyping approach, V-Shaped approach and RAD approach. In this section, only three approaches which are Waterfall approach, Agile approach and Prototyping approach were discussed.

2.2.4.1 Waterfall Approach

Waterfall approach was the classical approach in SDLC as shown I Figure 2.2. It was also a straightforward approach as it would only move to next stage after the first stage is completed. Thus, phase will not go beyond. It also served as a baseline for many lifecycle approaches. Waterfall approach was easy to be managed due to its rigidity. It would be very useful when requirements were well defined and do not have any confused (Sabale, R.G. and Dani, A.R., 2012).
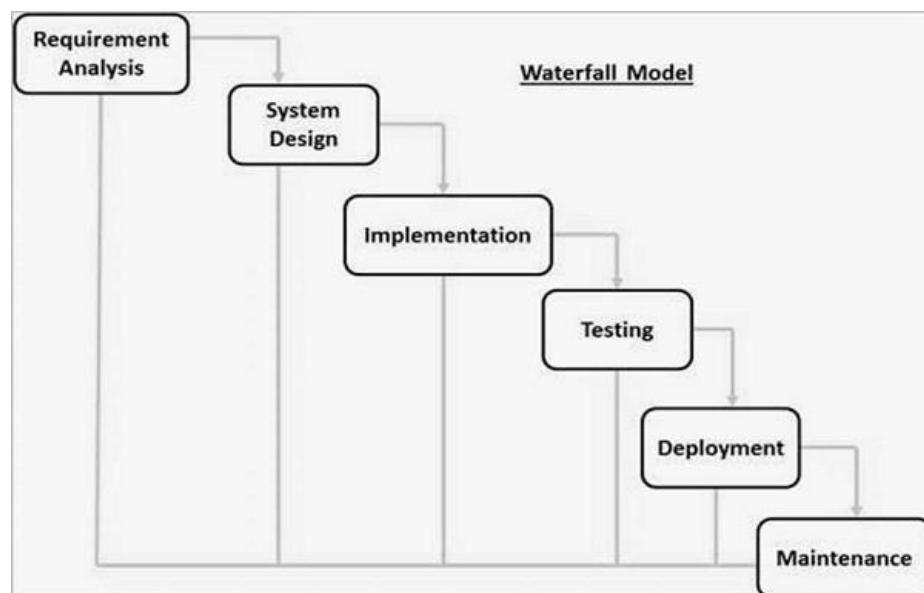
Figure 2.2: Waterfall Approach (Salesforce Tutorial, n.d.)

Advantages of using Waterfall approach (Sabale, R.G. and Dani, A.R., 2012):
a) It is easy to use and user friendly.

b) Lower cost and good in cost control.

Disadvantages of using Waterfall approach (Sabale, R.G. and Dani, A.R., 2012):

a) High in risk involved as the risk is only analysis at the beginning.

b) Long time frame.

c) Not suitable for complex and big projects.

d) Difficult to go back to previous phases when things go wrong.

2.2.4.2 Agile Approach

Agile approach was a new approach in software developing life-cycle. It had become a major driving force of developing software in many company (Half, R., 2019). Dubey, P. and Dora, K.S. (2013) mentioned that Agile approach was a combination of software development methods based on iterative and incremental development where the requirements were rapidly delivered from working software products. Tasks were broken down into many blocks which deliver specific features. Each block was incremental in terms of features. All features required were hold by the final block.
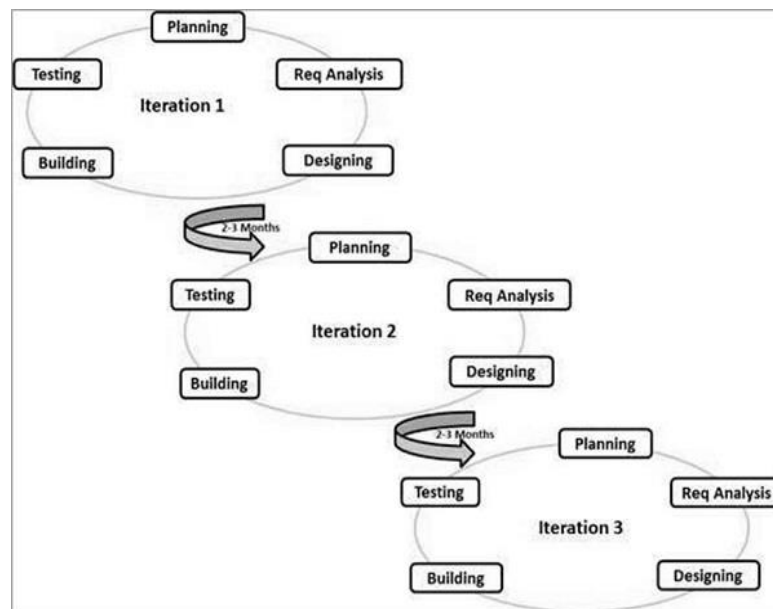
Figure 2.3: Agile Approach (tutorialspoint, n.d.)

There were four Agile Mainfesto principle (SDLC Agile Model, n.d.):

a) Individuals and interactions

    The self-motivation and organization are interactions such as colocation and pair-programming which are very important in Agile approach.

b) Working software

    Demo working software is the best communication with customers to archive their requirements.

c) Customer collaboration

    Continuous interaction with customers is important to understand their requirements when requirements are not identified completely in the beginning of the project.

d) Responding to change

    Agile approach is focused on quick response and continuous development.

Advantages of using Agile approach (Sabale, R.G. and Dani, A.R., 2012):

a) Able to analyse risk during the process.

b) Highly flexibility.

c) Customer and development team will be involved in the development process. It will prevent conflict on products when come to final phases.

d) Will have teamwork and cross training.

Disadvantages of using Agile approach (Kumar, M., 2018):

a) Difficult to access the effort at the beginning of the large project.

b) Lack of emphasis on necessary documentation of the project.

c) Project will be cancelled or failed if customers are not clear on the final outcome they want.

2.2.4.3 Prototyping Approach

Prototyping approach was to build a software application prototype which would display some functionality of the product during development process and gather the feedback or requirements from customers to improve it. Then, the product would be updated and added more functions again and again until the product was approved by customers. It could be said as a loop to deliver a product that fulfil all the requirements of customer.

Advantages of using Prototyping approach:

a) Able to gather and understood more and more requirements even the requirements are not completely defined in the beginning.

b) It is simple to be implemented as it is built upon Waterfall approach.

c) Lower risk on deliver the final product wrongly as missing functionality can be identified immediately.

d) Error can be identified immediately.

e) Do not need to analyse risk at the beginning of project.

Disadvantages of using Prototyping approach (Kumar, M. and Rashid, E., 2018):

a) Higher cost due to building many prototypes.

b) Leads to implementing and repairing way of building system.

c) Complexity of product may be increased as the scope of project may be increased beyond the expected or planed before.

d) Inadequate of problem analysis.

2.2.5   Previous Related Project/Work

There were many existing applications in Google Play Store and also App Store (IOS). I had chosen some similar feedback applications which were MY McD Feedback, Trimble Feedback and Feedback to study. These applications were downloaded from Google Play Store. All of the reviews and studies were done in the following subsections including pros and cons and descriptions about the application.

2.2.5.1 MY McD Feedback

MY McD Feedback was developed by Mc Donald company to captures the feeling and experience of their customers. It allowed their customers to rate their services by completing a short survey.

This application used several types of survey questions including rating scale and multiple-choice questions. It required users to turn on their location service of the device. Then, the application would show some Mc Donald restaurants nearby. After selecting the restaurant, it finally allowed us to fill in the questionnaire. There are some pros and cons found when using it.
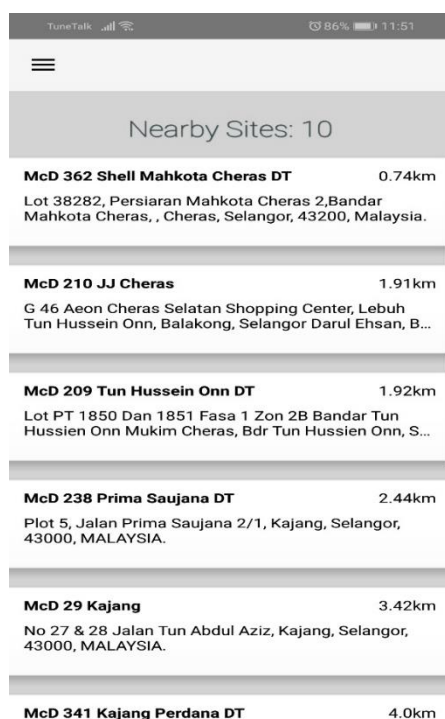
Figure 2.4: Location Services   **Figure 2.5: Error Location Services**
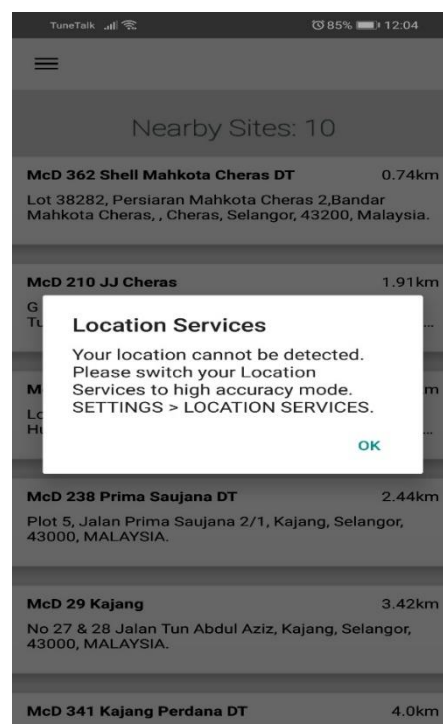
In my opinion, one of the cons of this feedback application was that the application could only be used after the location service is turned on. It was annoying to keep asking people to turn on the location. In addition, location service might be error and unable to find the restaurant nearby just like Figure 2.5. Moreover, as the questionnaire provided was according to the Mc Donald restaurant nearby (Figure 2.5), users may be unable to select the restaurant when they were not near to it. Thus, the feedback must be done on the spot.
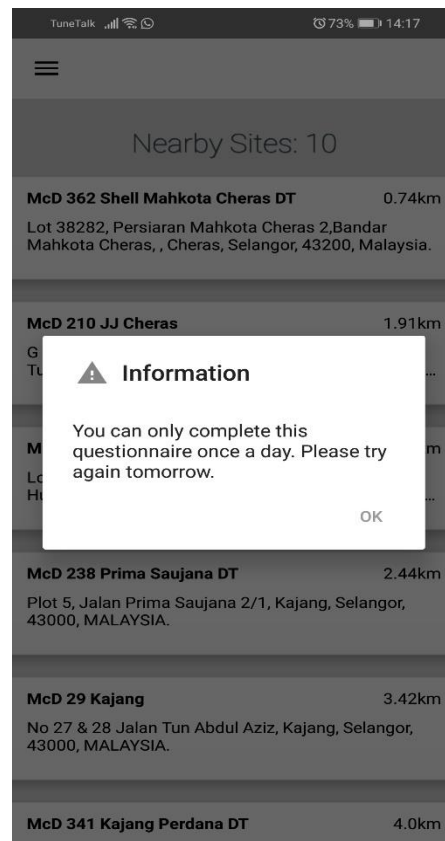
Figure 2.6: Limitation of filling in feedback

Besides, the worst part of this application was that the questionnaire could only be done once a day which has showed in Figure 2.6. Although this limitation might be used to avoid user from answering the questionnaire and getting the rewards again and again, it might cause losing of important information from their customers. They would not be able to give any feedback for others Mc Donald restaurant if they had done it before for another restaurant in the same day. Thus, users might give up reporting issues or using the application, causing loss of important feedback for Mc Donald.

In this application, most of the questions asked were about the feelings on their services. There were no any comment boxes for customers to fill in their reason of having dissatisfaction of their services. Thus, the experiences they collected might not be so useful.
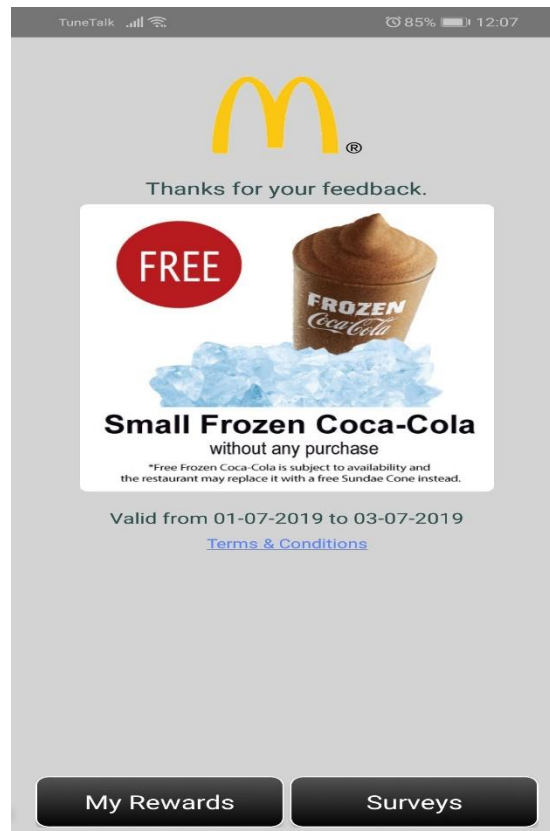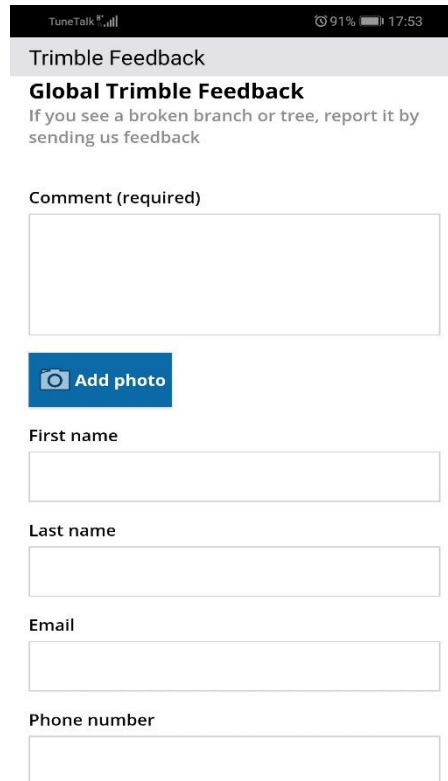
Figure 2.7: Reward of giving feedback

Besides, there were some pros in this application. As there were a lot of questions in the questionnaire, the application was designed to show percentage of completeness instead of numbers. It might reduce the impatience of users when filling in the surveys. People might lose their patient if they found that they had to answer about 20 questions and did not know how many questions were left. In addition, there was reward given by Mc Donald after finishing the questionnaire. It was a good idea to attract users especially Mc Donald lovers to do the questionnaire so that Mc Donald could collect feedback easily.

2.2.5.2 Trimble Feedback

Trimble Feedback was a mobile application that used to report issues related to build environment to your local civic organizations and services providers. The report submitted was in few steps: choose service, taking a picture of the issues and attach it, describing the issue with a few words and finally submit it.

Figure 2.8: UI of feedback form in Trimble Feedback

Figure 2.9: Type of feedback in Trimble Feedback

Figure 2.9 shows that this application provides 6 category of feedback which was street light issues, graffiti, illegal dumping, broken tree, general comment and complaint. Each feedback was required to give a comment, name, picture, email and phone number like Figure 2.8.

This application was designed user friendly and the colour is nice. This application had categorized different types of feedback for user to choose instead of asking users to type it themselves. Besides, it allowed users to upload a photo which would give a clear image for people who in charge. Not at all, the admin would be able to contact you through the application to inform or asking for more detail information.

From the other side, there were also some cons found in this application, as this application would send the feedback to services providers according to specific area, there would be a problem when your location was not found by GPS. Besides, there should have one more category of feedback which is "others" in case that people were unable to categorized the type of issues.

2.2.5.3 Feedback

Feedback was a feedback application written in Norwegian. It was very easy to use. First, find your recipient. Then, write your feedback with a photo taken and finally send. A notification would be received when your message was being processed.

Figure 2.10: Home page of Feedback   Figure 2.11: Map in Feedback
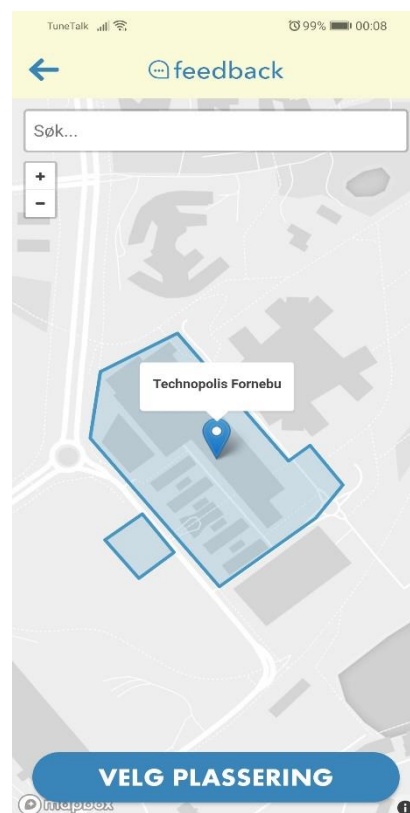
Figure 2.10 was the home page of Feedback. When opening this application, it would require us to select a recipient with location first. Figure 2.11 shows the map used to select recipient in Feedback.

Figure 2.12: UI of Feedback

Figure 2.12 shows the UI of Feedback. The "Hvem eller hva gjelder det?" was translated as "Who or what it is?" while "Gjentar sakan seg" was "Repeated case". There would be several selections (type of feedback and places) to choose like Figure 2.13.

