

**MOBILE APPLICATION FOR UTAR DIECS
INFORMATION AND DOCUMENT SHARING**

LEE KAI LI

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

**Lee Kong Chian Faculty of Engineering and Science
Universiti Tunku Abdul Rahman**

April 2019

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.

Signature : _____

Name : Lee Kai Li _____

ID No. : 1503941 _____

Date : 26 April 2019 _____

APPROVAL FOR SUBMISSION

I certify that this project report entitled "**MOBILE APPLICATION FOR UTAR DIECS INFORMATION AND DOCUMENT SHARING**" was prepared by **LEE KAI LI** 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.

Approved by,

Signature : _____

Supervisor : Ms. Too Chian Wen

Date : 26 April 2019

Signature : _____

Co-Supervisor : _____

Date : _____

The copyright of this report belongs to the author under the terms of the copyright Act 1987 as qualified by Intellectual Property Policy of Universiti Tunku Abdul Rahman. Due acknowledgement shall always be made of the use of any material contained in, or derived from, this report.

© 2019, Lee Kai Li. All right reserved.

ABSTRACT

Despite there are so many ways accessing to information and documents in UTAR DIECS, there are still some drawbacks and limitations with the current circumstances. These limitations have caused decreasing in efficiency and effectiveness for lecturers in sharing information and document and for students in retrieving information and documents. Hence, a mobile application for information and document sharing among UTAR DIECS lecturers and students are developed to solve the limitations and problems faced by lecturers and students.

With the implementation of the mobile application, all the information and document sources are centralized whereby students do not need to access certain information through browsing different sites one by one and lecturers have a platform to share non-course-based information. Besides, the proposed solution also helps in increasing efficiency for lecturers and students by increasing the mobility of accessing information and documents. They can now share and acquire information and document on their fingertip. Furthermore, there is a functionality in the mobile application that allows the students and lecturers to search the post by entering a keyword. This feature resolves the problem of difficult in finding back the information that has been viewed.

TABLE OF CONTENTS

DECLARATION	ii
APPROVAL FOR SUBMISSION	iii
ABSTRACT	v
TABLE OF CONTENTS	vi
LIST OF TABLES	x
LIST OF FIGURES	xii
LIST OF SYMBOLS / ABBREVIATIONS	xviii
LIST OF APPENDICES	xix

CHAPTER

1	INTRODUCTION	1
1.1	Introduction	1
1.2	Background of the problem	2
1.3	Problem Statements	4
1.4	Project Objectives	5
1.5	Project Solution	6
1.6	Proposed Approach	8
1.7	Project Scope	9
2	LITERATURE REVIEW	11
2.1	Introduction	11
2.2	Similar Mobile Applications Study and Evaluation	11
2.2.1	Mobile Applications Comparison Matrix	24
2.2.2	Conclusion	25
2.3	Comparison of System development methodologies	25
2.3.1	Development methodologies comparison matrix	35
2.3.2	Conclusion	35

3	METHODOLOGY	37
3.1	Introduction	37
3.2	Project Initiation	37
3.2.1	Requirement specification and gathering	37
3.2.2	Project Plan	39
3.2.3	Application Architecture	40
3.2.4	Quick design	40
3.3	Iteration Process	41
3.3.1	First Iteration	41
3.3.2	Second Iteration	42
3.3.3	Third Iteration	42
3.4	Development phase	43
3.5	Testing phase	44
3.6	Deployment phase	44
3.6.1	Prepared final report	44
3.6.2	Prepared presentation	45
4	PROJECT SPECIFICATION	46
4.1	Introduction	46
4.2	Use Case Diagram	46
4.3	Use Case Description	46
4.4	Functional and Non-functional requirements	53
4.4.1	Functional requirements	53
4.4.2	Non-functional requirements	54
4.5	Fact findings	54
4.5.1	Survey on students	54
4.5.2	Survey on lecturers	62
4.5.3	Interview with academic staffs	67
5	SYSTEM DESIGN	71
5.1	Introduction	71
5.2	User Interface design	71
5.2.1	UI design navigation model	71

			72
	5.2.3	UI for student	73
	5.2.4	UI for admin	77
5.3	System design models		81
	5.3.1	Data flow diagram	81
	5.3.2	Activity diagrams for admin	84
	5.3.3	Activity diagram for student	88
5.4	System architecture		91
5.5	Database design		92
	5.5.1	Physical Entity Relationship Diagram	92
	5.5.2	Logical Entity Relationship Diagram	93
	5.5.3	Data dictionary	94
6	SYSTEM IMPLEMENTATION		98
6.1	Introduction		98
	6.1.1	Modules for student in UTAR DIECS	98
	6.1.2	Modules for academic staff in UTAR DIECS	110
7	SYSTEM TESTING		119
7.1	Introduction		119
7.2	Testing objectives		119
7.3	Testing strategy		119
	7.3.1	Testing scope	119
	7.3.2	Testing type	120
7.4	Test cases and results		121
	7.4.1	Unit test	121
	7.4.2	Integration test	131
	7.4.3	Usability test	134
	7.4.4	User acceptance test	137
8	CONCLUSIONS AND RECOMMENDATIONS		141
8.1	Conclusions		141
8.2	Recommendations for future work		142

REFERENCES **145**

APPENDICES **149**

LIST OF TABLES

Table 2-1	Comparison matrix of information and document sharing mobile application	24
Table 2-2	Differences between scrum and Extreme programming (XP) (Chereches, n.d.)	28
Table 2-3	Comparison matrix of various methodologies (Sabale and Dani, 2012, pp.23)	35
Table 4-1	View information and document use case	46
Table 4-2	Search document use case	47
Table 4-3	View profile use case	47
Table 4-4	Update user profile use case	48
Table 4-5	Select activity to participate	48
Table 4-6	Login as student use case	49
Table 4-7	View organization board use case	49
Table 4-8	Login as administrator use case	50
Table 4-9	Manage students' accessibility use case	50
Table 4-10	Create post use case	51
Table 4-11	Update post use case	51
Table 4-12	Delete information use case	52
Table 4-13	Track students' involvement use case	53
Table 5-1	Description for Entity Relationship Diagram	93
Table 5-2	Data dictionary for admin entity	94
Table 5-3	Data dictionary for category entity	95
Table 5-4	Data dictionary for participation entity	95
Table 5-5	Data dictionary for post entity	95
Table 5-6	Data dictionary for student entity	96

Table 5-7	Data dictionary for studentgroup entity	97
Table 6-1	Modules for respective users	98
Table 7-1	Unit test case for login verification	121
Table 7-2	Unit test case for view information and document	122
Table 7-3	Unit test case for search information and document	123
Table 7-4	Unit test case for view user profile	124
Table 7-5	Unit test case for update user profile	125
Table 7-6	Unit test case for view organization board	126
Table 7-7	Unit test case for create post	127
Table 7-8	Unit test case for update post	128
Table 7-9	Unit test case for delete post	129
Table 7-10	Unit test case for view student involvement report	130
Table 7-11	Integration test case and result	131
Table 7-12	User Satisfaction survey (adapted from System Usability Scale, Brooke, J. (1986))	134
Table 7-13	Usability test result	136
Table 7-14	Test case for admin	137
Table 7-15	Test case for student	139
Table 7-16	Test result for admin	140
Table 7-17	Test result for student	140
Table 8-1	Table of recommendations for future work	142

LIST OF FIGURES

Figure 1-1	Sample of information and documents sharing source through UTAR email	3
Figure 1-2	Sample of information and document sharing source through UTAR website.	3
Figure 1-3	Interaction between the mobile application, database, UTAR DIECS admins and students	7
Figure 1-4	Workflow of a prototyping model	8
Figure 2-1	Interfaces of Moodle mobile application	11
Figure 2-2	Interfaces of UM mobile application	15
Figure 2-3	Interfaces of Segi Mobile application	17
Figure 2-4	Interfaces of Inti mobile application	19
Figure 2-5	Interfaces of Taylor's Mobile application	21
Figure 2-6	The phases of waterfall methodology (Gechter, Ronzani and Rioli, 2014)	26
Figure 2-7	Extreme Programming (XP) (Antossoftwaredtopics, 2016)	28
Figure 2-8	Scrum approach (Boer, 2017)	28
Figure 2-9	Rapid Application Development (RAD) model (Parhizkar et.al., 2015)	30
Figure 2-10	Phases of spiral model (n.a., 2016.)	31
Figure 2-11	Phases of prototyping model (Sarjusingh, Castellanos and Mohammed, 2009)	33
Figure 3-1	Model View Control Architecture	40
Figure 4-1	Ways to retrieve information and document by students	55
Figure 4-2	Type of information and documents accessed by students	55
Figure 4-3	Students' event participation frequency	56

Figure 4-4	Persons that students enquire when problem arises	57
Figure 4-5	The ways student approached the person-in-charge of the events and information	58
Figure 4-6	Students' acknowledgement of lecturer in-charged tasks	58
Figure 4-7	Problems faced by students in retrieving information	59
Figure 4-8	Percentage of students' acknowledgement of the department organizational board	60
Figure 4-9	Features needed in the mobile application	61
Figure 4-10	Additional feature of having a private chat room	61
Figure 4-11	Sources to post information and documents	62
Figure 4-12	Categories of information uploaded by lecturers	63
Figure 4-13	Method to notify students when emergency occurs	63
Figure 4-14	Problems faced in posting information in UTAR WBLE	64
Figure 4-15	Method ensure students are aware for the updates of information and documents	65
Figure 4-16	Communication medium used to liaise with students	66
Figure 4-17	Additional features to be included in the mobile application	66
Figure 5-1	UI design navigation model	71
Figure 5-2	UI design for student login page	72
Figure 5-3	UI design for admin login page	72
Figure 5-4	Home page for student	73
Figure 5-5	Information detail screen for student	74
Figure 5-6	Student chooses to join or not to join the event	74
Figure 5-7	Search screen for student	75

Figure 5-8	Search result by entering keyword	75
Figure 5-9	Side drawer navigator for student	76
Figure 5-10	User profile screen for student	76
Figure 5-11	Edit profile for student	76
Figure 5-12	Organization chart in UTAR DIECS	77
Figure 5-13	Lecturer profile	77
Figure 5-14	Home page for admin	77
Figure 5-15	Create post for admin	78
Figure 5-16	Update post for admin	78
Figure 5-17	Admin chooses to edit or delete the post	78
Figure 5-18	Admin chooses to delete the post	78
Figure 5-19	Side drawer for admin	79
Figure 5-20	Search screen for admin	79
Figure 5-21	Search result by entering keyword	79
Figure 5-22	History of admin post	80
Figure 5-23	Student participation report for a particular event	80
Figure 5-24	Organization chart in UTAR DIECS	80
Figure 5-25	Lecturer profile	80
Figure 5-26	Data flow diagram for admin	82
Figure 5-27	Data flow diagram for student	83
Figure 5-28	Activity diagram for login verification for admin	84
Figure 5-29	Activity diagram for searching information for admin	84
Figure 5-30	Activity diagram for view information for admin	85
Figure 5-31	Activity diagram for admin create post	85

Figure 5-32	Activity diagram for admin edit post and view participation report	86
Figure 5-33	Activity diagram for admin view organization chart	87
Figure 5-34	Activity diagram for student login verification	88
Figure 5-35	Activity diagram for student search information	88
Figure 5-36	Activity diagram for student view post	89
Figure 5-37	Activity diagram for student view profile	90
Figure 5-38	Activity diagram for student view organization chart and lecturer profile	90
Figure 5-39	System architecture	91
Figure 5-40	Physical entity relationship diagram	92
Figure 5-41	Logical entity relationship diagram	93
Figure 6-1	Login page for student	99
Figure 6-2	Home page for student	99
Figure 6-3	Code segment for login page	99
Figure 6-4	Code segment that verify credentials via API	100
Figure 6-5	Home page for student	101
Figure 6-6	Detail screen of information for student	101
Figure 6-7	Code segment to display different colour for different category	101
Figure 6-8	Code segment that load data from database through API	102
Figure 6-9	API code segment that return post for specific group of students	102
Figure 6-10	Button for selecting participation	103
Figure 6-11	Screen indicate response from student	103
Figure 6-12	Code segment for creating participation	103

Figure 6-13	User profile page for student	104
Figure 6-14	Code segment for loading user details from database through API	105
Figure 6-15	Update profile page for student	105
Figure 6-16	Message indicates profile is successfully updated	105
Figure 6-17	Code segment for update function	106
Figure 6-18	Search user interface	107
Figure 6-19	Result displayed by entering keyword	107
Figure 6-20	Code segment for loadPost function	107
Figure 6-21	Organization chart in UTAR DIECS	108
Figure 6-22	Profile of a selected lecturer	108
Figure 6-23	Code segment for loading organization chart	108
Figure 6-24	Code segment for assigning different colour for different administrative position	109
Figure 6-25	Home page for admin	110
Figure 6-26	Create page for admin	110
Figure 6-27	Message indicating record saved	111
Figure 6-28	Code segment for create function	111
Figure 6-29	History page for admin	112
Figure 6-30	Admin chooses to edit or delete	112
Figure 6-31	Update screen for admin	112
Figure 6-32	Message prompt for confirm deletion	112
Figure 6-33	Message showing record is updated	113
Figure 6-34	Code segment for update function	113
Figure 6-35	Code segment for delete function	113
Figure 6-36	Search page for admin	114