Figure 2.13: Type of feedback and places

This feedback application was designed user friendly and the colour is nice. It also allowed users to take photo and video in the feedback which gave a very clear image for people who receive. Also, it provided the Kiosk method for people to show their feelings on particular feedback. It also allowed users to choose whether the issue mentioned in the feedback form was repeated case or not. The "Kontakinformasjon" mean "contact information". Users could also control the settings of receiving notification from the system.

However, there were some weakness found in this application. As this application required users to locate the recipient firs before filling in the feedback form, there would be a problem when your location is not found by GPS. Hence, feedback could not be sent correctly. Besides, this application should provide language settings for users who did not know Norwegian so that users could change to the language they know.

2.2.6   Mobile Application Development Framework

2.2.6.1 Ionic

Ionic is an open source framework built on Angular JS which provides cross-platform mobile application development for iOS, Android and web. It is easy to be used as it allows for quick prototyping with a decent CLI. Ionic is a free framework which provide open source mobile UI toolkit (Haije, E. G., n.d.).

2.2.6.2 React Native

React Native is an open source framework written in Java Scripts created by Facebook based on React framework. It can be used to develop cross-platform mobile application for iOS and Android (Safari, n.d.). The benefits of using React Native is high reusability as it is originally created for designing user interface. React Native is also efficiency for speeding up the development time (Hales, A., 2019).

2.2.6.3 Xamarin

Sharma, A. (2018) said that Xamarin is a cross-platform framework for mobile application development that use .Net and C# for iOS, Android and Windows App. It is a reliable tool which provides native user interface and control that can help developers to create a native application (Hales, A., 2019). Xamarin can be used with Visual Studio with free for individual developer.

2.3   Conclusion

2.3.1   System Development Methodology Applied

Waterfall approach was following a strict structure which means that every phase in the SDLC such as requirements gathering phases, design phases, implementation phases, testing phases, deployment phases and maintenance phases are required and not allowed to be skipped. Thus, Waterfall approach were classified into heavyweight methodology (traditional SDLC) which are time consuming to understand fully the requirements and develop the complete product in a single cycle when comparing to Agile approach and Prototyping approach (Dora, K. and Dubey, P., 2013).

For Agile approach, unlike Waterfall approach, requirements were not gathered completely in the beginning of project when using Agile approach. It saved a lot of time due to frequent communications with customers so that developers did not need to spend time in identifying all the requirements stated by customers. Agile approach would have teamwork and communication which allowed developing a product in short period. However, Agile approach was not emphasizing on documentation but on solution that need to be delivered in time. Thus, it could be found that Agile approach was more focusing on solving problems immediately. It may not be suitable for doing this project.

For Prototyping approach, it was same like Agile approach which allow the communication between customers and developers to collect feedback from them so that the product could be updated with new features. Also, the unclear requirements of the project were not so important at the beginning as it would be identified during the progress. Thus, the complexity and risk of failure would be low as the prototype enable

developers detect any defects early. Moreover, it could adapt the changes of requirements during any phases of SDLC. Not at all, customers could also have a basic understanding of the product before it is fully developed.

In a nutshell, it could be concluded as Prototyping approach would be more suitable because the pros and cons stated above would be match for developing mobile feedback system for UTAR students. As there were so many students in UTAR, it was easy to gather more useful feedback from them by providing prototype of the system. Hence, the gathered information would be very helpful in collecting better and more requirements and also help the students to know the basic of the software application that was going to be developed.

2.3.2 Previous Related Project

Table 2.2: Comparison of Features among My McD Feedback, Trimble Feedback and Feedback

	My McD Feedback	Trimble Feedback	Feedback
Reward Given	✓		
Photo Required		✓	✓
Video Required			✓
Satisfaction Rating	✓		✓
Location Required	✓	✓	✓
Subjective Questions		✓	✓
Objective Questions	✓		
Categories of Feedback		✓	
Notification		✓	✓

Based on Table 2.2 above, it could be clearly found that Feedback had the most features when comparing to the other feedback application. Thus, it could be concluded that Feedback may be a good example for developing mobile feedback application.

2.3.3 Mobile Application Development Framework

Table 2.3: Features of Framework Used for Mobile App Development

	Ionic	React Native	Xamarin
Free	✓	✓	
Free Trial			✓
Cross-Platform	✓	✓	✓
Language	CSS, HTML5	JavaScript	C#
Simple	✓	✓	✓
Reusability		✓	
Lost Cost Development	✓		✓

Based on the table above, it could be concluded that React Native was more suitable for developing this project. Firstly, it is because React Native is free and is cross-platform framework for iOS and Android. Besides, React Native also can be used for developing Windows Phone. It has a better performance than Ionic as specific platform instead of Cordova is used on processing hardware functionalities (Ashwini, A., 2017).

CHAPTER 3

METHODOLOGY

3.1 Introduction

In this chapter, it discussed about activities that had been taken place to achieve the objectives which is what was occurred from the beginning of project until it was completed. Section 3.2 describes activities carried out in each phases of prototyping approach. Section 3.3 describes about the Gantt Chart while Section 3.4 describes the Work Breakdown Structure (WBS).

3.2 Prototyping Approach
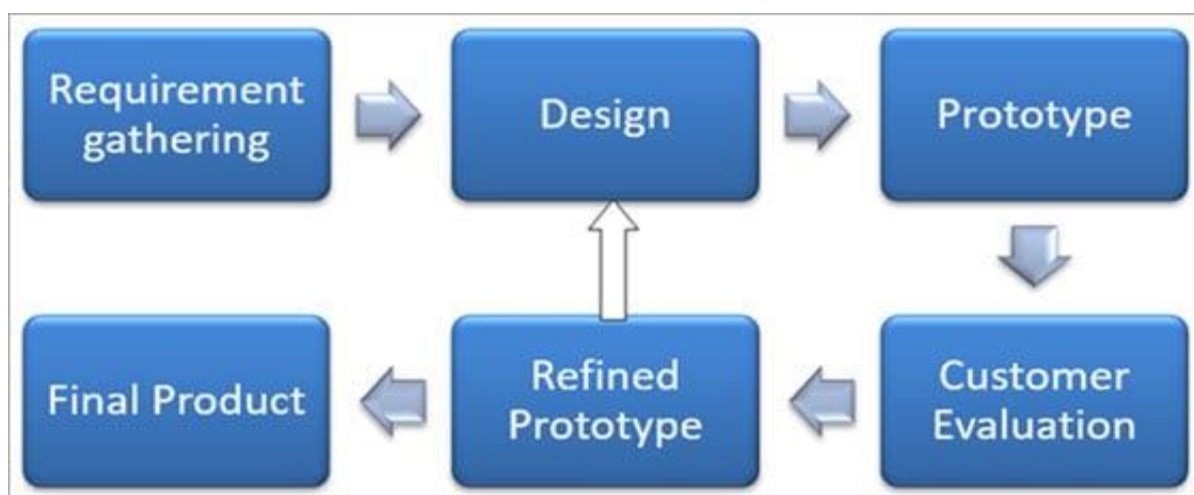
Figure 3.1: Prototype Approach SDLC (Khalid, H., 2018)

3.2.1 Requirement Gathering

Figure 3.1 is the prototype approach used as the methodology. To gather improvements on existing feedback system in UTAR and requirements of this project, an interview was held in chapter 1, some improvements of existing system was collected. Details and data collected would be described in fact-finding of chapter 4. The data was analysed and converted to functional requirements and non-functional requirements of this project. Besides, research papers that were related to technology and concepts

needed to develop mobile feedback application had been gathered in the previous chapter.

3.2.2 Design

Design of the project had been started to get more requirements and improvements. After the requirements were clearly defined. A new design of the project with further improvements was started. It was a loop when there are changes of requirements, improvements or user interface design required by users. After the prototype refine phases, the loop was started. The loop would only be stopped once the users were satisfied and sign for this project.

3.2.3 Prototype

After simple design on user interface and confirmation on functionality of the project, a prototype was started developing. Different version of prototype were developed to collect improvements and feedback from users.

3.2.4 User Evaluation

During this phase, a new prototype developed was tested by users after each time of completion of developing prototype. User satisfaction and feedback were collected for analysis. A better prototype were developed in the next iteration continuously until a completed product was developed.

3.2.5 Refine Prototype

Prototype was refined and readjusted as well as the user interface and functionality and non-functionality requirements. This phase started looping back to design phases to redesign and develop the project again for users.

3.2.6   Final Product

Finally, it came to this phase when all the requirements including user interfaces were approved by users. It was the final phases of prototyping methodology where the loop ended. The newest version of prototype with the best UI and functionality was developed. User acceptance testing, unit testing, integration testing and system testing was applied before it is ready to be deployed. All the documentations of this project were finished.

3.4   Work Breakdown Structure
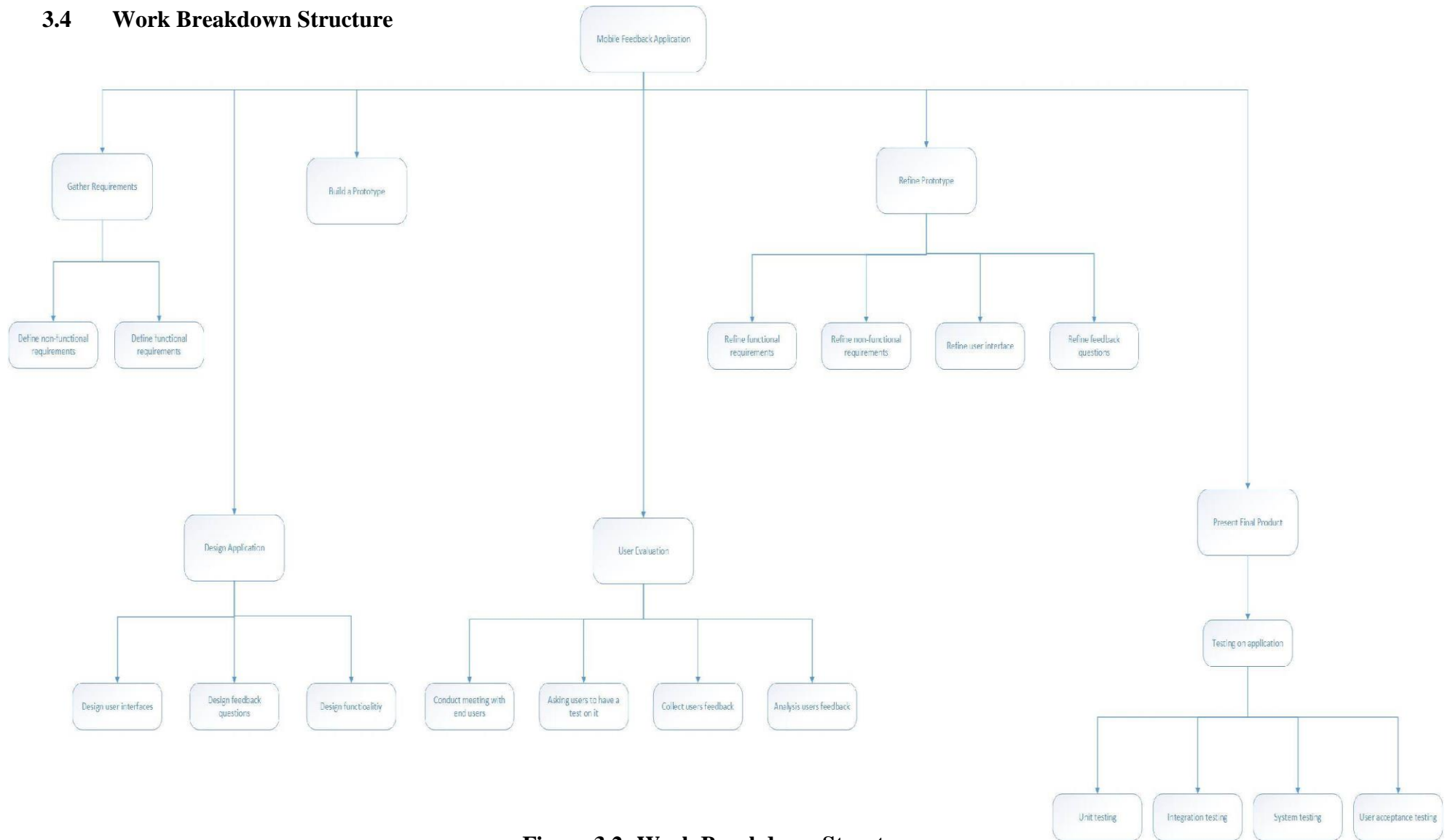
Figure 3.2: Work Breakdown Structure

3.3 Gantt Chart

Final Year Project 1

Gantt Chart

No.	Project Activities	Planned Completion Date	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	
1.	project planning, objectives setting	2019-06-09	▓	▓											✎ 🗑
2.	propose solution and approach, literature review, propose development methodology/ approach (in detail)	2019-06-22			▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	✎ 🗑
3.	conceptual design and/or preliminary architecture design	2019-07-06						▓	▓	▓	▓	▓			✎ 🗑
4.	capturing requirements	2019-07-20								▓	▓	▓	▓		✎ 🗑
5.	generate requirement specification, requirement modeling	2019-08-03										▓	▓		✎ 🗑
6.	prototype developing, test plan, prepare proposal report	2019-08-17											▓	▓	✎ 🗑

Table 3.1: Gantt Chart of Final Year Project 1

Final Year Project 2

ID	Task Name	Start	Finish	Duration
1	Designing UI	13/1/2020	14/1/2020	2d
2	Designing Feedback Questions	14/1/2020	14/1/2020	1d
3	Designing Functionality	15/1/2020	17/1/2020	3d
4	Working on Prototype	20/1/2020	24/1/2020	1w
5	Conduct Meeting with Users to Test	27/1/2020	28/1/2020	2d
6	Analyse Feedback from Users	29/1/2020	29/1/2020	1d
7	Modification and Make Improvements	29/1/2020	31/1/2020	3d
8	Working on 2nd Version of Prototype	3/2/2020	7/2/2020	1w
9	Modification and Make Improvements with User Feedback	7/2/2020	12/2/2020	4d
10	Working on 3rd Version of Prototype	12/2/2020	21/2/2020	1w 3d
11	Modification and Make Improvements with User Feedback	19/2/2020	24/2/2020	4d
12	Working on 4th Version of Ptototype	24/2/2020	5/3/2020	1w 4d
13	Modification and Make Improvements with User Feedback	5/3/2020	10/3/2020	4d
14	Working on Final Version of Product	10/3/2020	23/3/2020	2w
15	Unit Testing	23/3/2020	27/3/2020	1w
16	Integration Testing	26/3/2020	30/3/2020	3d
17	System Testing	30/3/2020	3/4/2020	1w
18	User Acceptance Testing	3/4/2020	10/4/2020	1w 1d
19	Present Final Product	13/4/2020	13/4/2020	1d