Figure 6-37	Search result displayed by entering keyword	114
Figure 6-38	Code segment for loading search result from database	114
Figure 6-39	Admin login page	115
Figure 6-40	Admin home page after successful login	115
Figure 6-41	Code segment for login function	116
Figure 6-42	History page for admin	117
Figure 6-43	Student participation report for a particular event	117
Figure 6-44	Code segment for loading event's student participation report	117
Figure 6-45	Organizational chart in UTAR DIECS	118
Figure 6-46	Lecturer profile	118
Figure 6-47	API code segment that shows displaying order of organizational chart by number	118

LIST OF SYMBOLS / ABBREVIATIONS

<i>UTAR</i>	Universiti Tunku Abdul Rahman
<i>DIECS</i>	Department of Internet Engineering and Computer Science
<i>HOD</i>	Head of Department
<i>IT</i>	Industrial Training
<i>FYP</i>	Final Year Project
<i>WBLE</i>	Web Based Learning Environment
<i>UM</i>	Universiti Malaya
<i>QR code</i>	Quick Response code
<i>FGO</i>	Faculty General office

LIST OF APPENDICES

APPENDIX A	Work Breakdown Structure	149
APPENDIX B	Gantt Chart	150
APPENDIX C	Use Case diagram	151
APPENDIX D	Questionnaires for student	152
APPENDIX E	Questionnaire for academic staff	155
APPENDIX F	Interview question with HOD	157
APPENDIX G	Interview question with FYP coordinator	159
APPENDIX H	Interview question with IT coordinator	160
APPENDIX I	Interview question with FGO	162
APPENDIX J	Low fidelity paper-based prototype	163
APPENDIX K	Usability test result	169
APPENDIX L	User Acceptance Test result for admin	179
APPENDIX M	User Acceptance Test result for student	183

CHAPTER 1

INTRODUCTION

1.1 Introduction

As the rapid growth of technology, people access to information and documents have become far more advance compared with the 20th century. Mobile phones have become the basic needs for every human being.

Students in UTAR DIECS use various sources to access to information and documents such as UTAR WBLE and UTAR portal. Lecturers and HOD in UTAR DIECS also use these sources to upload the information and documents. There are some drawbacks of the current information and documents sharing system in UTAR DIECS. One of them is it will decrease the efficiency of students to access to the information and lecturers and HOD to upload the post and files.

Some problems have been revealed with direct observation to the target group. The problems have been found are scattering sources to access information and documents, students are unable to get the latest information on time, may retrieve wrong information, lack of mobility and students are not able to classify the category of the information posted in which resulting in missing out important information.

The solution to address these problems is by developing a mobile application that allows the lecturers and HOD (the admins) to create and upload information and documents and manage the students' accessibility to the uploaded piece of information. It also allows the students to view, search and download the information and documents uploaded by the admins.

The mobile application is an android application. Therefore, android studio and react-native framework are used as the platform and language to build this application. MySQL is used as the database of the mobile application. Last but not least, prototyping methodology is used throughout the project.

1.2 Background of the problem

Nowadays, technology has an inseparable relationship with every human being. Small devices from mobile phones to big technology equipment in large company. Technology has a big impact on accessing information and communicate. With the great help of technology, distance is no longer an issue in communication. With the assistance of technology, searching and accessing information is done within seconds.

UTAR Mail and UTAR portal have always been used by UTAR DIECS students to access to information and documents. Besides these two sources, UTAR website and any other sources are also being used to acquire information and documents. Lectures and HOD in UTAR DIECS normally use these sources to post and upload information and documents to notify students. When there are changes in the content of that information, the lecturers and HOD have to inform the students by various ways such as contacting one of the students, email every student and many other ways.

In current situation in UTAR DIECS, there are too many sources to retrieve information and documents such as UTAR portal, UTAR website, WBLE and so on. With the scattered sources, students often are not able to retrieve a particular information precisely which cause some misunderstandings and contradictions. Besides, sometimes students may even not be able to know how and where to access the specific information and documents they are interested in. Thus, they might miss out the information.

On the other hand, students might not be able to get latest information on time. As an extension to students may not be able to know how and where to get the information. For example, if a student is interested and wish to take part in a particular event, he does not know where to get the events details, by the time he be aware of the event, it is already passed. This shows the low efficiency of broad sources of information and documents.

Furthermore, Figure 1-1 and 1-2 are the samples of the sources of information and documents. With the current system, it is tedious for student to read the information line by line to classify what category of the post belongs. When students want to get back to the post, it is hard for them to search which is the one because of multiple sources, students might not be able to get back to the

information and document. This problem leads to difficulty in searching the information.

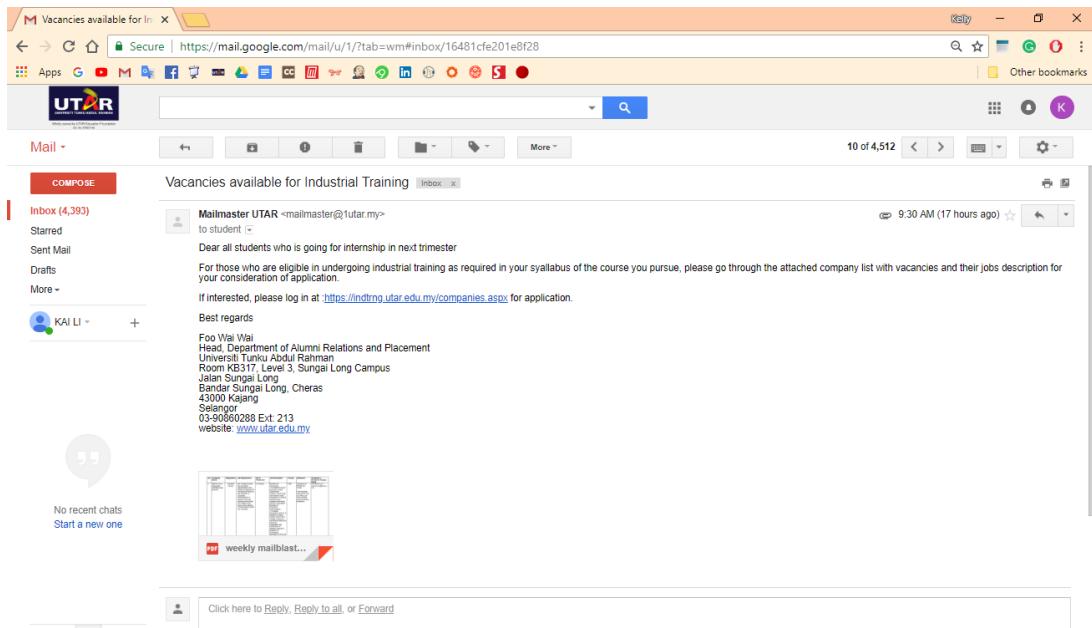


Figure 1-1 Sample of information and documents sharing source through UTAR email

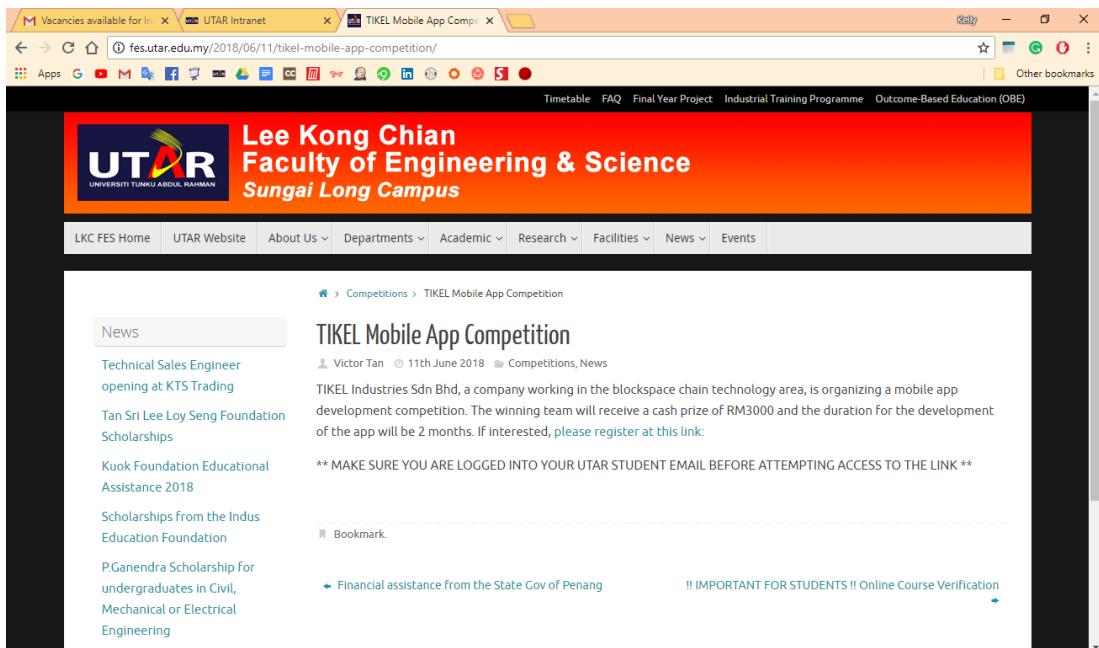


Figure 1-2 Sample of information and document sharing source through UTAR website.

Besides difficulty in searching uncategorized information and document, retrieving wrong information and document is also another concern in the current situation. Accessing information in multiple sources may cause the students mess up the sources hence causing the students to obtain wrong information which may eventually lead them to miss out important information.

In the perspective of UTAR DIECS lecturers and HOD, the standard procedure to post an information is through sending a google sheet to FGO. After that, FGO will process the google sheet and post the information to various sources. All these platforms are web based. It is lack of mobility as it requires desktop or laptops to upload and manage information. Although mobile phones are accessible to the websites, it is still a tedious task to create or manage information in mobile phones browser.

1.3 Problem Statements

There are few problems been investigated in this project. These problems have been existed from the beginning of every program for every students and lecturers in UTAR DIECS. These problems are revealed from direct observation to the targeted group, questionnaires survey and interview with students, lecturers, HOD in UTAR DIECS and FGO. The problems are listed below:

i. Scattering sources of accessing information and documents

Referring to Figure 4-1, students have too much sources to go through and the lecturers and HOD need to upload the information and document in every source. There is no specific mobile application that allows the students, lecturers and HOD to access and manage the information at ease.

ii. Unable to get latest information on time due to dispersed platforms

According to Figure 4-15, there is no way for lecturers to inform students for the newest update on time. Students are having a hard time in reading line by line from various sources. They have to check every website every day to get news. It is hard to get notified without accessing to the websites to acquire information. Thus, students are not able to get latest information on time.

iii. Unable to classify the category of the information and document which may cause students to miss out information

The information in the sources is often written in paragraph. When students browse through the information, the students need to read through the paragraph. In the course of time it is hard for the students to classify the information which leads them miss out the information in accordance to Figure 4-7.

iv. May retrieve wrong information

Accessing multiple sources of information might cause the students to mix up the information. This leads to retrieving wrong information and documents.

v. Lack of mobility

According to the interview with FGO, the standard procedure for lecturers to post information is via filling up information details in google sheet and submit to the FGO. Admins in FGO process the information and post it to websites simultaneously. It is lack of mobility because to create the information in more efficient way is through laptops and desktops. It is possible to access the website and upload the information through smartphones, but it is very troublesome to do such work in a small device.

1.4 Project Objectives

The objectives of the project that have been achieved are:

i. Conducted literature review on existing mobile application and comparing the types of system development methodologies

The evaluation of existing similar mobile application is to extract the features that can be used in the mobile application. Meanwhile, the comparison of different methodologies is to select the most suitable methodology that can be adopted throughout the project.

ii. Performed data gathering by conducting survey and questionnaires

The analysis of the survey is to acquire the requirements from UTAR DIECS students and lecturers.

iii. Developed a mobile application

This mobile application acts as a centralized platform and increase mobility for UTAR DIECS lecturers and HOD to share information and documents as well as students to access and view documents.

iv. Performed various testing

Different testing is carried out to test the usability of the mobile application and acceptance of the users to improve the quality of the mobile application.

1.5 Project Solution

Since the traditional way for UTAR DIECS students to access to information and documents has caused with problems listed above, a proposed solution to fix these problems is to develop a mobile application that acts as a centralized platform and increase mobility.

This mobile application has the following features and functions in order to address the problems:

i. Allows admins (lecturers and HOD) to share and upload documents

The admins are able to upload and create information and documents in this mobile application. This feature saves lecturer's time in which the admins are able to upload the information and document anytime and anywhere without needing computers. Thus, increasing the efficiency and mobility in this posting and uploading work.

ii. Allows students to view the information and documents shared

When students use the mobile application, students are able to view the information posted by lecturer without needing to access the information through web browser. This mobile application increases mobility as the students can view information through mobile phone at anytime and anywhere.

iii. Allows students and admins (lecturers and HOD) to search for relevant information and documents

This feature allows students to search for the posted information and documents by keying in the keyword of the post. If there is no result found, a 'no result found' message will be displayed. With existing system in UTAR, when students do not remember and mark down where is the information they retrieved from, it is very hard for them to search the

information and documents. This is because they may need to search every single source and go through it one-by-one in order to get the single piece of information. This function increases the efficiency of students in searching the relevant chunk of information.

iv. Enables admins to manage the accessibility of students to the post

Every post has different visibility. For example, students who is taking part in the Industrial Training program can view the information about Industrial Training whereas those who are not undertaking this program are not allowed to view the content of relevant information. In the current system, admins often send the information through email in which they have to compile a list of students' emails and send the information to the students in the list of emails only, this might be very troublesome to some admins. Therefore, this feature increases the performance by managing the accessibility and visibility of students to the information and documents.