Table 3.2: Gantt Chart Development
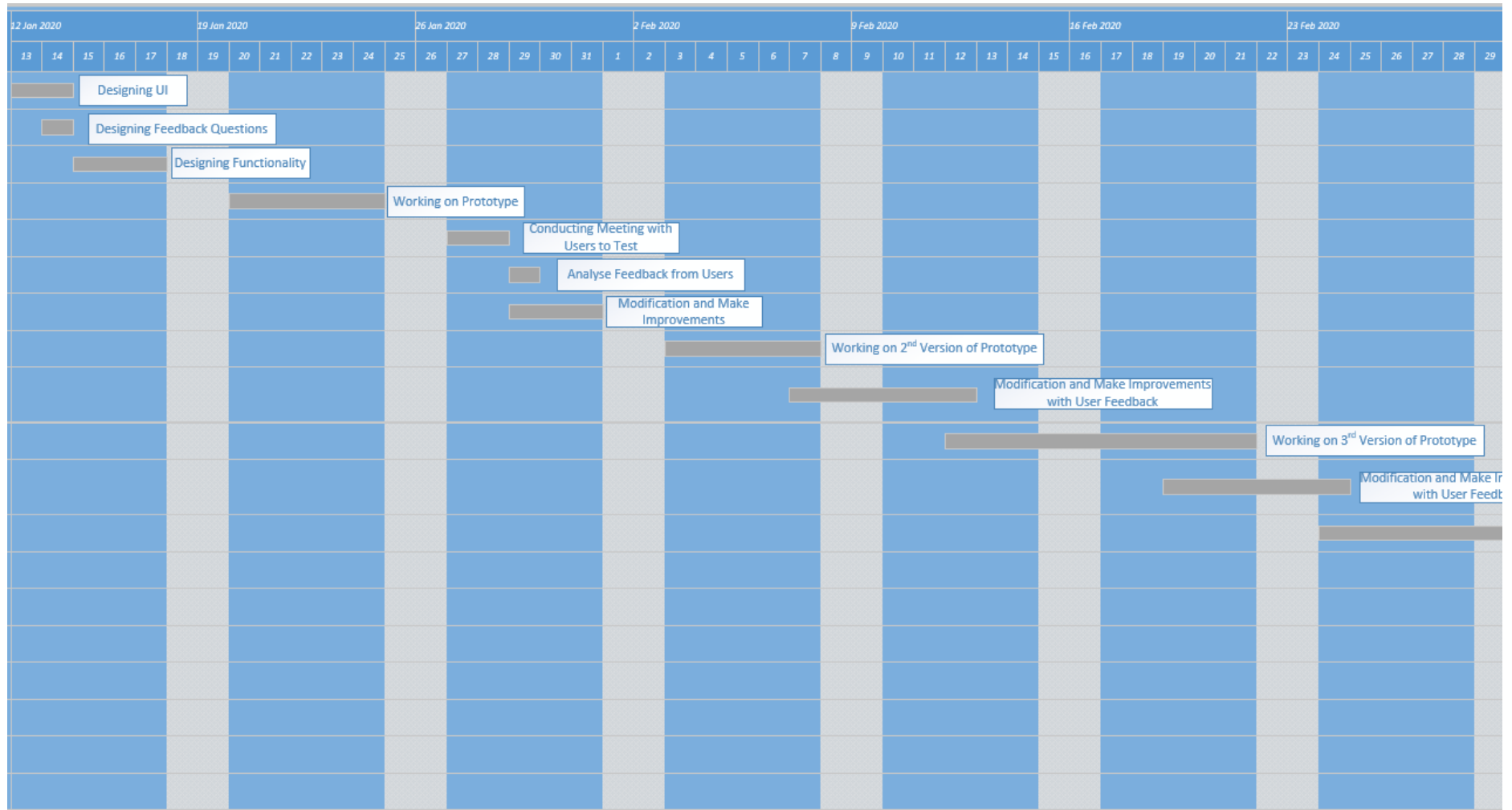
Table 3.3: Gantt Chart Table Development 1
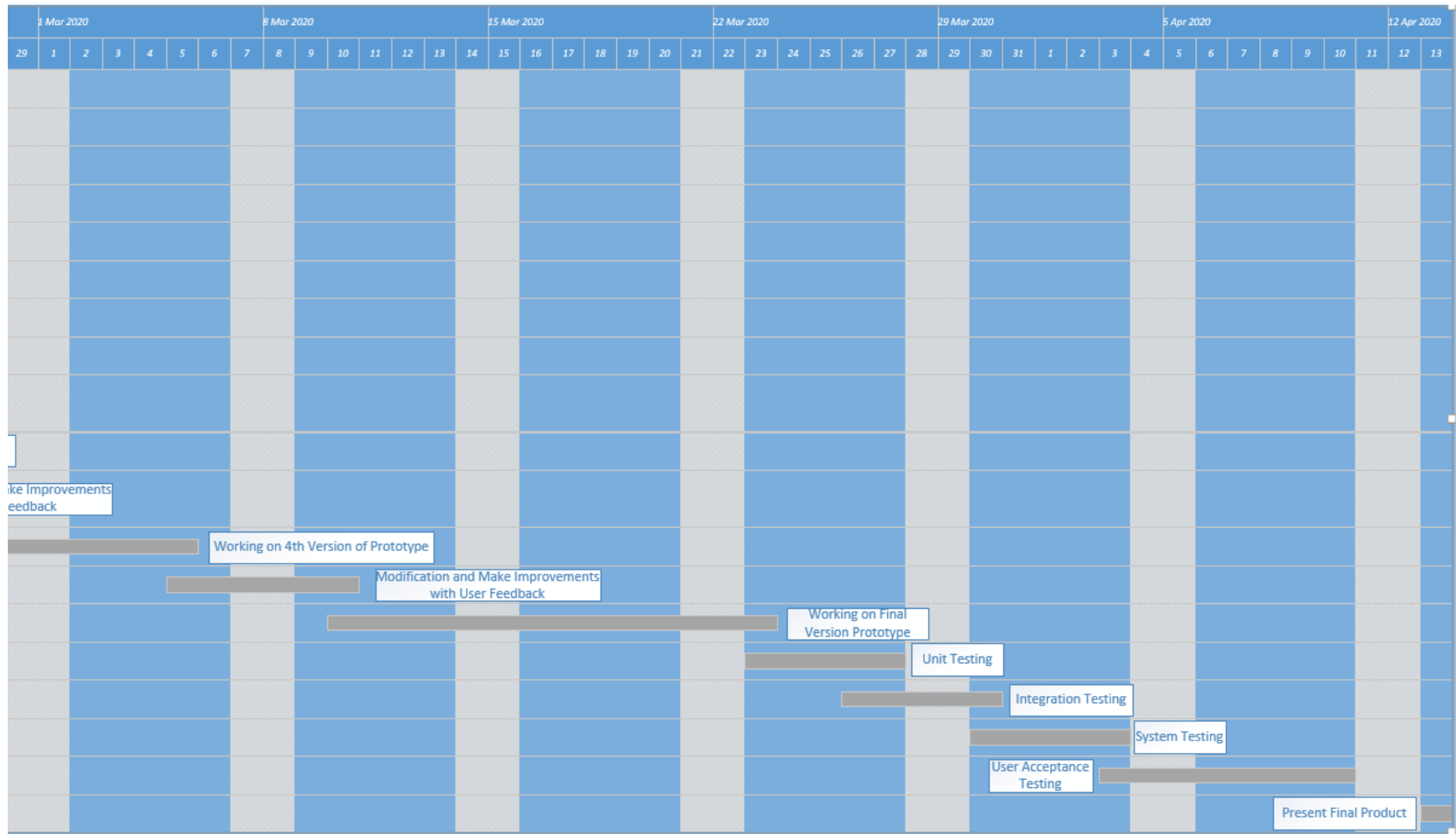
Table 3.4: Gantt Chart Table Development 2

CHAPTER 4

PROJECT SPECIFICATION

4.1   Introduction

In this chapter, Section 4.2 discusses about fact-finding while Section 4.3 is about the requirement specification which contain functional requirements and non-functional requirements in Section 4.3.1 and 4.3.2 respectively.

4.2   Fact-finding

For this project, an interview was held for analysing problem in existing feedback form and system in UTAR portal. Requirements and improvements are also analysed. 6 students were randomly interviewed in chapter 1 while 4 more students are added into this interview to collect more requirements and information. A total of 10 students were randomly selected to participate this interview.

From this interview, it was found that a lot of students do not use the feedback form given in UTAR portal. Only 4 students took this as their own responsible in order to improve school facilities. Those 6 students were more prefer on waiting others to report if issues occurred or going to FGO to report it face-to-face. They said that it will be more flexible and easier to describe the issues when giving a feedback. Most of the students may not be good enough in writing skills but good in speaking. Besides, one of the advantages of using face-to-face feedback was that students can receive instant feedback instead of waiting to be informed.

Then, some students had found some disadvantages of using the existing feedback system and the feedback form. One of the cons that causes students do not like to use the system is that there is no feedback (notification, email) from staff after reporting something. It could be said that the feedback loop is not closed. After reporting issues, students had to check the progress manually in portal. Without informing students how and when the issues reported will be handled, students would never know that the issues had been treated or not. One of the interviewees said "I usually login to the portal and check the progress. It might waste some of my time on

login to portal every day". So, it could be found that a notification is important to students who give feedback. The importance of feedback loop closing was mentioned in chapter 2.

Some interviewees also mentioned that it was hard to choose the type of feedback. The categorising of feedback is hard to be determined because there are too many selections can be chosen. They said that they usually confused on the type of feedback they want to report. Sometimes, they even confused that what kind of feedback should be inform using the feedback form. An interviewee suggested that it is better to add 'others' option in the selection of feedback type so that students no need to determine the category themselves.

In a nutshell, students who had used the existing feedback system and feedback form of UTAR in UTAR portal would like to have improvements on the notification system and categorising of feedback type. By solving these two biggest problems in the existing feedback system, the feedback system of UTAR might be welcomed by more students.

4.3   Requirement Specification

4.3.1   Functional Requirements

The functional requirements for mobile feedback application collected were:

1. Application must be able to take photo.
2. Application must be able to send email back to reporters when the issues is settled.
3. Application must provide different category include an option of "others" in feedback form.
4. Application must be able to display the progress of issues reported.
5. Application should have a record of reported issues as history.
6. Application can only allow staff to update the status of feedback.
7. Application should be able to show all the feedback with different category.
8. Application allows reporters (students or academic staffs), staffs and admin to login.
9. Application must be able to send notification to staffs or admin when feedback or issues are reported.
10. Application should be able to print report about feedbacks status that have assigned to staffs.
11. Application should only allow admin to assign the task (feedbacks) reported.
12. Application can only allow admin to control (update or delete) the categories of feedbacks.

4.3.2   Non-Functional Requirements

The non-functional requirements for mobile feedback application were:

1. Application should run on Android and iOS mobile phone.
2. Application should have mobile device which have camera.
3. Application need to connect to Internet for reporting and receiving feedback or notifications.
4. Application must have pdf file reader to read the report downloaded.

CHAPTER 5

SYSTEM DESIGN

5.1   Introduction

System design is an important phase that will help the process of development easier and smooth along the whole development process. Section 5.2 was about the system modelling. The last section, Section 5.3 was about the prototype screen.

5.2   System modelling

5.2.1   Use Case Diagram
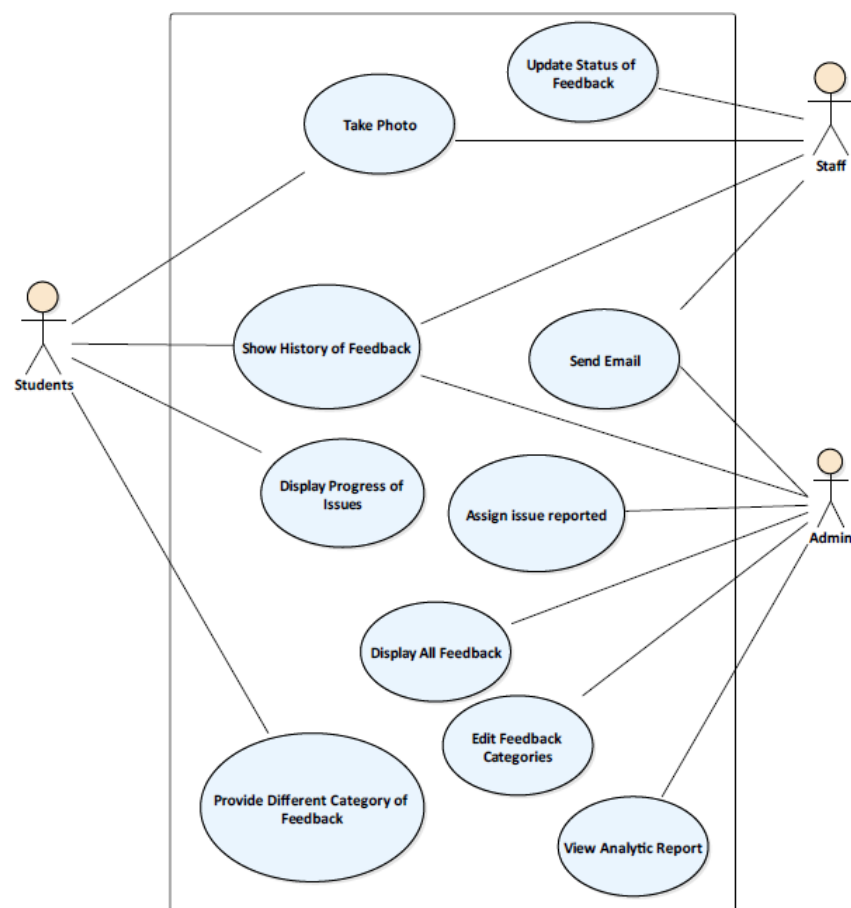
Figure 5.1: Use Case Diagram

Figure 5.1 shows the use case diagram of mobile feedback application. All the relationships between functional requirements and actors was declared clearly.

5.2.1.1 Use Case Description

Table 5.1: Take Photo Use Case

Use Case Name	Take Photo
Actor	Student, Staff
Flow of Events: 1. Students want to report issues in university. 2. Students fill in the feedback form. 3. Students take a photo of the issue on the spot. 4. Students submit the feedback form with the photo. 5. The feedback is assigned to a staff. 6. Staff has solved the issue. 7. Staff take a photo of the issue solved. 8. Staff update the progress of feedback to 'Solved' with the photo.	

Table 5.2: Send Email Use Case

Use Case Name	Send Email
Actor	Staff, Admin
Flow of Events: 1. Admin receives a new feedback reported by students. 2. Admin assign the feedback to a staff. 3. Admin can send an email to the specific staff as a notification of a new task. 4. Staff receives and update the progress of feedback. 5. Staff can send an email to the reporter as a notification about the updating of his/her feedback.	

Table 5.3: Provide Different Category of Feedback Use Case

Use Case Name	Provide Different Category of Feedback
Actor	Student
Flow of Events: 1. Students want to give feedback on issues. 2. System provide many different categories of feedback form such as air-cons, projector, sounds audio, toilet, light, chairs and etc. 3. Students choose one of the categories for feedback.	

Table 5.4: Display Progress of Issues Use Case

Use Case Name	Display Progress of Issues
Actor	Student
Flow of Events: 1. Students haven given a feedback. 2. Students want to know the progress of particular feedback. 3. Students find particular feedback reported before in history. 4. System displays the progress together with feedback details in a table.	

Table 5.5: Display History of Feedback Use Case

Use Case Name	Display History of Feedback
Actor	Student, Staff, Admin
Flow of Events: 1. Students haven given a feedback. 2. Students, staffs or admin want to know the progress of particular feedback and what kind of feedback have reported before. 3. Students, staffs or admin find those particular feedbacks in history. 4. System displays the progress together with feedback details in a table.	

Table 5.6: Display All Feedback Use Case

Use Case Name	Display All Feedback
Actor	Admin
Flow of Events: 1. Staff want to see all the feedback reported by students. 2. Staff asks the system to display all the feedback. 3. System displays all feedback in different categories including descriptions, date, progress and student id.	

Table 5.7: Update Progress of Feedback Use Case

Use Case Name	Update Progress of Feedback
Actor	Staff
Flow of Events: 1. Staff has completed or handled the issues reported. 2. Staff updates the status (progress) of the feedback. 3. System will send an email to the particular student about the progress of feedback.	

Table 5.8: Assign Issue Reported Use Case

Use Case Name	Assign Issue Reported
Actor	Admin
Flow of Events: 1. Students have reported an issue. 2. System will send notification to admin. 3. Admin check out the issue and assign the task to any staffs.	

Table 5.9: Edit Feedback Category Use Case

Use Case Name	Edit Feedback Category
Actor	Admin
Flow of Events: 1. Admin want to edit the categories that can be reported by students. 2. Admin disable or enable the categories that will be showed on students view.	

Table 5.10: View Analytic Report Use Case

Use Case Name	View Analytic Report
Actor	Admin
Flow of Events: 1. Admin want to know how many tasks (feedbacks) have been handled or solved in this month. 2. Admin can view the analytic report to know what is the total amount of feedbacks are pending, handling or solving.	

5.2.2   Data Flow Diagram

5.2.2.1 Context Diagram
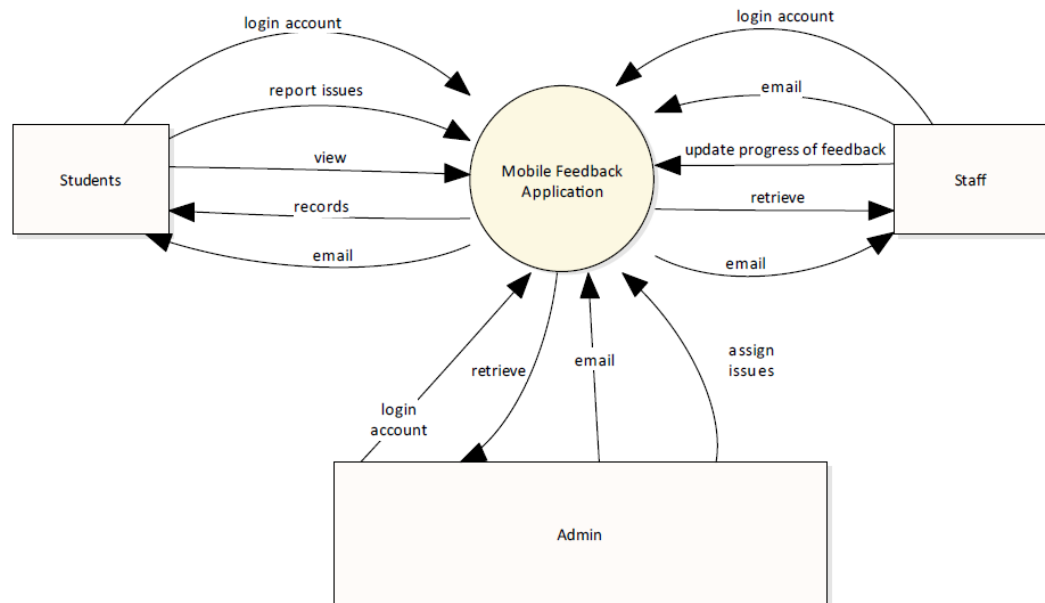
Figure 5.2: Context Diagram of Mobile Feedback Application

Figure 5.2 shows the context diagram of mobile feedback application. It describes the actions can be done by those users. The arrows flow shows the action could be done on mobile feedback application and data flew to the users.

5.2.2.2 Level 1 Data Flow Diagram
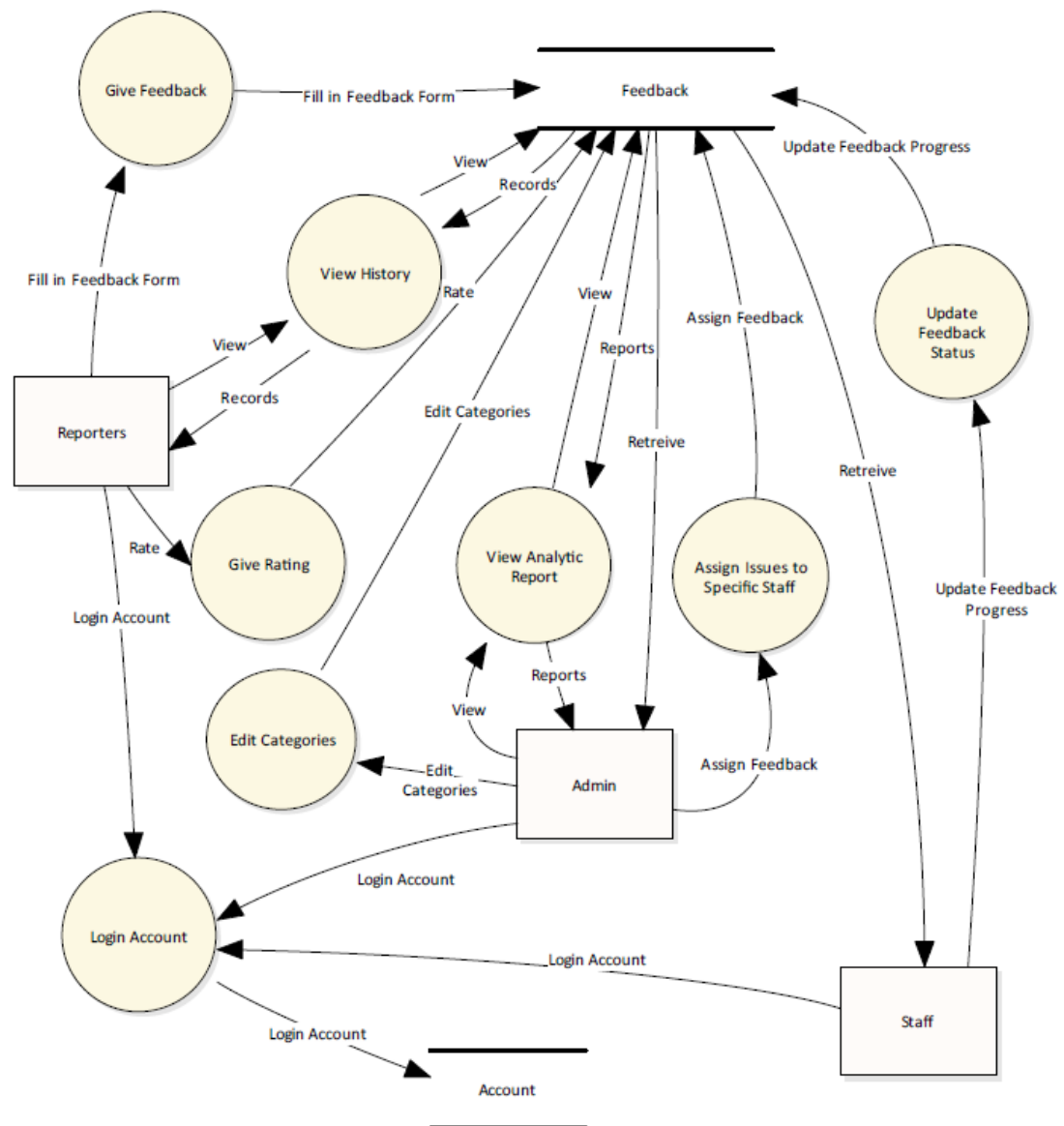
Figure 5.3: Level 1 Data Flow Diagram of Mobile Feedback Application

Figure 5.3 shows the level 1 of data flow in the mobile feedback application. The rectangular shape represented the actors while circle shape represented the process of activities. It shows clearly that flow of the data given from actors to database and data retrieved from database by actors.

5.2.3 ERD Diagram
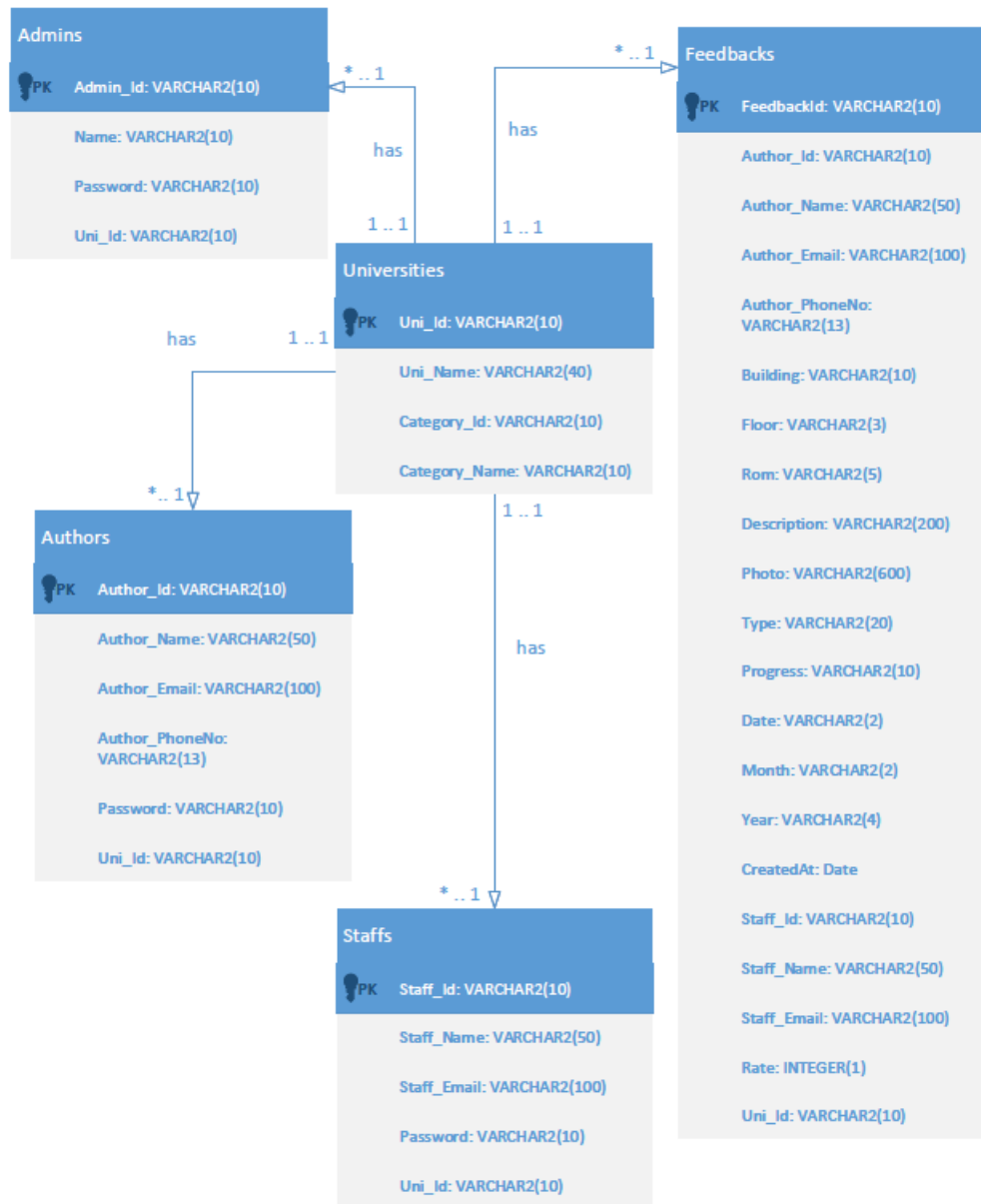
Figure 5.4: ERD Diagram of Mobile Feedback Application

Figure 5.4 shows the relationship between tables in the database.

5.3   UI Screen

5.3.1   Reporter Site (Students or Academic Staff)

Figure 5.5 and 5.6 is about the login screen of mobile feedback application. Figure 5.5 allowed users to choose their login type while Figure 5.6 allows users to key in personal data. Figure 5.7 is the home screen for reporters. It shows the categories of feedback for reporters to choose while Figure 5.8 shows the detail of feedback categories. Figure 5.9 shows the feedback form for reporters to report. Reporters had to take a photo for each feedback before submitting. Figure 5.10 shows a list of feedback reported by him/her. Figure 5.11 shows about the detail or further information of a feedback when a feedback is selected by the reporters. Figure 5.12 shows about the profile screen of the reporters. It shows the personal information of the reporters and allows them to change their personal data. The logout button is allocated in profile screen for reporters to logout.

5.3.1.1 Login Interface
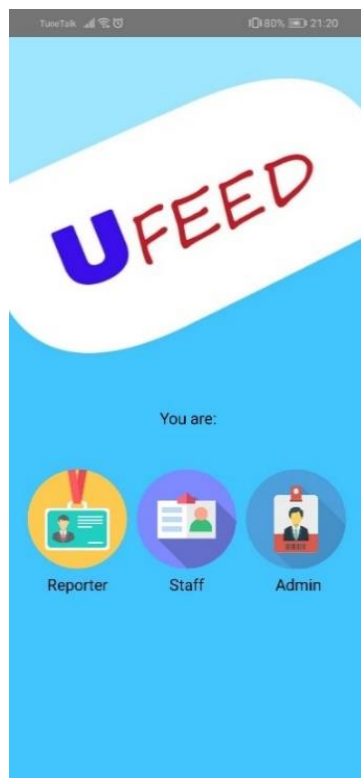
Figure 5.5: Login Screen for Choosing User Type
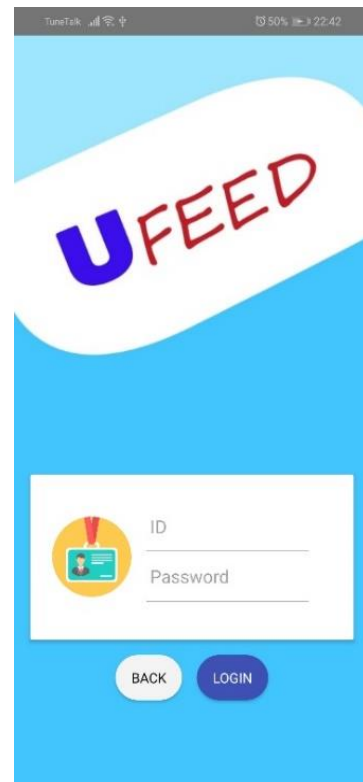
Figure 5.6: Reporter Login Interface

5.3.1.2 Choosing Feedback Type Fragment (Home Screen for Reporter)
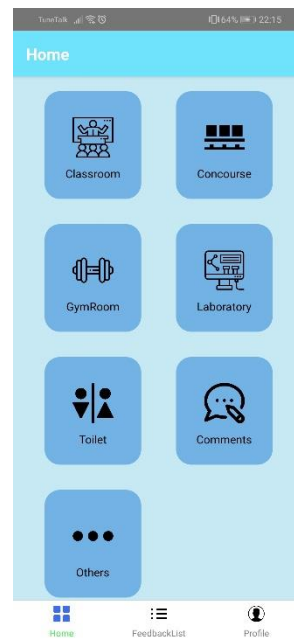
Figure 5.7: Home Screen

5.3.1.3 Detail Categories of Feedback
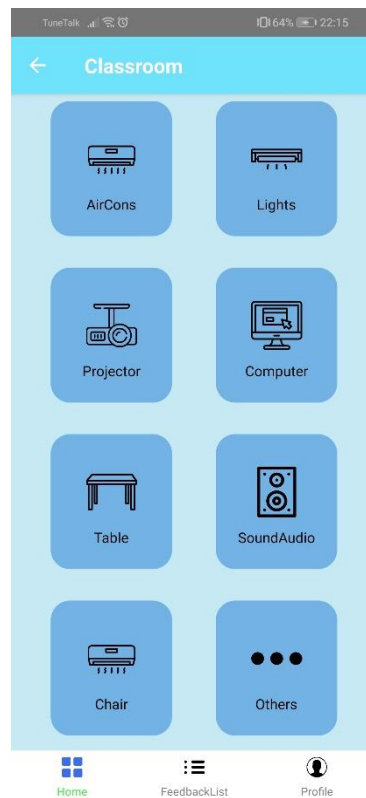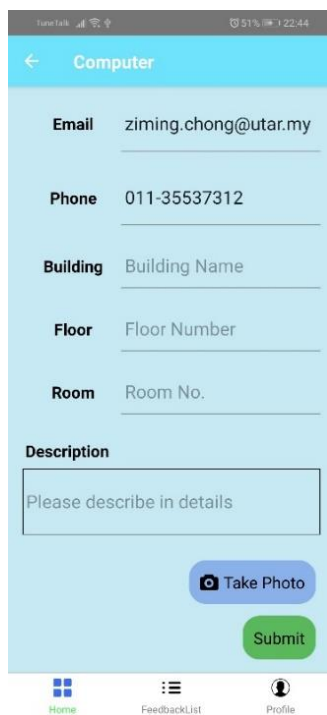
Figure 5.8: Detail Categories of Feedback

5.3.1.4 Giving Feedback Activity

Figure 5.9: Giving Feedback Activity

5.3.1.5 Feedback List Screen

Figure 5.10: Feedback List

5.3.1.6 View of Feedback
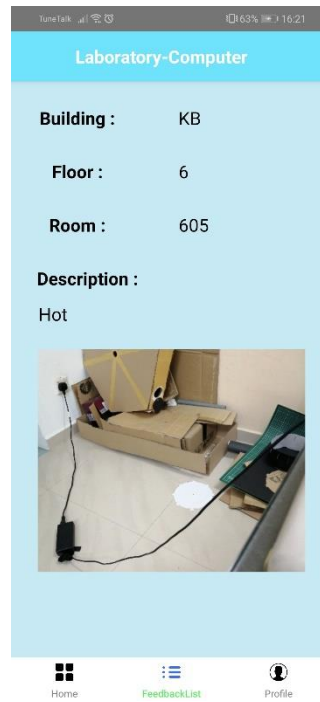
Figure 5.11: View of Feedback

5.3.1.7 Profile Screen
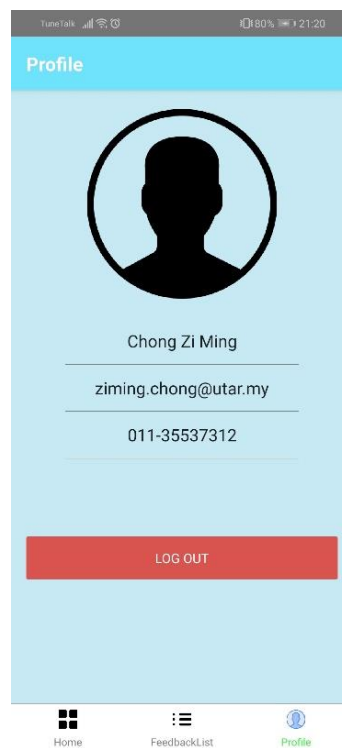
Figure 5.12: Profile Screen

5.3.2   Staff Site

Figure 5.13 shows the login screen design for staffs. It has the same UI as Figure 5.5 which allows users to choose their login type. Figure 5.14, 5.15 and 5.16 show the feedback list on staff site. Staff can filter the feedbacks list by its progress on the sidebar in Figure 5.17. There are only three type of progress which are pending, handling and solved. It allows staffs to choose the filter of feedback list. Staffs can logout the application by clicking the logout button on the sidebar. Figure 5.18 is the UI of viewing a feedback. It allows staffs to update the progress of feedback.

5.3.2.1 Login Interface
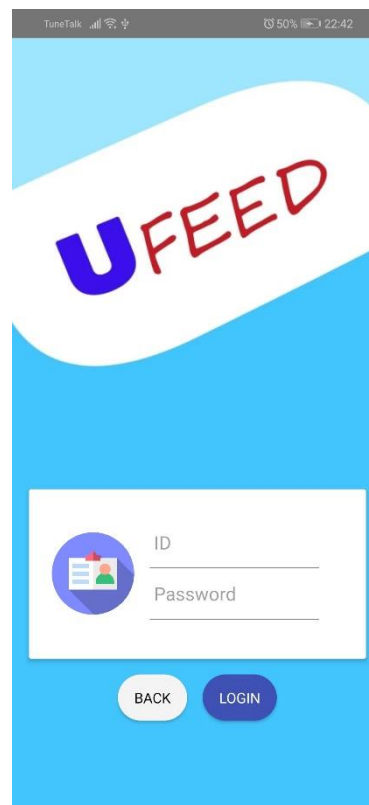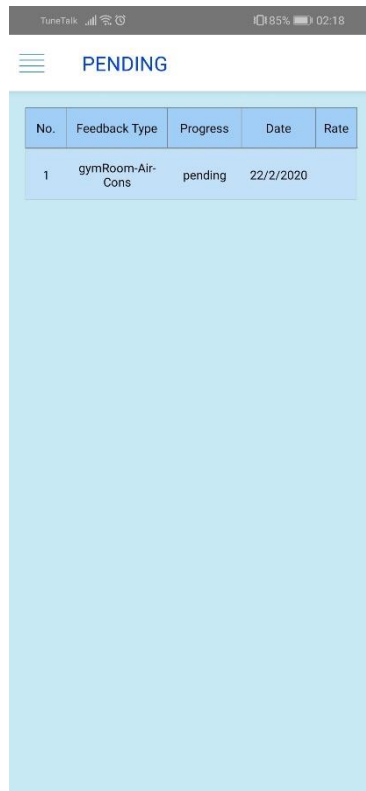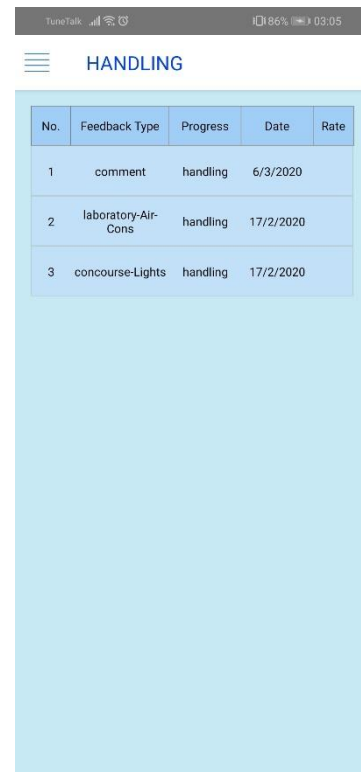
Figure 5.13: Staff Login Interface