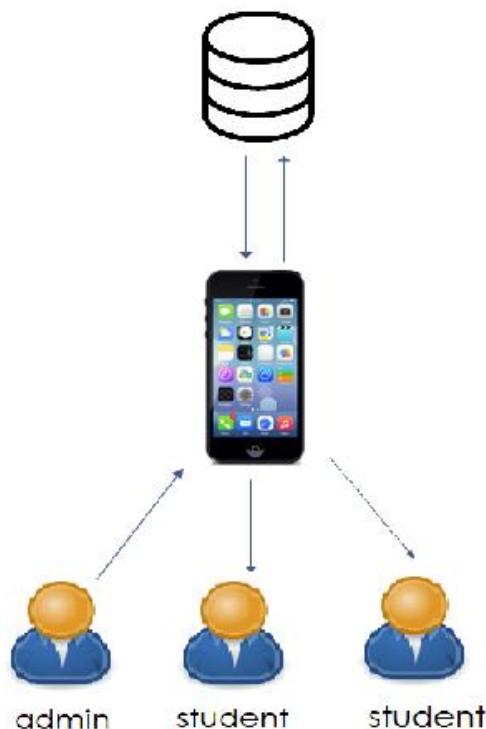


Figure 1-3 Interaction between the mobile application, database, UTAR DIECS admins and students

1.6 Proposed Approach

The methodology used throughout this project is prototyping methodology. The prototyping model uses a prototype that is built, tested and redefined until the final prototype is produced and accepted by the target user, then the final prototype can now be developed into a complete system. This methodology is useful when not all the requirements are known at the beginning of the data gathering.

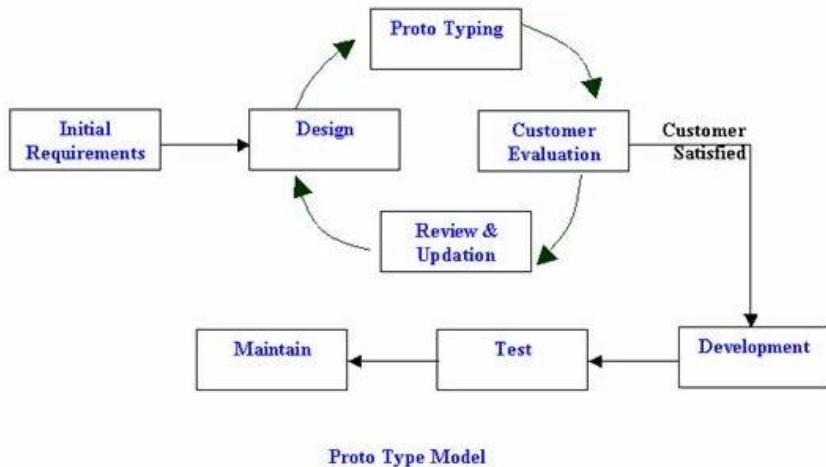


Figure 1-4 Workflow of a prototyping model

Prototyping methodology is suitable for this project because users can get involved throughout the mobile application development (ITQB exam certification,2017). The targeted users of this application are lecturers, students and HOD in UTAR DIECS. Since the focused users are abridged, therefore the interaction between the users and developer is vital. Besides, involvement of user can also increase the user acceptability and satisfaction to the final mobile application.

After a series of tests and refines, errors can be detected earlier (ITQB exam certification,2017). This process is iterative where users can find out the dissatisfaction parts and the limitations of the prototypes. When the mobile application is being developed, the number of errors can also be reduced. This eases the process of maintenance after the mobile application is being developed.

Next, by using prototyping methodology, confusing and difficult functions can be easily identified and eliminated (ITQB exam certification,2017). Features and functions that are not needed and unnecessary which will cause the mobile

application hard to implement should be eliminated as early as possible. This is to prevent the complexity of the mobile application to be increased.

1.7 Project Scope

The problems proposed is solved by developing a mobile application for information and document sharing. This application is a mobile application, therefore, android Studio, React-native framework, MySQL will be used to develop this mobile application. The target users of this mobile application are UTAR DIECS students, HOD and lecturer.

User scope coverage:

i. UTAR DIECS students

- Students are able to view and download the contents posted by the admins.
- Students can also search for the relevant documents
- Students can view their own profile
- Students can choose to take part, not-to-take-part when there is an event posted
- Students are able to view the current UTAR DIECS organizational board

ii. UTAR DIECS lecturers and HOD (admin)

- Lecturers are able to upload documents and post information
- Lecturers can also manage the uploaded files such as edit or delete
- Lecturers can track the involvement of students when there is an event

System scope coverage

System provides a search engine for students and admins to search relevant information by entering the keyword. If the information matched the entered keyword, the information is displayed as a search result, otherwise, ‘no result found’ will be displayed. Besides, admins are able to create non-course-related information post including job opportunity, site visit, event week such as sport festival, general information such as UTAR car park and ATM machine replacement, talks, extra activity such as Zumba dance training, Microsoft excel

training and competition. Next, the system not only able to allow all the students to view the information and events created, but also allow the admins to target a group of students for a specific piece of information. For example, job opportunity opens to all final year and internship students. Last but not least, for every information, the ‘JOIN’ button directs the students to the registration link, after successful registration, the students responded to the information will be recorded and displayed in the student participation survey.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In this chapter, seven similar existing information and document sharing mobile application are studied and their features are discussed. Although some of the mobile applications are not exactly the same as this project, but useful features are extracted out to be included in the mobile application to be developed. Next, comparison between various development methodology will also be discussed in this section.

2.2 Similar Mobile Applications Study and Evaluation

Five mobile applications are studied in this section. Four of the mobile applications are from other universities whereas another one of the mobile applications is developed by a software company.

a) Moodle mobile application

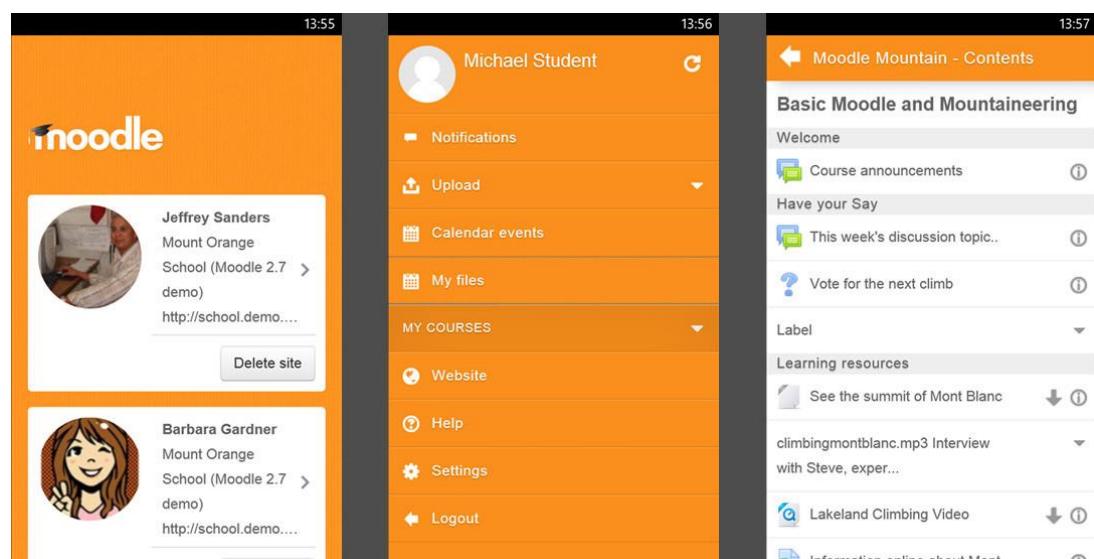


Figure 2-1 Interfaces of Moodle mobile application

Main features of Moodle

- View and manage files

Students are allowed to view the files and course materials uploaded by admins. They are also allowed to download the files. Besides students' view and download, administrators are also allowed to upload files. If there are changes in the uploaded content, the admins can edit the content and also delete.

- Search engine

Moodle provides a search engine which allows students and admins to search courses from the course list to find one they wish to acquire information.

- Notification

Students will be kept up to date with this notification features. It sends notifications to students from time-to-time when there are any changes and updates in the mobile application. It will not send notification for new events updated, but also forum posts, upcoming events, submitted assignments and etc.

- Synchronization of events with Calendar

Admins can create and manage the events. Events will be categorized into different events, namely global events, course events, group events and user events. Then, events created can be dragged and dropped to different date to change the date of the event.

- Chat engine

This mobile application allows students to chat among course mates. Besides, lectures and staffs can also communicate with their colleagues and students with the use of chat engine.

- Student survey feedback

Students can fill up the feedback survey and submit to the lecturers. Lecturers can view the feedbacks generated by the mobile application.

- Manage students' accessibility

Admins can add or delete user from accessing the mobile application.

Evaluation on Moodle mobile application

Moodle is a learning application that allows lecturers, and administrator and students to create a customized learning environment with robust, secure and integrated system. This mobile application can be used by participated University Staffs, lecturers and students. A university has to register and gets the site address. Then students are accessible to the mobile application by entering the URL of the Moodle site, student id and password. Moodle mobile application provides varieties of features besides features listed above.

One of the best features is the synchronized events with calendar. It eases both admins and students. Events are displayed in a calendar form helps the students to track the events more easily. By viewing from a list of events, students may rather prefer to view it in calendar form which does not only show the date of the events but also students can remember and mark the date correctly. With a list of events, students sometimes may oversee the events which eventually cause them to missed out the event. Besides, the calendar feature also helps admins to edit the date of events at ease. Admins need not click in layer by layer in order to edit only the date, instead, they just need to drag and drop the event box to the desire date.

Furthermore, another good feature in this mobile application is the chat engine. Lecturers often need to provide students their contact numbers to let the students approach them. Not all the lecturers are willing to share their personal private contact number with the students to prevent any disturbing occurs. By using a chat engine, lecturers can not only solve the students' questions via the mobile application but also inform students if there are any class cancellations or changes of class venue. Moreover, students can also discuss among their course mates. When students have problems or questions to ask, a chat engine is a good platform for them to share their knowledge.

However, Moodle mobile application has one limitation which is by adding user to access the mobile application, some of the students might be missed out. This will cause the students that are not included in the system miss out important events and information.

In conclusion, some of the features in Moodle mobile application can be implemented in the mobile application. The features are view and manage files, search engine, synchronization of events with calendar,

notification and chat engine. All these features are important for students to keep event up-to-date, easier to access to information and documents resolve and prevent confusion regarding the information or events posted. They are also vital for administrators to clarify and solve students' problems and notify students when there are any updates and changes.

b) University of Malaya (UM) mobile application

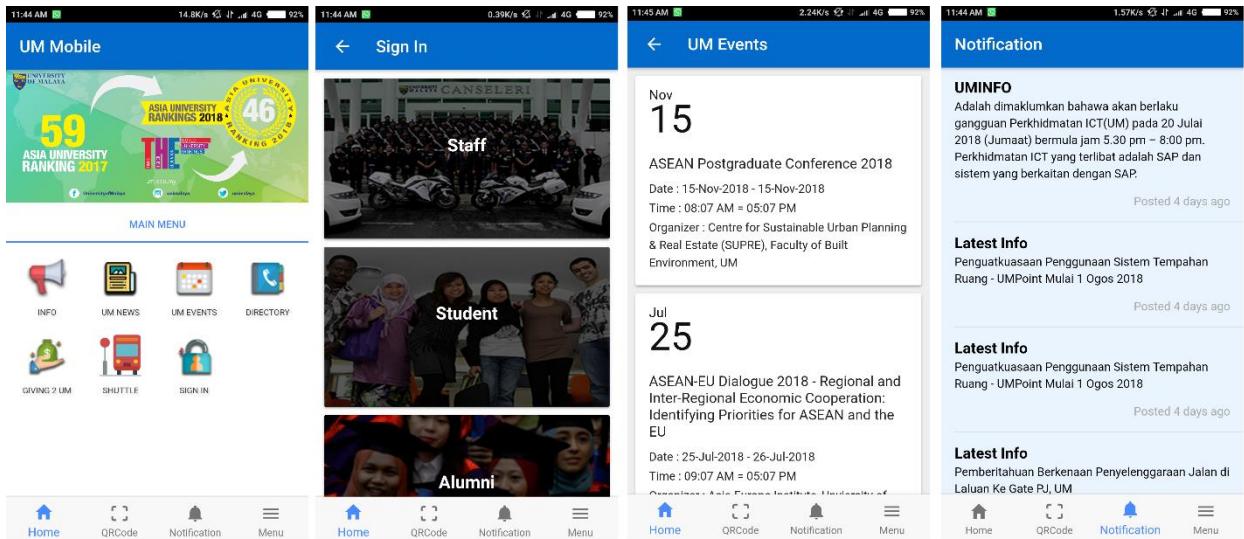


Figure 2-2 Interfaces of UM mobile application

Main features in UM Mobile

- Viewable and manageable information and documents
UM students, staff and alumni can view and download the document posted. UM staff can also create and manage (i.e. edit and delete) the content uploaded. Not only UM personnel can view the information but visitors are also allowed to view the latest news, ongoing news and events held in UM
- Notification
Upon latest news and events are updated, notification will be sent to the logged in user to keep the user up-to-date about what is going on around UM.
- Categorize events by date
A list of events held in UM is displayed in this application, UM students, staff, alumni and visitors can view the on-going and due events in the event list. The events are organized from the latest ones on top to the oldest ones at the bottom. Therefore, when users want to view the events, it is always showing the latest events.
- Office directory
Visitors and alumni can view the directory of the campus so that when they want to visit to the campus, they can go to their desire location based on this

directory when there is no one to ask around. This is also useful for students to have an overall view of what buildings and departments UM has.