5.3.2.2 Staff Feedback List with Filter
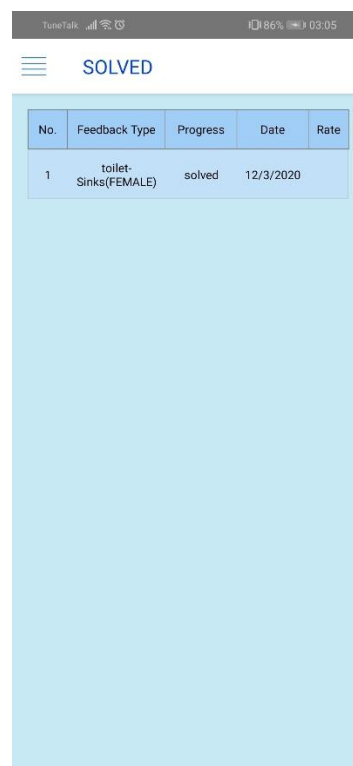
No.	Feedback Type	Progress	Date	Rate
1	gymRoom-Air-Cons	pending	22/2/2020	

Figure 5.14: Staff Feedback List (Pending)

No.	Feedback Type	Progress	Date	Rate
1	comment	handling	6/3/2020	
2	laboratory-Air-Cons	handling	17/2/2020	
3	concourse-Lights	handling	17/2/2020	

Figure 5.15: Staff Feedback List (Handling)

No.	Feedback Type	Progress	Date	Rate
1	toilet-Sinks(FEMALE)	solved	12/3/2020	

Figure 5.16: Staff Feedback List (Solved)

5.3.2.3 Sidebar (Staff)
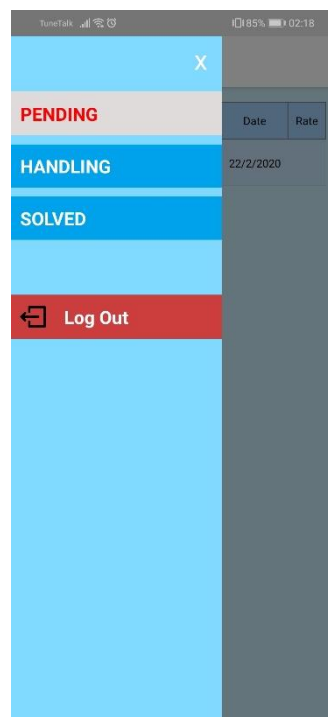
Figure 5.17: Sidebar (Staff)

5.3.2.4 View of Feedback (Staff)
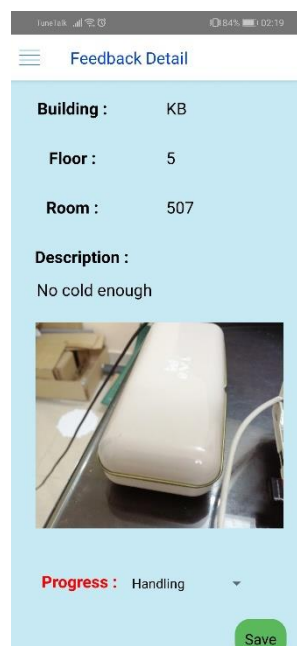
Figure 5.18: View of Feedback (Staff)

5.3.3 Admin Site

Figure 5.19 was the login page for admin while Figure 5.20 was the new feedback list which were not assigned to any staff. Figure 5.21 was the sidebar on admin site. Besides of filtering the feedback list, admin can navigate to new feedback list screen, manage categories screen, report analytics screen and logout function. Figure 5.22 was the view of a feedback. Admin could view the detail information of the feedback and allowed admin to assign the feedback to any staff. Figure 5.23 was the screen of managing categories while Figure 5.24 was the screen of analytic report per month.

5.3.3.1 Login Interface
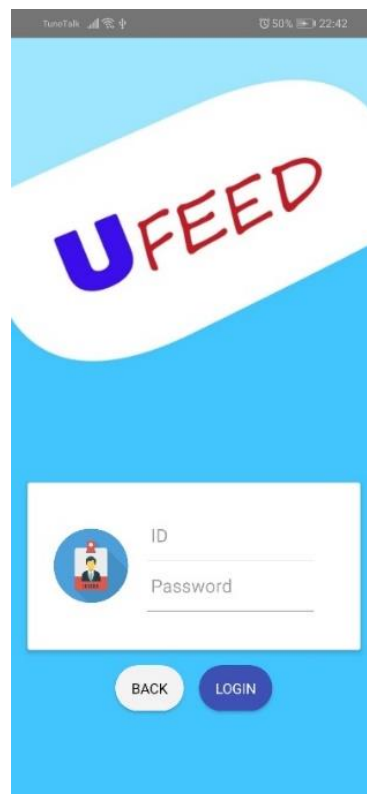
Figure 5.19: Admin Login Interface

5.3.3.2 New Feedbacks
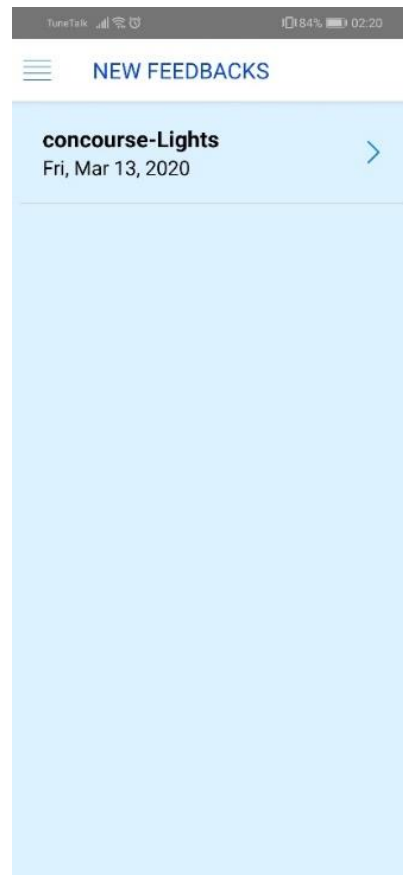
Figure 5.20: New Feedback Screen

5.3.3.3 Admin Feedback List with Filter

Admin site have the same interface of viewing feedback list with filter.

5.3.3.4 Sidebar (Admin)
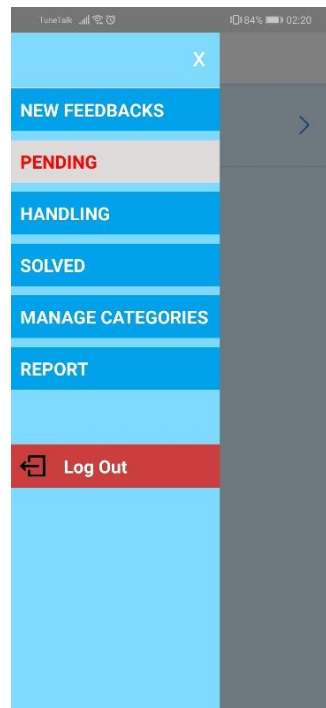
Figure 5.21: Sidebar (Admin)

5.3.3.5 View of Feedback (Admin)
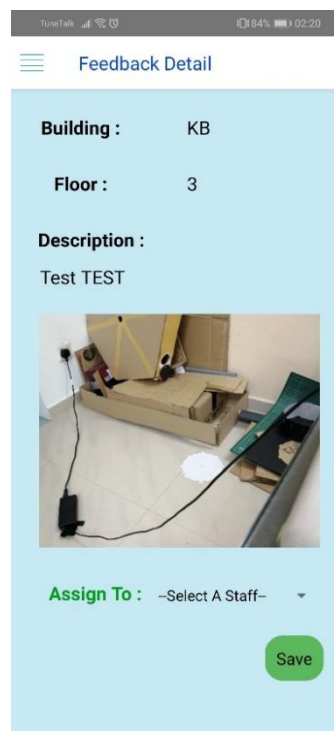
Figure 5.22: View of Feedback (Admin)

5.3.3.6 Manage Categories
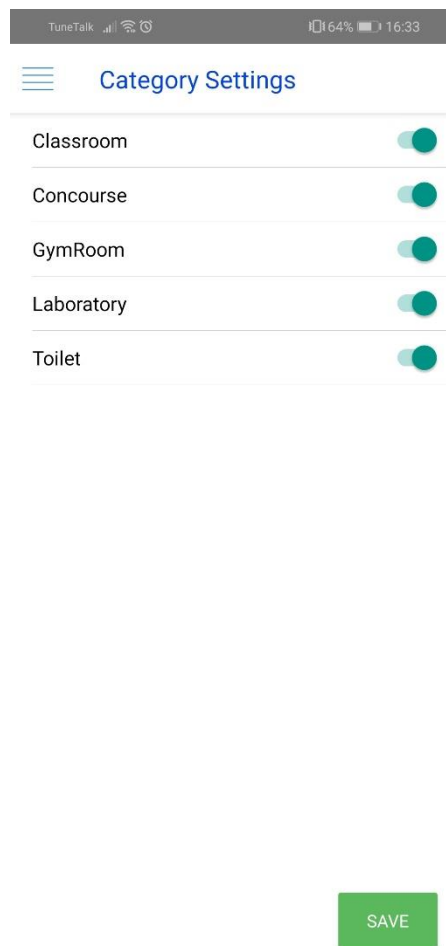
Figure 5.23: Manage Categories

5.3.3.7 Analytic Report
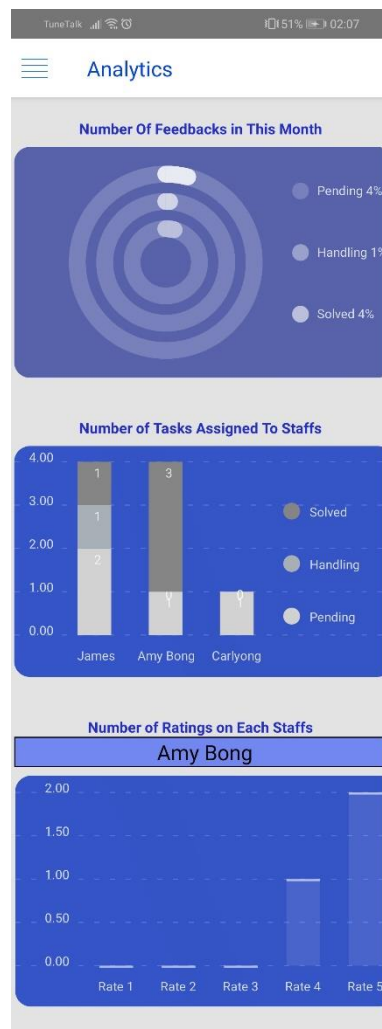
Figure 5.24: View of Analytic Report

CHAPTER 6

IMPLEMENTATION

6.1 Introduction

This chapter was describing about the implementation of this project. Section 6.2 describes about the login method of this application. Section 6.3, 6.4 and 6.5 describe about implementation of user (reporter), admin and staff site respectively.

6.2 Login

6.2.1 Distinguish User

When users login to this application, they need to choose the type of user to login. In Figure 6.1, we could see that there were three type of user to login as. Once the user chooses the type of user, enter their login id and password, the backend API in Figure 6.2, would find the relevant data. When the data was found, and password was correct, it would be stored in an asyncstorage.

```javascript
let users = await firebase.firestore()
  .collection(personalDetails.type)

let loginUser = users.where(id, '==', personalDetails.id).get()
  .then(snapshot => {
    if (snapshot.empty) {
      console.log('No Matching Documents');
      message = 'Incorrect Id Number !';
      loginComplete(user, message);
      return;
    }

    snapshot.forEach(doc => {
      user = doc.data();
    });

    if(user.password != personalDetails.password) {
      message = 'Incorrect Passsword !';
    } else {
      message = 'SUCCESS';
    }

    loginComplete(user, message);

  })
  .catch(err => {
    console.log('Error getting documents', err);
    loginComplete(user, err);
  })
}
```


Figure 6.1: User Type for Login   **Figure 6.2: Authentication API**

6.2.2 Keeping User Logged in

When user returned or reopened the application, it would find the user data from the asyncstorage. If user data was found, it would redirect user to the home page.

```javascript
async _readSettings() {
  try {
    let type = await AsyncStorage.getItem('type');

    if (type != null) {
      // this.props.navigation.navigate('Home');
      if (type == 'authors') {
        this.props.navigation.navigate('Home');
      } else if (type == 'staffs') {
        this.props.navigation.navigate('Staff');
      } else {
        this.props.navigation.navigate('Admin');
      }
    }

    this.setState({
      isLoading: false
    });
  } catch (error) {
    console.log('## ERROR READING ITEM ##: ', error);
  }
}
```

Figure 6.3 Checking User Logged in Status

6.3   User (Reporter) Sie Implementation

6.3.1   Giving Feedback

On every feedback reported by users, it required users to upload a photo as a must. When user clicked the button of inserting photo, it would launch the camera or gallery for user to insert a photo. Figure 6.4 shows that the application would launch the image picker when user pressing the take photo button.

```
pickImageHandler() {
  ImagePicker.showImagePicker({title: "Pick an Image", maxWidth: 800, maxHeight: 600}, res => {
    if (res.didCancel) {
      console.log("User cancelled!");
    } else if (res.error) {
      console.log("Error", res.error);
    } else {
      const source = { uri: res.uri, path: res.path}
      console.log(source);
      this.setState({
        photoUri: source,
        show: true
      });
    }
  });
}
```

Figure 6.4: Image Picker

When the user submitted the feedback, an API would be call to upload the feedback to database. For uploading a feedback, the application would store the image in database first. In Figure 6.6, an API would be called to retrieve the download URL of the image then only store the image URL with feedback into the database. Figure 6.5 was about storing feedback into database. Once feedback was given, it would send back a message to inform user whether the feedback was saved successfully.

```
export function addFeedback(feedback, addComplete) {
  feedback.createdAt = firebase.firestore.FieldValue.serverTimestamp();

  firebase.firestore()
    .collection('feedbacks')
    .add(feedback)
    .then((snapshot) => {
      feedback.feedbackId = snapshot.id;
      snapshot.set(feedback);
    }).then(() => addComplete('success'))
    .catch((error) => addComplete('fail'));
}
```

Figure 6.5: Upload Feedback API

```javascript
export function uploadFeedback(feedback, onFeedbackUploaded, { updating }) {

  if (feedback.photoUri) {
    const imageUri = feedback.photoUri;

    const fileExtension = imageUri.split('.').pop();
    console.log("EXT: " + fileExtension);

    var uuid = uuid4();

    const fileName = `${uuid}.${fileExtension}`;
    console.log(fileName);

    var storageRef = firebase.storage().ref(`feedbacks/images/${fileName}`);
    console.log(storageRef);

    storageRef.putFile(imageUri)
      .on(
        firebase.storage.TaskEvent.STATE_CHANGED,
        snapshot => {
          console.log("snapshot: " + snapshot.state);
          console.log("progress: " + (snapshot.bytesTransferred / snapshot.totalBytes) * 100);

          if (snapshot.state === firebase.storage.TaskState.SUCCESS) {
            console.log("Success");
          }
        },
        error => {
          unsubscribe();
          console.log("image upload error: " + error.toString());
        },
        () => {
          storageRef.getDownloadURL()
            .then((downloadURL) => {
              console.log("File available at: " + downloadURL);

              if (updating) {
                feedback.photo_Solved = downloadURL;

                delete feedback.photoUri;

                console.log("updating...");
                let site = 'staff';
                updateFeedback(feedback, onFeedbackUploaded, site);
              } else {
                feedback.photo = downloadURL;

                delete feedback.photoUri;

                console.log("adding...");
                addFeedback(feedback, onFeedbackUploaded);
              }
            })
        }
      )
  } else {
    let site = 'staff';
    updateFeedback(feedback, onFeedbackUploaded, site);
  }
}
```

Figure 6.6: Upload and Retrieve Image URL API

6.3.2 Viewing Feedback

When user wanted to view a feedback they reported before, an API in Figure 6.7 would return a list of feedback. User could choose which feedback to view. Another API in Figure 6.8 would be called to return the feedback.

```javascript
export async function getFeedbacks(users, feedbacksRetrieved) {

  var feedbackList = [];
  var userid = '';

  if (users.type == 'authors') {
    userid = 'author.id';
  } else {
    userid = 'staff.id';
  }

  var snapshot = await firebase.firestore()
    .collection('feedbacks')
    .where(userid, '==', users.id)
    .get()

  if (snapshot.empty) {
    console.log('No Mathcing Documents');
    feedbacksRetrieved(feedbackList);
    return;
  }

  snapshot.forEach((doc) => {
    feedbackList.push(doc.data());
  });

  feedbacksRetrieved(feedbackList);
}
```

Figure 6.7: Retrieve Feedback List API

```javascript
export async function getFeedback(id, feedbackRetrieved) {

  var feedback = null;

  var snapshot = await firebase.firestore()
    .collection('feedbacks')
    .doc(id)
    .get()
    .then(doc => {
      if (!doc.exists) {
        console.log('No such document!');
      } else {
        feedback = doc.data();
        feedbackRetrieved(feedback);
      }
    })
    .catch(err => {
      console.log('Error getting document', err);
    });
}
```

Figure 6.8: Retrieve Specific Feedback API

6.4   Admin Site Implementation

6.4.1   Assign New Feedback

When a new feedback was reported, it would be sent to admin site first. An API in Figure 6.9 was called to return new feedbacks. After admin assigned the feedbacks to staffs, an API in Figure 6.10 was called to updated the feedback in database. At the same time, it would ask admin to send an email to the specific staff. Figure 6.11 shows the email application called when the feedback was updated successfully.

```javascript
export async function getAllNewFeedbacks(feedbacksRetrieved) {

  var feedbackList = [];

  var snapshot = await firebase.firestore()
    .collection('feedbacks')
    .where('staff', '==', '')
    .get()

    if (snapshot.empty) {
      feedbacksRetrieved(feedbackList);
      return;
    }

    snapshot.forEach((doc) => {
      feedbackList.push(doc.data());
    });

    feedbacksRetrieved(feedbackList);
}
```