- QR code scanner

For the events registration with QR code, this feature allows the participants such as UM students, alumni and visitors to take part at ease. They just need to scan the QR code with the camera on the phone, then the application will display relevant details from the QR code as result.

- Synchronized Shuttle services

Visitors and alumni can use this shuttle service to search for route to get to UM campus. It has different routes to choose from based on different locations. It also provides a feature that allows the user to find the nearest bus stop to get to the campus.

- Feedback

The users can provide feedback to the administrator based on their personal experience with this mobile application. They can provide the limitations and advantages of using this mobile application.

Evaluation on UM mobile application

UM mobile application is mainly used by UM staffs, UM students, UM alumni and visitor. All these target users can login as respective identity. Login with different identity can view different content. Visitors and alumni can register an account in order to access to UM information. It provides different additional features such as QR code scanner, synchronized shuttle services and office directory.

One of the best features is the QR code scanner. When students want to acquire further details of single information and document, they can just simply scan the QR code by using the camera on their smartphones. For example, when students see a competition poster in campus and they have no idea whom to ask for the further details of the competition, then by scanning the QR code on the mobile application, it will redirect the students to the further details of the competition page.

Besides QR code scanner, directory of department office is also another good feature. Sometimes students may not know where the department office is, and who to seek for when they have a question regarding an activity. At this

moment, a directory is a good choice for students to find out the route to the department office.

In conclusion, besides the general features such as viewable and manageable files and notification, features that can be included into the mobile application to be developed is the events categorization by date. This feature is helpful for students to categorize the events from the latest events to the oldest events. Therefore, every time student access to the mobile application, they are able to get the latest events and information and document posted.

c) Segi mobile application



Figure 2-3 Interfaces of Segi Mobile application

Main features of Segi mobile application

- Register and login as guest

Guests with no username and password can register an account to get notification and view the latest news in the university. After an account is registered, the user can login into his account. A user profile showing his personal details such as email, mobile number, Identification number, gender and date of birth will be displayed. User can also update the account by changing any of the user details.

- Latest news in the university

User logged in as a guest of the mobile application and view the recent activities held in or outside the university. The latest activity or news will

be posted on the top followed by the older activities. Therefore, when user wants to view the events, it's always the latest ones on top. The user can also share the event via varieties sources such as WhatsApp, Facebook, Facebook messenger, Instagram stories and etc.

- Career test

The user can perform the career test to assess themselves to find out the most suitable course for them, at the end of the test, the application will recommend them with the most appropriate and suitable courses so that the user does not need to go through the courses one by one to choose the one that most suitable to them.

- Gallery of campuses

It provides the gallery of the campuses which allows the user to view the campus environment on their mobile phone without needing to go to the campus physically. The environment of each campus is shows in the gallery with a short description.

- Live chat

The live chat links to a WhatsApp contact number which allows the user to inquire the person in charge for each campus. This feature helps the user when they do not know where to get the contact number when they have enquiries.

- Route to nearest campus

It provides the route to the nearest location of segi campus with google maps plugin. Hence, when user clicks on the location, it will show the nearest campus based on the user's current location.

Evaluation on Segi mobile application

Segi mobile application is mainly for non-Segi students to explore more about Segi University and Colleges. The main user of this mobile application is the guest user who is not part of Segi University Student. This mobile application can promote their University by showing the attractive and interactive events and activities they can join as students in Segi University.

Gallery of campuses is one of the best features in this mobile application as it shows the environment of the campus so that the guest user can have an overall

view of how their future campus will look like with visiting the campus physically. Sometimes the campus is far away from the city the user is at, therefore, this feature is good for those who want to enrol in the campus at another state.

Besides the general feature- the latest news, live chat is also one of the best features in this mobile application. Although the live chat is not directly allowed the user to chat with the person in charge in the mobile application, but it does provide a link to the external mobile application which is WhatsApp.

However, although the live chat that provides a link to an external application is good, but for those who do not have WhatsApp installed in their mobile device will cause them trouble. Not all of the user will have some of the external mobile application installed in their mobile phone. Therefore, building a live chat engine is better than providing a link to external application.

There is no feature suitable for this project although this mobile application provides several features. The latest news is originally already included in the project, the live chat in the mobile application still has some limitation and need improvement, hence, the live chat will not be adopted in this project.

d) Inti mobile application

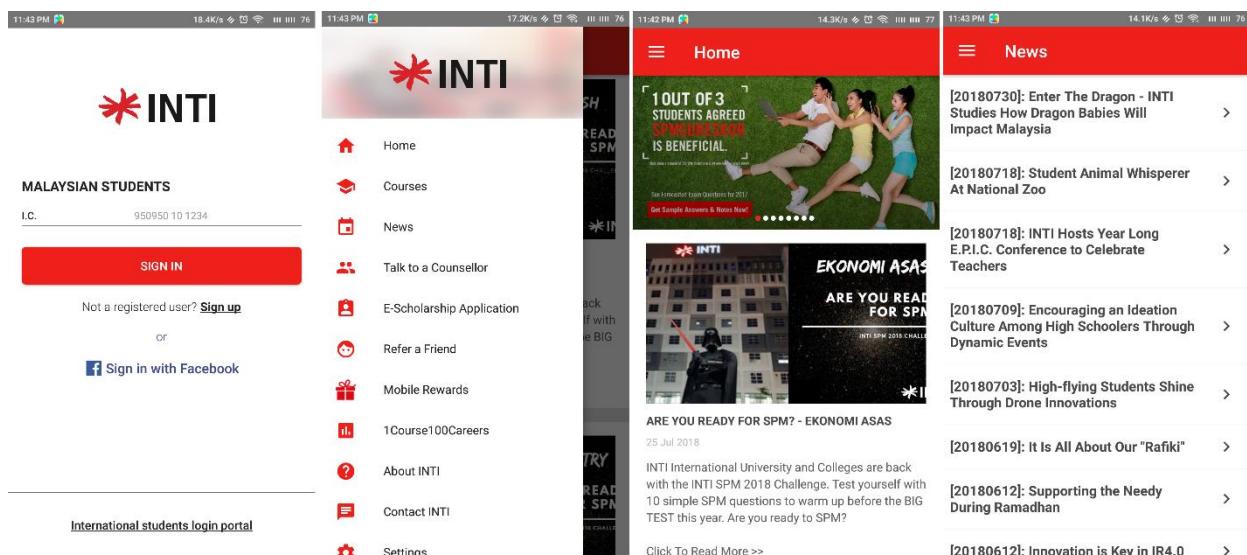


Figure 2-4 Interfaces of Inti mobile application

Main features of Inti mobile application

- Register or login as local Malaysian student or international student
Local students use their Malaysia identification number to register or login while international students use their passport number to login. Besides using Malaysian identification number or passport number, user can also choose to sign in with their Facebook account.
- Image carousel
This feature allows the administrator to upload the images of the events so that the user do not need to read the events in a long paragraph. Instead, they just need to look at the picture with the information and details of the events. Then, user can click on the image to view the further details of the events.
- Notification of latest news
This show the latest on-going news in Inti campus. It is a list of events which user can click on each event to view the details of it. The events categories include conference, general announcement, achievements and etc.
- Chat engine
This feature allows the user to chat with the counsellor when they have any enquiries. It has a built-in chat engine which allows the user to communicate with the person in the mobile application from time to time.