Figure 6.9: Retrieve New Feedbacks API

```
export function updateFeedback(feedback, feedbackUpdated, site) {

  var updatedAt = firebase.firestore.FieldValue.serverTimestamp();
  let updateValue  = null;

  if (site == 'staff') {
    updateValue = {
      updatedAt: updatedAt,
      comment: feedback.comment,
      progress: feedback.progress,
      photo_Solved: feedback.photo_Solved
    };

  } else if (site == 'admin') {
    updateValue = {
      updatedAt: updatedAt,
      'staff.name': feedback.staff.name,
      'staff.id': feedback.staff.staffId,
      'staff.email': feedback.staff.email
    };
  }

  var snapshot = firebase.firestore()
    .collection('feedbacks')
    .doc(feedback.id)
    .update(updateValue)
    .then(() => sendEmail(feedback, site))
    .then(() => feedbackUpdated('success'))
    .catch((error) => feedbackUpdated('fail'));
}
```

Figure 6.10: Update Feedback API

```
function setEmail(recipients, body, subject) {
  Mailer.mail({
    subject: subject,
    recipients: [recipients],
    ccRecipients: [],
    bccRecipients: [],
    body: body,
    isHTML: true,
    attachment: {
      path: '',  // The absolute path of the file from which to read data.
      type: '',   // Mime Type: jpg, png, doc, ppt, html, pdf, csv
      name: '',   // Optional: Custom filename for attachment
    }
  }, (error, event) => {
    Alert.alert(
      error,
      event,
      [
        {text: 'Ok', onPress: () => console.log('OK: Email Error Response')},
        {text: 'Cancel', onPress: () => console.log('CANCEL: Email Error Response')}
      ],
      { cancelable: false }
    )
  });
}
```

Figure 6.11: Send Email

6.4.2 Viewing Feedbacks

In Admin site, admin could view the progress of information of any feedbacks. All the feedbacks were returned according to the filter. There were three filters on the progress of a feedback which were pending, handling and solved. An API in Figure 6.12 was called to return feedbacks based on filter. The same API would be called when a specific feedback is selected.

```javascript
export async function getAllFeedbacksWithFilter(filter, feedbacksRetrieved) {

  var feedbackList = [];

  var snapshot = await firebase.firestore()
    .collection('feedbacks')
    .where('progress', '==', filter)
    .get()

    if (snapshot.empty) {
      console.log('No Mathcing Documents');
      feedbacksRetrieved(feedbackList);
      return;
    }

    snapshot.forEach((doc) => {
      if (doc.data().staff) {
        feedbackList.push(doc.data());
      }
    });

    feedbacksRetrieved(feedbackList);
}
```

Figure 6.12: Retrieve Feedbacks with Filter API

6.4.3   Managing Categories of Feedback

Figure 6.13 was an extra function for admin to manage the categories of feedback in the university. By default, all the categories such as classroom, concourse, laboratory, gym room and toilet were available for user to choose for giving feedback. Admin could disable or enable the categories to be showed to users.

```javascript
export function updateCategories (uniId, categories, categoriesUpdated) {

  var updateValue = {
    categories: categories
  };

  var snapshot = firebase.firestore()
    .collection('universities')
    .doc(uniId)
    .update(updateValue)
    .then(() => categoriesUpdated('success'))
    .catch((error) => categoriesUpdated('fail'));
}
```

Figure 6.13: Update Categories API

6.4.4   Analytic Report

Figure 6.14 was extra functions also for admin to view a monthly analytic report. The reports included the total number of feedbacks, total number of feedbacks every staffs had on this month and grouped by the progress and total number of ratings of every staffs.

```javascript
export function processFeedbacksData(analyticDataRetreived) {=}

async function getFeedbacksByMonth(month) {=}

function getRequiredData(feedbackList) {=}

function getNumberOfFeedbacksPerMonth(feedbackList) {=}

function getNumberOfTasksOfStaffs(feedbackList) {=}

function getRatingOfStaffs(feedbackList) {=}
```

Figure 6.14: Retrieve Analytic Report

6.5 Staff Site Implementation

6.5.1 Updating Progress of Feedback

Staff would receive an email from admin when he/she was assigned a task (feedback). The same API in Figure 6.12 were called to return feedbacks according to the filter (pending, handling, solved). The same API in Figure 6.8 would retrieve the feedback. Staff could update the progress of feedback. The API in Figure 6.10 would update the feedback and send an email to the user who reported it.

CHAPTER 7

TESTING

7.1   Introduction

This chapter describes testing method carried on this project. Section 7.2 describes unit testing of this project while Section 7.3 is about integration testing. User Acceptance Testing had been carried and described in Section 7.4.

7.2   Unit Testing

Unit testing was conducted by testing on the individual unit programs to ensure that those functions were working well. In this project, unit testing was more focus on API of this project to test the data retrieved and saved. APIs involved in unit testing were Feedback API, Auth API, Category API, Staff API, Send Email API and Analytic API.

7.2.1   Feedback API

7.2.1.1 Add New Feedback

Table 7.1: Add New Feedback Test Case

Test Case	Test Procedure	Expected Result	Status (Pass / Fail)
Empty field validation	1. Click submit button in the form without filling in any field.	Submit feedback fail with warning message to take photo and fill in all the field.	Pass
Photo validation	1. Fill in all the require data in the feedback form. 2. Click the submit button without taking photo.	Submit feedback fail with warning message to take photo.	Pass

Report feedback	1. Fill in all the require data including taking photo in the feedback form. 2. Click the submit button.	Submit feedback successfully with thank you message.	Pass

7.2.1.2 Get Feedbacks Reported

Table 7.2: Get Feedbacks Reported Test Case

Test Case	Test Procedure	Expected Result	Status (Pass / Fail)
Empty feedback list	1. Login as new users (reporter). 2. Go to feedback list screen.	Message of empty feedback list.	Pass
View feedback list	1. Login as existing user (reporter) or report any feedbacks. 2. Go to feedback list screen.	A table with feedback list	Pass

7.2.1.3 Get Feedbacks with Filter

Table 7.3: Get Feedbacks with Filter Test Case

Test Case	Test Procedure	Expected Result	Status (Pass / Fail)
Empty feedback list	1. Login as new staff. 2. Go to pending, handling and solved screen in sidebar.	Message of empty feedback list.	Pass
View pending feedback list	1. Login as existing staff or assigned tasks by admin. 2. Go to pending screen in sidebar.	A table of his/her feedback list with progress of pending only.	Pass
View handling feedback list	1. Login as existing staff. 2. Go to handling screen in sidebar.	A table of his/her feedback list with progress of handling only.	Pass
View solved feedback list	1. Login as existing staff. 2. Go to solved screen in sidebar.	A table of his/her feedback list with progress of solved only.	Pass

7.2.1.4 Get All New Feedbacks

Table 7.4: Get All New Feedbacks Test Case

Test Case	Test Procedure	Expected Result	Status (Pass / Fail)
Empty feedback list	1. Login as admin. 2. Go to new feedbacks screen in sidebar.	Message of empty feedback list.	Pass
View new feedbacks	1. Login as admin. 2. Go to new feedbacks screen in sidebar.	A list of new feedbacks.	Pass

7.2.1.5 Get Feedback

Table 7.5: Get Feedback Test Case

Test Case	Test Procedure	Expected Result	Status (Pass / Fail)
View feedback	1. Select a feedback to view.	Return of the feedback detail	Pass

7.2.1.6 Upload Feedback

Table 7.6: Upload Feedback Test Case

Test Case	Test Procedure	Expected Result	Pass / Fail
Empty photo	1. Click submit button in the form without filling in any field.	Submit feedback fail with warning message to take	Pass

		photo and fill in all the field.	
Report feedback	1. Fill in all the require data including taking photo in the feedback form. 2. Click the submit button.	Return of image downloaded URL and call add feedback API.	Pass

7.2.1.7 Update Feedback

Table 7.7: Upload Feedback Test Case

Test Case	Test Procedure	Expected Result	Status (Pass / Fail)
Update feedback with empty photo	1. Login as staff. 2. Select the progress of feedback as "solved". 3. Click the save button.	Submit feedback fail with warning message to take photo.	Pass
Update progress	1. Login as staff. 2. Select the progress of feedback as "solved" with a photo. 3. Click the save button.	Submit feedback successfully with thank you message and call send email API.	Pass
Update progress	1. Login as staff.	Submit feedback successfully with thank you message	Pass

	2. Update the progress of feedback from "pending" to "handling". 3. Click the save button.	and call send email API.	
Assign staff	1. Login as admin. 2. Assign new feedbacks to a staff. 3. Click the save button.	Submit feedback successfully with thank you message and call send email API.	Pass

7.2.1.8 Assign Staff

<p align="center">Table 7.8: Assign Staff Test Case</p>

Test Case	Test Procedure	Expected Result	Status (Pass / Fail)
Assign staff	1. Login as admin. 2. Assign new feedbacks to a staff. 3. Click the save button.	Update feedback API and get staff data API is called.	Pass

7.2.1.9 Get Staff

Table 7.9: Get Staff Test Case

Test Case	Test Procedure	Expected Result	Status (Pass / Fail)
Retrieve staff personal information	1. Login as admin. 2. Assign new feedbacks to a staff. 3. Click the save button.	The specific staff information is returned.	Pass

7.2.1.10 Update Rating

Table 7.10: Update Rating Test Case

Test Case	Test Procedure	Expected Result	Status (Pass / Fail)
Give rating	1. Login as reporter. 2. View feedback which is resolved. 3. Click the "Rate Me" button. 4. Select the rate. 5. Click submit button.	Submit feedback successfully with thank you message.	Pass

7.2.1.11 Get All Feedbacks with Filter

Table 7.11: Get All Feedbacks with Filter Test Case

Test Case	Test Procedure	Expected Result	Status (Pass / Fail)
Empty feedback list	1. Login as new admin. 2. Go to pending, handling and solved screen in sidebar.	Message of empty feedback list.	Pass
View pending feedback list	1. Login as admin 2. Go to pending screen in sidebar.	A table with all feedback list with progress of pending only.	Pass
View handling feedback list	1. Login as admin. 2. Go to handling screen in sidebar.	A table with all feedback list with progress of handling only.	Pass
View solved feedback list	1. Login as staff. 2. Go to solved screen in sidebar.	A table with all feedback list with progress of solved only.	Pass

7.2.2   Auth API

7.2.2.1 Login

Table 7.12: Login Test Case

Test Case	Test Procedure	Expected Result	Status (Pass / Fail)
Login validation	1. Login with empty user id or password	Login fail with warning message of filling all the required data.	Pass
Login validation	1. Login with incorrect user id but correct password	Login fail with warning message of incorrect id number.	Pass
Login validation	1. Login with correct user id but incorrect password	Login fail with warning message of incorrect password.	Pass
Login	1. Login with correct username and password	Return of a user's detail information.	Pass

7.2.3   Category API

7.2.3.1 Get University

Table 7.13: Get University Test Case

Test Case	Test Procedure	Expected Result	Status (Pass / Fail)
Retrieve particular university information	1. Login as admin 2. Go to "Manage Categories" screen.	Return of specific university information with categories data.	Pass

7.2.3.2 Update Categories

Table 7.14: Update Categories Test Case

Test Case	Test Procedure	Expected Result	Status (Pass / Fail)
Update Categories	1. Login as admin 2. Go to "Manage Categories" screen. 3. Disable or enable a category. 4. Click save button.	Return of an update successfully message.	Pass

7.2.4   Staff API

7.2.4.1 Get All Staffs

Table 7.15: Get All Staffs Test Case

Test Case	Test Procedure	Expected Result	Status (Pass / Fail)
Retrieve all staffs	1. Login as admin. 2. Select a feedback which want to assign staff.	Return all staffs information.	Pass

7.2.5   Send Email API

7.2.5.1 Send Email

Table 7.16: Send Email Test Case

Test Case	Test Procedure	Expected Result	Status (Pass / Fail)
Send email	1. Login as admin or staff. 2. Updating on feedback.	Call set email function with recipients and sender email and get feedback reporter API.	Pass

7.2.5.2 Set Email

<p align="center">**Table 7.17: Set Email Test Case**</p>

Test Case	Test Procedure	Expected Result	Status (Pass / Fail)
Send email	1. Login as admin 2. Updating on feedback.	Open email apps in the device.	Pass

7.2.5.3 Get Feedback Reporter

<p align="center">**Table 7.18: Get Feedback Reporter Test Case**</p>

Test Case	Test Procedure	Expected Result	Status (Pass / Fail)
Retrieve the feedback reporter' or staff email address	1. Login as admin or staff. 2. Updating on feedback.	Return of specific staff or reporter email address.	Pass

7.2.6   Analytic API

7.2.6.1 Process Feedback Data

Table 7.19: Process Feedback Data Test Case

Test Case	Test Procedure	Expected Result	Status (Pass / Fail)
Retrieve data to show analytic report	1. Login as admin. 2. Go to "Report" screen in sidebar.	Called "getFeedbacksByMonth" and "getRequireData" function at least one time.	Pass

7.2.6.2 Get Feedbacks by Month

Table 7.20: Get Feedbacks by Month Test Case

Test Case	Test Procedure	Expected Result	Status (Pass / Fail)
Retrieve feedbacks that reported or updated on this month	1. Login as admin. 2. Go to "Report" screen in sidebar.	Return of feedback lists reported or updated on this month.	Pass

7.2.6.3 Get Required Data

Table 7.21: Get Required Data Test Case

Test Case	Test Procedure	Expected Result	Status (Pass / Fail)
Process data retrieved into analytics data.	1. Login as admin. 2. Go to "Report" screen in sidebar.	Called "getNumberOfFeedbacksPerMonth", "getNumberOfTasksOfStaffs" and "getRatingOfStaffs" at least once.	Pass

7.2.6.4 Get Number of Feedbacks Per Month

Table 7.22: Get Number of Feedbacks Per Month Test Case

Test Case	Test Procedure	Expected Result	Status (Pass / Fail)
Get the number of feedbacks reported or updated on this month.	1. Login as admin. 2. Go to "Report" screen in sidebar.	Return a total number of feedbacks that are pending, handling and solved in this month	Pass

7.2.6.5 Get Number of Tasks of Staffs

Table 7.23: Get Number of Tasks of Staffs Test Case

Test Case	Test Procedure	Expected Result	Status (Pass / Fail)
Get the number of feedbacks of every staffs assigned on this month.	1. Login as admin. 2. Go to "Report" screen in sidebar.	Return a total number of feedbacks in different progress of every staffs have on this month.	Pass

7.2.6.6 Get Ratings of Staffs

Table 7.24: Get Ratings of Staffs Test Case

Test Case	Test Procedure	Expected Result	Status (Pass / Fail)
Get the number of ratings given by reporters on this month when the	1. Login as admin. 2. Go to "Report" screen in sidebar.	Return a total number of ratings of different rates in this month.	Pass

7.3   Integration Testing

Integration testing was carried after the unit testing was done. The following subsection was the integration testing on the API which were tested in unit testing.
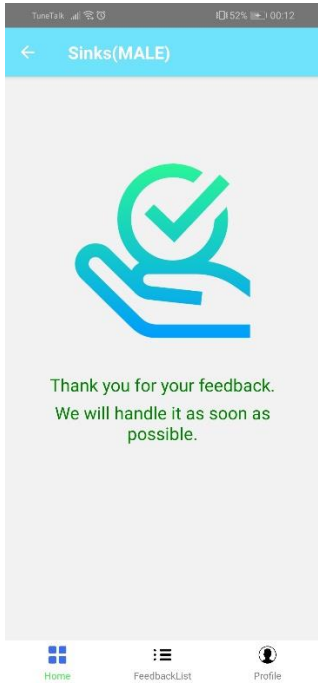
7.3.1   Login

Table 7.25: Login Integration Test Case

Test Case	Login as reporters / staff / admin
Test Procedure	1. Click on the users type you want to login as. 2. Fill in all required fields (user id and password). 3. Click the login button.
Expected Results	Login successfully, saving user data and navigating user to their home page.
Status (Pass / Fail)	Pass

7.3.2 Giving Feedback

Table 7.26: Giving Feedback Integration Test Case

Test Case	Giving feedback
Test Procedure	1. Choose the categories / type of your feedback. 2. Fill in all the required fields. 3. Take a photo or select a photo from gallery that related to the feedback. 4. Click the submit button.
Expected Results	Submit successfully with a new screen view
Status (Pass / Fail)	Pass

7.3.3   Updating Feedback

Table 7.27: Updating Feedback Integration Test Case (1)
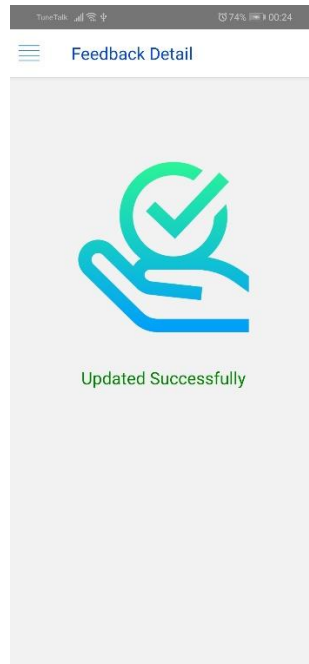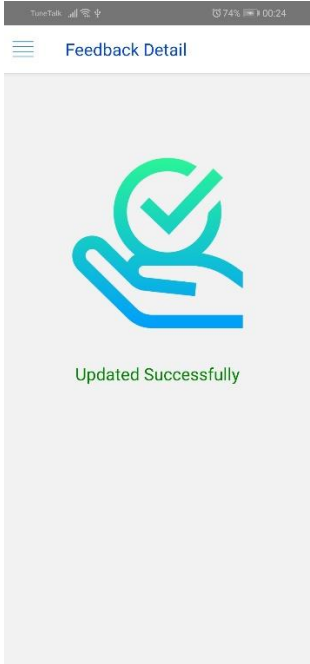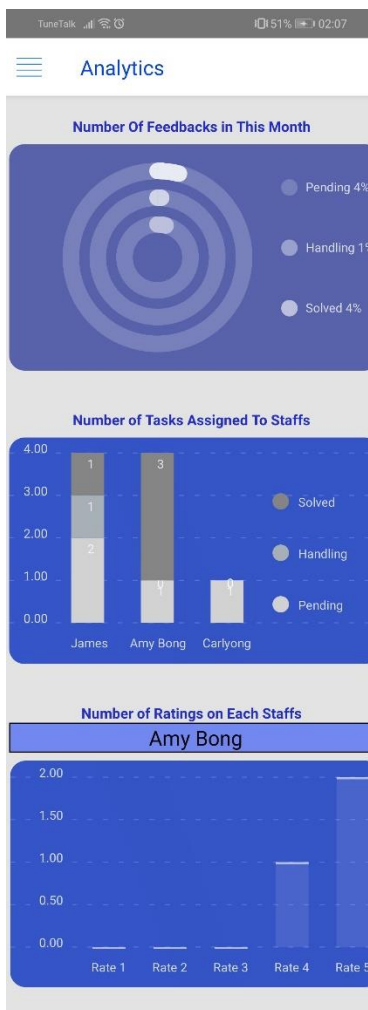
Test Case	Staffs change the progress of feedback
Test Procedure	1. Login as staff. 2. Select the feedback that want to start handling. 3. Change the progress of feedback. (ex: changing the progress of "pending" to "handling") 4. Click save button.
Expected Results	Update successfully with a new screen view and Email App is opened.
Status (Pass / Fail)	Pass

Table 7.28: Updating Feedback Integration Test Case (2)

Test Case	Admin assigns feedbacks to staffs
Test Procedure	1. Login as admin. 2. New feedbacks were reported. 3. Select a feedback to assign a staff for it. 4. Click save button.
Expected Results	Update successfully with a new screen view and Email App is opened.
Status (Pass / Fail)	Pass

7.3.4 Analytic Report

Table 7.29: Analytic Report Integration Test Case

Test Case	Admin assigns feedbacks to staffs
Test Procedure	1. Login as admin. 2. Go to "Report" screen in sidebar.
Expected Results	Return of a set of analytic data which related to feedbacks reported or updated in this month.
Status (Pass / Fail)	Pass

7.4   User Acceptance Testing (UAT)

This section describes the UAT test cases on reporters, staffs and admin site. The following sections was the test cases and results. Table 7.1, 7.2 and 7.3 were the table used for recording the results (time required) of a tester to complete each test scenario. The "Comments" column was used to record any feedback given by tester. Section 7.4.4, 7.4.5 and 7.4.6 were the results of UAT. 4 testers were selected to test on each actor. The test results were analysed and recorded in Table 7.4, 7.5 and 7.6.

7.4.1   Test Case for Reporters

Table 7.30: Test Case for Reporters

Testing Date				
Tester Name				
Test Module	Test Procedure	Status (Pass / Fail)	Time Required	Comments

Login	1. Reporter selects the login type.
	2. Enter the student id and password as below:
	   o student id: 1702298
	   o password: pass2298			

Change Personal Information	1. Reporter wants to correct his/her personal information.			
Giving Feedback	1. Reporter wants to giving a feedback. 2. Reporter give a feedback according to the scenario given below: ▪ The sound audio in the lecture room KB201 is broken.			

	With unknown reason, there is an eco when the lecturer starts to talk using the mic. One of the speakers must be broken but you do not know which of it.			
View Feedback	1. Reporter had made a feedback. 2. Reporter wants to view the feedback detail and progress of it.			
Giving Rate on Solved Feedback	1. After a staff had resolved the feedback reported by him/her. 2. Reporter wants to give a rating on the staff's performance.			
Logout	1. Reporter wants to logout this application.			

7.4.2   Test Case for Admin

Table 7.31: Test Case for Admin

Testing Date				
Tester Name				
Test Module	Test Procedure	Status (Pass / Fail)	Time Required	Comments

Login	1. Admin selects the login type.
	 2. Enter the admin id and password as below:
	    o admin id: 2066698
	    o password: admin6698			

Assign New Feedbacks to Staffs.	1. There is a new feedback reported. 2. Assign the feedback to a staff named "Carlyong".			
View Feedbacks	1. Admin wants to view feedbacks which progress is "pending" 2. Admin wants to know which feedbacks are handling by staffs. 3. Admin wants to know which feedbacks had been resolved.			
Update Categories	1. Admin wants to update the categories that can be selected by reporters for giving feedbacks. 2. Admin disable/enable the Toilet category.			

View Feedbacks Analytic	1. Admin wants to have a report on feedbacks and staffs in this month.			
Logout	1. Admin wants to logout this application.			

7.4.3 Test Case for Staffs

Table 7.32: Test Case for Staff

Testing Date				
Tester Name				
Test Module	**Test Procedure**	**Status (Pass / Fail)**	**Time Required**	**Comments**
Login	1. Staff selects the login type. 2. Enter the staff id and password as below: o staff id: 1701457 o password: carl1457			
Update progress of feedbacks	1. Staff updates the progress of feedback according to the steps below: 1. pending → handling 2. handling → solved			
View Feedbacks	1. Staff wants to view feedbacks which progress is "pending" 2. Staff wants to know which feedbacks are handling by staffs. 3. Staff wants to know which feedbacks had been resolved.			

Logout	1. Staff wants to logout this application.			

7.4.4 Test Results for Reporters

Table 7.33: Test Result for Reporters

Test Module	Number of Test Conducted	Number of Test Passed	Average time	Comments
Login	4	4	24s	
Change Personal Information	4	4	40s	
Giving Feedback	4	4	1m 58s	
View Feedback	4	4	10s	
Giving Rate on Solved Feedback	4	4	21s	- Drag on giving rate is not smooth enough.
Logout	4	4	4s	

7.4.5 Test Results for Admin

Table 7.34: Test Result for Admin

Test Module	Number of Test Conducted	Number of Test Passed	Average time	Comments
Login	4	4	23s	
Assign New Feedbacks to Staffs.	4	4	22s	
View Feedbacks	4	4	1m 27s	
Update Categories	4	4	13s	- Same Categories pop out when continue to disable / enable it
View Feedbacks Analytic	4	4	8s	
Logout	4	4	5s	

7.4.6 Test Results for Staffs

Table 7.35: Test Result for Staffs

Test Module	Number of Test Conducted	Number of Test Passed	Average time	Comments
Login	4	4	24s	
Update progress of feedbacks	4	4	1m 20s	
View Feedbacks	4	4	28s	
Logout	4	4	3s	

CHAPTER 8

CONCLUSION & RECOMMENDATION

8.1   Introduction

This chapter describes the conclusion and recommendation of this project. Section 8.2 describes the contribution of the application. Section 8.3 shows the recommendations and the future enhancements while Section 8.4 is the conclusion of this project.

8.2   Contribution of The Application

This mobile application would encourage students and help them to report a feedback easily. It enabled students to report a feedback and take photo on the spot. It had improved the usability of existing feedback system in the UTAR. It provided students an easy way to choose the feedback type and make it clearly to be understand the feedback type by staffs and admin. It also sent an email as a notification to students when progress of the feedback reported was updated. It helped students to follow up the progress of feedback easily.

This mobile application also helped staffs to do their tasks on feedbacks easily. It enabled staffs to update the progress of feedbacks instantly. It provided a filter function on feedbacks for staffs to find the feedbacks easily. The filter was used to filter the progress of feedbacks which were "pending", "handling" an "solved".

Admin could assign the new feedbacks to staffs easily. This mobile application helped admin to filter out new feedbacks, pending feedbacks, handling feedbacks and resolved feedbacks. Besides, this mobile application helped admin to control the main categories of feedbacks. Admin can show or hide the categories on reporter site. Besides, to help admin to follow up the feedbacks progress and performance of staffs monthly, this mobile application provided a monthly analytic report to catch up number of feedbacks reported and updated and also performance of staffs.

8.3 Recommendations and Future Enhancements

Although the application was developed and fulfilled all the specifications stated in scope statement, there were some limitations that can be improved in future. The table 8.1 below shows the limitations and improvements or enhancements that could improve the usability of this mobile application.

Table 8.1: Limitations and Recommendations for Future Work

Limitations	Recommendations
Categories for reporters to choose was limited.	Enable Admin to add new categories of feedback
Reporters needed to find out a hard way to talk directly, get help or ask questions to staffs.	Develop an AI chat box for users (reporters) to ask for help, checking feedback progress or report an informal feedback.
Admin was responsible all of the feedbacks and performance of staffs. It would be hard for admin to assign tasks if the number of staffs was too many.	Add a new level called "supervisors" to inspect the working performance of staffs instead of inspected by admin.
The analytic report only showed monthly report and could not be saved forever.	Enable admin to print daily, weekly and yearly reports on feedbacks and working performance of staffs and downloaded as a pdf file.

8.4   Conclusion

This project had been developed for 5 months and above since gathering requirements, designing the mobile application and its prototype, implementation and testing on this mobile application. Most of the activities were completed according to the Gant Chart designed in previous chapter.

At the beginning of this project, software requirements were collected through interviewing with UTAR students. They were selected randomly in the university. Data collected were analysed to generate the functional and non-functional requirements. In order to improve the existing feedback system of UTAR, research and analyse were done to find out the limitations of the existing feedback system. Limitations and advices on it were collected from UTAR students. Researches on creating a closed loop of feedback mechanism were done also to collect requirements.

During the design phase, a prototype was developed with storyboard provided as well, to discuss with supervisor and those interviewers for improving the design of the mobile application. Not at all, Use Case Diagram, ERD Diagram, Context Diagram and Level 1 Data Flow Diagram were created during this phase.

While for the implementation phase, all of the functions, APIs and UI were implemented with Android Studio. The database used in this project was Firebase which was a NoSQL cloud database. Unlike SQL database, all the data including feedbacks and users' information were stored in Firebase. The database was also implemented with Android Studio.

In testing phase, a unit testing, integration testing and UAT were conducted to make sure that the mobile application was bugs free as possible as we could and all the requirements and objectives were met.

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APPENDICES

APPENDIX A: Interview Questions and Responses

__Interview Questions__

1. Have you done or filled up the student's feedback form in UTAR portal before? Why?

2. What are the devices you used to fill up the student's feedback form? Mobile phone or pc (laptop) Why?

3. If no, how will you report or give feedback to the staff when defects occurred?

   (Skip to question 8 if you never make feedback before)

4. If yes, will you think that it is a waste of time to report the defects?

5. If yes, what kind of problems you have met during filling up the form?

6. If yes, have you received any notifications (email) from staff that update the progress of the feedback?

7. If yes, how long will the defects be handled and solved by staff?

8. Which part of the feedback form you think that it can be changed or improved?

9. If there is a mobile feedback application developed by UTAR, will you use it for reporting or giving feedback? Why?

<u>Response 1</u>

1. Have you done or filled up the student's feedback form in UTAR portal before? Why?
   No. Because I am waiting others to report.

2. What are the devices you used to fill up the student's feedback form? Mobile phone or pc (laptop) Why?
   Laptop. Because the screen is bigger and the Wi-Fi in UTAR is weak. I do not want to waste my data.

3. If no, how will you report or give feedback to the staffs when defects occurred?
   I will go to the FGO to report because face-to-face reporting is easier.

   (Skip to question 8 if you never make feedback before.)

4. If yes, will you think that it is a waste of time to report the defects?
   -

5. If yes, what kind of problems you have met during filling up the form?
   -

6. If yes, have you received any notifications (email) from staff that update the progress of the feedback?
   -

7. If yes, how long will the defects be handled and solved by staff?
   -

8. Which part of the feedback form you think that it can be changed or improved?
   No. It is good enough.

9. If there is a mobile feedback application developed by UTAR, will you use it for reporting or giving feedback? Why?
   Yes. It is because mobile app is more convenient. It will save time to report defects.

Response 2

1. Have you done or filled up the student's feedback form in UTAR portal before? Why?
   No. Because I am lazy and waiting for someone to report.

2. What are the devices you used to fill up the student's feedback form? Mobile phone or pc (laptop) Why?
   Laptop. Because laptop have a bigger screen than mobile phone.

3. If no, how will you report or give feedback to the staff when defects occurred?
   I will go to the FGO to report because face-to-face reporting are easier to report about the detail. I can get response from staffs immediately.

   (Skip to question 8 if you never make feedback before.)

4. If yes, will you think that it is a waste of time to report the defects?
   -

5. If yes, what kind of problems you have met during filling up the form?
   -

6. If yes, have you received any notifications (email) from staff that update the progress of the feedback?
   -

7. If yes, how long will the defects be handled and solved by staff?
   -

8. Which part of the feedback form you think that it can be changed or improved?
   No. It is good enough.

9. If there is a mobile feedback application developed by UTAR, will you use it for reporting or giving feedback? Why?
   Yes. It is because mobile app is more convenient and save a lot of time to turn on laptop.

<u>Response 3</u>

1. Have you done or filled up the student's feedback form in UTAR portal before? Why?
   No. I am waiting someone to report.

2. What are the devices you used to fill up the students' feedback form? Mobile phone or pc (laptop) Why?
   Laptop. Because the screen is bigger.

3. If no, how will you report or give feedback to the staff when defects occurred?
   I will go to the faculty to report because I can get the response immediately.

   (Skip to question 8 if you never make feedback before.)

4. If yes, will you think that it is a waste of time to report the defects?
   -

5. If yes, what kind of problems you have met during filling up the form?
   -

6. If yes, have you received any notifications (email) from staff that update the progress of the feedback?
   -

7. If yes, how long will the defects be handled and solved by staff?
   -

8. Which part of the feedback form you think that it can be changed or improved?
   There are too many feedback type in the form. Some of the them can be reduced.

9. If there is a mobile feedback application developed by UTAR, will you use it for reporting or giving feedback? Why?
   Yes. It is because mobile app is more convenient and save my time to find staffs.

Response 4

1. Have you done or filled up the student's feedback form in UTAR portal before? Why?
   Yes. It is because I have paid my fee and I deserve a better facility.

2. What are the devices you used to fill up the student's feedback form? Mobile phone or pc (laptop) Why?
   Laptop. Because the screen of mobile is small and hard for me to see.

3. If no, how will you report or give feedback to the staff when defects occurred?
   -

   (Skip to question 8 if you never make feedback before.)

4. If yes, will you think that it is a waste of time to report the defects?
   No. Because it is our responsibilities.

5. If yes, what kind of problems you have met during filling up the form?
   There are too many of feedback types that confuse me.

6. If yes, have you received any notifications (email) from staff that update the progress of the feedback?
   No. I usually login to the portal and check the progress.

7. If yes, how long will the defects be handled and solved by staff?
   I cannot remember because I do not care on it. I just login the portal and to check whether the problems have been solved or not.

8. Which part of the feedback form you think that it can be changed or improved?
   Feedback type. Some of them can be reduced or categories them into Sungai Long campus ad Kampar campus first so that the feedback types can be reduces.

9. If there is a mobile feedback application developed by UTAR, will you use it for reporting or giving feedback? Why?
   Yes. It is because mobile app is more convenient so that I do not need to turn on my laptop and login the portal. I can spend more time on my work.

Response 5

1. Have you done or filled up the student's feedback form in UTAR portal before? Why?
   Yes. It is because I deserve a better facility.

2. What are the devices you used to fill up the student's feedback form? Mobile phone or pc (laptop) Why?
   Laptop at home. Because UTAR Wi-Fi is not good and I need to waste my data to report.

3. If no, how will you report or give feedback to the staff when defects occurred?
   -

   (Skip to question 8 if you never make feedback before.)

4. If yes, will you think that it is a waste of time to report the defects?
   No. Because it is our responsibilities to make UTAR become better.

5. If yes, what kind of problems you have met during filling up the form?
   No problems.

6. If yes, have you received any notifications (email) from staff that update the progress of the feedback?
   No.

7. If yes, how long will the defects be handled and solved by staff?
   Since I do not check the status after I report the defects, I do not know how long they take to solve it.

8. Which part of the feedback form you think that it can be changed or improved?
   Feedback type. There should have one more type called "other".
   Adding one column for students to fill in their phone numbers so that the staffs can inform them with sending messages.

9. If there is a mobile feedback application developed by UTAR, will you use it for reporting or giving feedback? Why?
   No. Because it will waste the memory of my phone.

Response 6

1. Have you done or filled up the student's feedback form in UTAR portal before? Why?
   No. Because someone will report the issue.

2. What are the devices you used to fill up the student's feedback form? Mobile phone or pc (laptop) Why?
   Laptop. Because laptop is easier to type messages.

3. If no, how will you report or give feedback to the staff when defects occurred?
   I will go to the FGO to report because face-to-face reporting are easier to report about the detail.

   (Skip to question 8 if you never make feedback before.)

4. If yes, will you think that it is a waste of time to report the defects?
   -

5. If yes, what kind of problems you have met during filling up the form?
   -

6. If yes, have you received any notifications (email) from staff that update the progress of the feedback?
   -

7. If yes, how long will the defects be handled and solved by staff?
   -

8. Which part of the feedback form you think that it can be changed or improved?
   No. It is good enough.

9. If there is a mobile feedback application developed by UTAR, will you use it for reporting or giving feedback? Why?
   Yes. It is because mobile app is more convenient and mobile phone is always with us.

Response 7

1. Have you done or filled up the student's feedback form in UTAR portal before? Why?

   No. Because I think someone will report it.

2. What are the devices you used to fill up the student's feedback form? Mobile phone or pc (laptop) Why?
   Laptop. Because laptop has a bigger screen than phone.

3. If no, how will you report or give feedback to the staff when defects occurred?
   I will go to the FGO to report because face-to-face reporting are easier to report about the detail.

   (Skip to question 8 if you never make feedback before.)

4. If yes, will you think that it is a waste of time to report the defects?
   -

5. If yes, what kind of problems you have met during filling up the form?
   -

6. If yes, have you received any notifications (email) from staff that update the progress of the feedback?
   -

7. If yes, how long will the defects be handled and solved by staff?
   -

8. Which part of the feedback form you think that it can be changed or improved?
   The category for users to choose is too much and too difficult for users to choose.

9. If there is a mobile feedback application developed by UTAR, will you use it for reporting or giving feedback? Why?
   Yes. It is because mobile app is more convenience.

Response 8

1. Have you done or filled up the student's feedback form in UTAR portal before? Why?
   Yes. Because UTAR is waiting for our response on their facilities.

2. What are the devices you used to fill up the student's feedback form? Mobile phone or pc (laptop) Why?
   Laptop. Because mobile phone screen is too small that cause me have to zoom in the form.

3. If no, how will you report or give feedback to the staff when defects occurred?
   -

   (Skip to question 8 if you never make feedback before.)

4. If yes, will you think that it is a waste of time to report the defects?
   Actually, it can be said as a waste of time as I need to turn on my laptop to give a feedback instead of working on assignment.

5. If yes, what kind of problems you have met during filling up the form?
   It is so hard to find the correct category of the issues.

6. If yes, have you received any notifications (email) from staff that update the progress of the feedback?
   No. I just leave there after I report it.

7. If yes, how long will the defects be handled and solved by staff?
   I don't know because I did not check it after I report it.

8. Which part of the feedback form you think that it can be changed or improved?
   The notification system because it requires us to check the status by ourselves.

9. If there is a mobile feedback application developed by UTAR, will you use it for reporting or giving feedback? Why?
   Yes. It is because mobile app is more convenient and save time for me to report by using laptop.

Response 9

1. Have you done or filled up the student's feedback form in UTAR portal before? Why?
   Yes. Because no one will report if I ignore it.

2. What are the devices you used to fill up the student's feedback form? Mobile phone or pc (laptop) Why?
   Laptop. Because laptop is easier to type messages.

3. If no, how will you report or give feedback to the staff when defects occurred?
   -

   (Skip to question 8 if you never make feedback before.)

4. If yes, will you think that it is a waste of time to report the defects?
   Yes. I take a long time to find the type of my feedback.

5. If yes, what kind of problems you have met during filling up the form?
   Too much of category that is hard to distinguish the type of my feedback.

6. If yes, have you received any notifications (email) from staff that update the progress of the feedback?
   No.

7. If yes, how long will the defects be handled and solved by staff?
   Don't know. I do not check the progress of the report.

8. Which part of the feedback form you think that it can be changed or improved?
   Type of feedback can be categorised wisely.

9. If there is a mobile feedback application developed by UTAR, will you use it for reporting or giving feedback? Why?
   Yes. It is because mobile app is more convenient.

Response 10

1. Have you done or filled up the student's feedback form in UTAR portal before? Why?
   No. I am lazy to report.

2. What are the devices you used to fill up the student's feedback form? Mobile phone or pc (laptop) Why?
   Laptop. Because laptop has a bigger screen.

3. If no, how will you report or give feedback to the staff when defects occurred?
   I will go to the FGO to report because face-to-face reporting are easier to report about the detail.

   (Skip to question 8 if you never make feedback before.)

4. If yes, will you think that it is a waste of time to report the defects?
   -

5. If yes, what kind of problems you have met during filling up the form?
   -

6. If yes, have you received any notifications (email) from staff that update the progress of the feedback?
   -

7. If yes, how long will the defects be handled and solved by staff?
   -

8. Which part of the feedback form you think that it can be changed or improved?
   Number of type of feedback can be reduced.

9. If there is a mobile feedback application developed by UTAR, will you use it for reporting or giving feedback? Why?
   Yes. It is because mobile app is more convenient.

APPENDIX B: ERD Description

<u>**Authors Collection**</u>

Attribute	Description	Data Type	Primary Key	Foreign Key	FK referenced collection
Author_Id	Unique author id for login	String	Yes	-	-
Author_Name	Name of student	String	-	-	-
password	Password used by students for login	String	-	-	-
Author_PhoneNo	Author's phone number for contacting purpose	String	-	-	-
Auhor_Email	Author's email address for contacting purpose	String	-	-	-
Uni_Id	Unique university id	String	-	-	Yes

Feedback Data Collection

Attribute	Description	Data Type	Primary Key	Foreign Key	FK referenced table
feedbackId	Unique feedback id	String	Yes	-	-
date	Date of feedback reported	Date	-	-	-
description	Information of feedback	Text	-	-	-
building	Building name in the campus	String	-	-	-
floor	Floor number of the building	Number	-	-	-
photo	Photo of the issues	Blob	-	-	-
progress	Status of the feedback	String	-	-	-
room	Room number of issues occurred	String	-	-	-
type	Type of feedback	String	-	-	-
Author_Id	Unique author id for information purpose	String	-	-	-
Author_Name	Name of student	String	-	-	-
Author_PhoneNo	Author's phone number for contacting purpose	String	-	-	-
Auhor_Email	Author's email address for	String	-	-	-

	contacting purpose				
Staff_Id	Unique staff id for information purpose	String	-	-	-
Staff_Name	Name of staff	Sting	-	-	-
Staff_Email	Staff's email address for contacting purpose	String	-	-	-
rate	Rating on solved feedback	Number	-	-	-
createdAt	Recorded time of feedback created	Timestamp	-	-	-
Uni_Id	Unique university id	String	-	-	Yes

Staff Collection

Attribute	Description	Data Type	Primary Key	Foreign Key	FK referenced table
Staff_Id	Unique staff id for login	String	Yes	-	-
password	Password used by staff to login	String	-	-	-
Staff_Name	Name of staff	Sting	-	-	-
Staff_Email	Staff's email address for contacting purpose	String	-	-	-
Uni_Id	Unique university id	String	-	-	Yes

Admin Collection

Attribute	Description	Data Type	Primary Key	Foreign Key	FK referenced table
Admin_Id	Unique admin id for login	String	Yes	-	-
password	Password used by admin to login	String	-	-	-
Admin_Name	Name of admin	Sting	-	-	-
Uni_Id	Unique university id	String	-	-	Yes

University Collection

Attribute	Description	Data Type	Primary Key	Foreign Key	FK referenced table
Uni_Id	Unique unoversity id	String	Yes	-	-
Uni_Name	Name of university	String	-	-	-
Category_Id	Unique category id of feedback	Sting	-	-	-
Category_Name	Name of category of feedback	String	-	-	-

APPENDIX C: UAT Results

<u>**UAT Results of Reporters**</u>

Testing Date	06 / 04 / 2020			
Tester Name	Yeh Jia Yee			
Test Module	**Test Procedure**	**Status (Pass / Fail)**	**Time Required**	**Comments**

Login	1. Reporter selects the login type.
	2. Enter the student id and password as below:
	  ○ student id: 1702298
	  ○ password: pass2298
		Pass	21s	

Change Personal Information	1. Reporter wants to correct his/her personal information.	Pass	32s	
Giving Feedback	1. Reporter wants to giving a feedback. 2. Reporter give a feedback according to the scenario given below: ▪ The sound audio in the lecture room KB201 is broken. With unknown reason, there is an echo when the lecturer starts to talk using the mic. One of the speakers must be broken but you do not know which of it.	Pass	1m 26s	

View Feedback	1. Reporter had made a feedback. 2. Reporter wants to view the feedback detail and progress of it.	Pass	10s	
Giving Rate on Solved Feedback	1. After a staff had resolved the feedback reported by him/her. 2. Reporter wants to give a rating on the staff's performance.	Pass	11s	
Logout	1. Reporter wants to logout this application.	Pass	4s	

Testing Date	14 / 04 / 2020			
Tester Name	Lim Xin Jie			
Test Module	**Test Procedure**	**Status (Pass / Fail)**	**Time Required**	**Comments**
Login	1. Reporter selects the login type. 2. Enter the student id and password as below: ○ student id: 1702298 ○ password: pass2298	Pass	33s	
Change Personal Information	1. Reporter wants to correct his/her personal information.	Pass	38s	
Giving Feedback	1. Reporter wants to giving a feedback. 2. Reporter give a feedback according to the scenario given below: ▪ The sound audio in the lecture room	Pass	3m 08s	

Test Module	Test Procedure	Status (Pass / Fail)	Time Required	Comments
	KB201 is broken. With unknown reason, there is an echo when the lecturer starts to talk using the mic. One of the speakers must be broken but you do not know which of it.			
View Feedback	1. Reporter had made a feedback. 2. Reporter wants to view the feedback detail and progress of it.	Pass	8s	
Giving Rate on Solved Feedback	1. After a staff had resolved the feedback reported by him/her. 2. Reporter wants to give a rating on the staff's performance.	Pass	20s	
Logout	Reporter wants to logout this application.	Pass	3s	

Testing Date	14 / 04 / 2020			
Tester Name	Amy			
Test Module	Test Procedure	Status (Pass / Fail)	Time Required	Comments
Login	1. Reporter selects the login type. 2. Enter the student id and password as below: o student id: 1702298 o password: pass2298	Pass	18s	

Change Personal Information	1. Reporter wants to correct his/her personal information.	Pass	41s	
Giving Feedback	1. Reporter wants to giving a feedback. 2. Reporter give a feedback according to the scenario given below: ■ The sound audio in the lecture room KB201 is broken. With unknown reason, there is an echo when the lecturer starts to talk using the mic. One of the speakers must be broken but you do not know which of it.	Pass	1m 44s	
View Feedback	1. Reporter had made a feedback. 2. Reporter wants to view the feedback detail and progress of it.	Pass	13s	
Giving Rate on Solved Feedback	1. After a staff had resolved the feedback reported by him/her. 2. Reporter wants to give a rating on the staff's performance.	Pass	25s	
Logout	1. Reporter wants to logout this application.	Pass	4s	

Testing Date	14 / 04 / 2020			
Tester Name	Brandon Wong Shun Feng			
Test Module	**Test Procedure**	**Status (Pass / Fail)**	**Time Required**	**Comments**
Login	1. Reporter selects the login type. 2. Enter the student id and password as below: ○ student id: 1702298 ○ password: pass2298	Pass	25s	
Change Personal Information	1 Reporter wants to correct his/her personal information.	Pass	49s	
Giving Feedback	1. Reporter wants to giving a feedback. 2. Reporter give a feedback according to the scenario given below: ▪ The sound audio in the lecture room KB201 is broken. With unknown reason, there is an echo when the lecturer starts to talk using the mic. One of the speakers must be broken but you do not know which of it.	Pass	1m 32s	
View Feedback	1. Reporter had made a feedback. 2. Reporter wants to view the feedback detail and progress of it.	Pass	10s	

Giving Rate on Solved Feedback	1. After a staff had resolved the feedback reported by him/her. 2. Reporter wants to give a rating on the staff's performance.	Pass	28s	- Drag on giving rate is not smooth enough.
Logout	1. Reporter wants to logout this application.	Pass	3s	

UAT Results of Admin

Testing Date	14 / 04 / 2020			
Tester Name	Ammie Lee			
Test Module	**Test Procedure**	**Status (Pass / Fail)**	**Time Required**	**Comments**
Login	1. Admin selects the login type. 2. Enter the admin id and password as below: o admin id: 2066698 o password: admin6698	Pass	26s	
Assign New Feedbacks to Staffs.	1. There is a new feedback reported. 2. Assign the feedback to a staff named "Carlyong".	Pass	24s	
View Feedbacks	1. Admin wants to view feedbacks which progress is "pending" 2. Admin wants to know which feedbacks are handling by staffs. 3. Admin wants to know which feedbacks had been resolved.	Pass	1m 12s	
Update Categories	1. Admin wants to update the categories that can be selected by reporters for giving feedbacks. 2. Admin disable/enable the Toilet category.	Pass	15s	- Same Categories pop out when continue to disable / enable it

View Feedbacks Analytic	1. Admin wants to have a report on feedbacks and staffs in this month.	Pass	12s	
Logout	1. Admin wants to logout this application.	Pass	4s	

Testing Date	14 / 04 / 2020			
Tester Name	Frost Yap			
Test Module	**Test Procedure**	**Status (Pass / Fail)**	**Time Required**	**Comments**
Login	1. Admin selects the login type. 2. Enter the admin id and password as below: ○ admin id: 2066698 ○ password: admin6698	Pass	20s	
Assign New Feedbacks to Staffs.	1. There is a new feedback reported. 2. Assign the feedback to a staff named "Carlyong".	Pass	20s	
View Feedbacks	1. Admin wants to view feedbacks which progress is "pending" 2. Admin wants to know which feedbacks are handling by staffs. 3. Admin wants to know which feedbacks had been resolved.	Pass	1m 36s	
Update Categories	1. Admin wants to update the categories that can be selected by reporters for giving feedbacks.	Pass	13s	

	2. Admin disable/enable the Toilet category.			
View Feedbacks Analytic	1. Admin wants to have a report on feedbacks and staffs in this month.	Pass	6s	
Logout	1. Admin wants to logout this application.	Pass	6s	

Testing Date	14 / 04 / 2020			
Tester Name	Aries Lim			
Test Module	**Test Procedure**	**Status (Pass / Fail)**	**Time Required**	**Comments**

Login	1. Admin selects the login type.
	2. Enter the admin id and password as below:
	  o admin id: 2066698
	  o password: admin6698
		Pass	19s	

Assign New Feedbacks to Staffs.	1. There is a new feedback reported. 2. Assign the feedback to a staff named "Carlyong".	Pass	23s	
View Feedbacks	1. Admin wants to view feedbacks which progress is "pending" 2. Admin wants to know which feedbacks are handling by staffs. 3. Admin wants to know which feedbacks had been resolved.	Pass	1m 19s	

Update Categories	1. Admin wants to update the categories that can be selected by reporters for giving feedbacks. 2. Admin disable/enable the Toilet category.	Pass	9s	
View Feedbacks Analytic	1. Admin wants to have a report on feedbacks and staffs in this month.	Pass	6s	
Logout	1. Admin wants to logout this application.	Pass	4s	

Testing Date	14 / 04 / 2020			
Tester Name	Addy			
Test Module	Test Procedure	Status (Pass / Fail)	Time Required	Comments
Login	1. Admin selects the login type. 2. Enter the admin id and password as below: o admin id: 2066698 o password: admin6698	Pass	25s	
Assign New Feedbacks to Staffs.	1. There is a new feedback reported. 2. Assign the feedback to a staff named "Carlyong".	Pass	22s	
View Feedbacks	1. Admin wants to view feedbacks which progress is "pending" 2. Admin wants to know which feedbacks are handling by staffs.	Pass	1m 40s	

	3. Admin wants to know which feedbacks had been resolved.			
Update Categories	1. Admin wants to update the categories that can be selected by reporters for giving feedbacks. 2. Admin disable/enable the Toilet category.	Pass	14s	
View Feedbacks Analytic	1. Admin wants to have a report on feedbacks and staffs in this month.	Pass	8s	
Logout	1. Admin wants to logout this application.	Pass	5s	

UAT Results of Staffs

Testing Date	14 / 04 / 2020			
Tester Name	Zheng Lae Yi			
Test Module	**Test Procedure**	**Status (Pass / Fail)**	**Time Required**	**Comments**

Login	1. Staff selects the login type.
	2. Enter the staff id and password as below:
	   o staff id: 1701457
	   o password: carl1457
		Pass	28s	

Update progress of feedbacks	1. Staff updates the progress of feedback according to the steps below:
	   1. pending → handling
	   2. handling → solved
		Pass	1m 17s	

View Feedbacks	1. Staff wants to view feedbacks which progress is "pending" 2. Staff wants to know which feedbacks are handling by staffs. 3. Staff wants to know which feedbacks had been resolved.	Pass	22s	
Logout	1. Staff wants to logout this application.	Pass	3s	

Testing Date	14 / 04 / 2020			
Tester Name	Tan Zhan Pang			
Test Module	**Test Procedure**	**Status (Pass / Fail)**	**Time Required**	**Comments**

Login	1. Staff selects the login type.
	2. Enter the staff id and password as below:
	   o staff id: 1701457
	   o password: carl1457
		Pass	22s	

Update progress of feedbacks	1. Staff updates the progress of feedback according to the steps below:
	   1. pending → handling
	   2. handling → solved
		Pass	1m 17s	

View Feedbacks	1. Staff wants to view feedbacks which progress is "pending" 2. Staff wants to know which feedbacks are handling by staffs. 3. Staff wants to know which feedbacks had been resolved.	Pass	37s	
Logout	1. Staff wants to logout this application.	Pass	3s	

Testing Date	14 / 04 / 2020			
Tester Name	Wong Hui Jie			
Test Module	**Test Procedure**	**Status (Pass / Fail)**	**Time Required**	**Comments**

Login	1. Staff selects the login type.
	2. Enter the staff id and password as below:
	   o staff id: 1701457
	   o password: carl1457
		Pass	24s	

Update progress of feedbacks	1. Staff updates the progress of feedback according to the steps below:
	   1. pending → handling
	   2. handling → solved
		Pass	1m 21s	

View Feedbacks	1. Staff wants to view feedbacks which progress is "pending" 2. Staff wants to know which feedbacks are handling by staffs. 3. Staff wants to know which feedbacks had been resolved.	Pass	24s	
Logout	1. Staff wants to logout this application.	Pass	3s	

Testing Date	14 / 04 / 2020			
Tester Name	Ng How Jun			
Test Module	Test Procedure	Status (Pass / Fail)	Time Required	Comments

Login	1. Staff selects the login type.
	2. Enter the staff id and password as below:
	   o staff id: 1701457
	   o password: carl1457
		Pass	23s	

Update progress of feedbacks	1. Staff updates the progress of feedback according to the steps below:
	  1. pending → handling
	  2. handling → solved
		Pass	1m 22s	

View Feedbacks	1. Staff wants to view feedbacks which progress is "pending" 2. Staff wants to know which feedbacks are handling by staffs. 3. Staff wants to know which feedbacks had been resolved.	Pass	28s	
Logout	1. Staff wants to logout this application.	Pass	3s	