Evaluation on Inti mobile application

This mobile application's target user is local Malaysia students and international students. They can either signup or login to their account with Malaysia identification number or international passport number. There are other minor features such as online e-scholarship application which allows the students to apply for the scholarship with the link to the form provided, career test that chooses the best course for the students and many more.

One of the best features in this mobile application is the image carousel. Image is usually the easiest way people can remember. A picture speaks thousands of words. The user does not need to read the details in paragraph, instead, a picture will do. People tend to remember pictures rather than thousand lines of word.

Therefore, image carousel is one of the good ways to allow students to remember the events at ease.

Besides image carousel, chat engine is also another one best feature. Sometimes students have questions but they do not know whom they should prompt to, thus, they have been forced to visit the campus physically in order to get their problem resolved. By having a chat engine, the student does not need to travel all the way to the campus just to ask a simple question, alternatively, the just need to ask their questions or problems through the chat engine in the mobile application.

In conclusion, there are many features provided in this mobile application regardless the main features or the minor features. Features that should be included in this project is the image carousel and chat engine. These two features allow the students to remember the events as easy as ABC and allow students to communicate with the person who in charge of the event more easily which eventually can increase the student's participation in the events

e) Taylor's mobile application

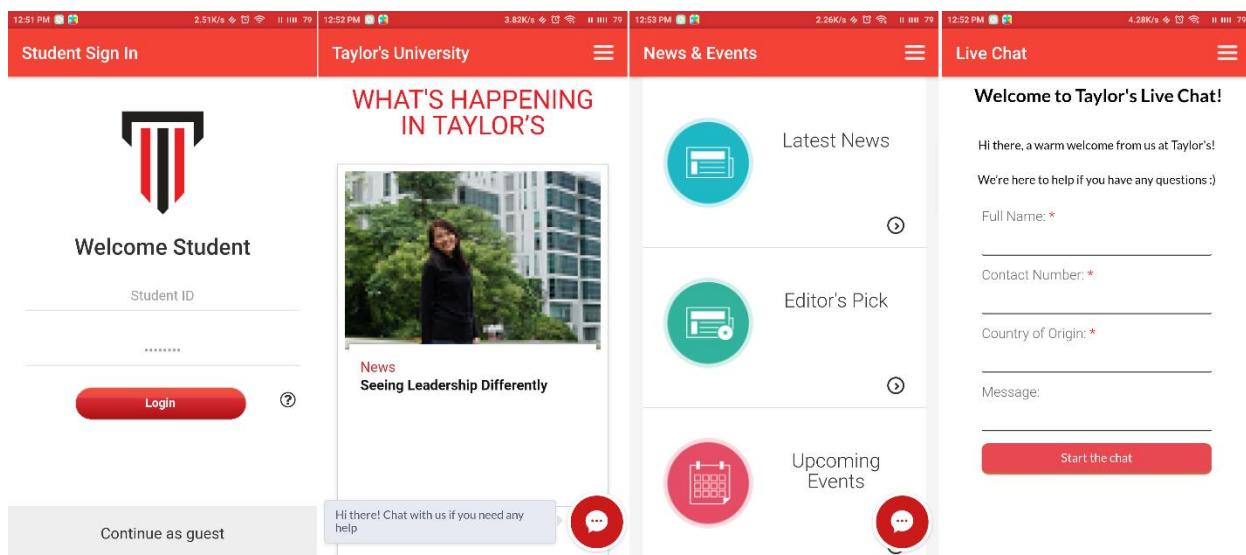


Figure 2-5 Interfaces of Taylor's Mobile application

Main features of Taylor's mobile application

- Mode (university or college)

The mobile application allows user to choose mode to enter the application either university mode or college mode. Entering different mode, different contents will be showed. In college mode, it shows the courses details and

some guideline to choose the right course while in university mode, it shows the latest news that is happening in the university. In other words, college mode shows the students some general overview of the courses provided in the university, university mode shows the events in the university.

- **Image carousel**

This feature allows to catch student's eye on the happenings in the university without needing to read through the details by paragraph.

- **Login as guest or student in Taylor's University**

Even though the user is not part of the university, the user can also login as a guest to view the latest happenings in Taylor's university. If the user is a student of Taylor University, the user can login as student by providing the student identification number and password to view the content.

- **Categorize news and events**

In the mobile application ser can sort and filter the news by general events, editor's pick, achievements, audio and photo stories. Besides the categories, user can also filter the new by choosing field by course such as biosciences, business, computing and etc. this feature allows the users to view only those news and events they are interested in, they don't have to search the news one by one to get into those they desire.

- **Live chat engine**

User can chat with the administrators in Taylor's university regardless they are part of the university or not. Non-Taylor's students can provide their name, contact number, country of origin and message to start the chat with the administrators in the university. When there is reply from the administrators, it will send a notification to the user to notify them.

- **Virtual tour**

Virtual tour is a gallery of images which provides panorama 360 degree that allows the user to view the environment in the university including the main areas, academic facilities and campus facilities. User can zoom in or zoom out, slide left, right, up and down to view the environment in the hall. This provides the user a 3D experience in the university.

Evaluation on Taylor's mobile application

This mobile application main focus on guest and students of Taylor's University. The features in the mobile application is astonishing with the virtual tour of the university environment which most of the similar university mobile applications do not have. The layout of the mobile application is neat and tidy, by browsing through the application, it clearly shows each categories of the component.

Key feature that is surprisingly good is the categories of news and events. Events and news are categorized in the order of the user desire. Rather than viewing the news one by one, as the user of this mobile application, sort and filter out those happenings that are interested in the more preferable. Hence, this feature will help the user to focus on the news and events they are most likely to view by choosing the desired field of study and categories.

Besides that, the virtual tour is also another one of the best features. 2D pictures can only show one side of the view. Instead, by using panorama 360 feature, it allows user to view every angle of the environment which gives a feeling that the user is in the campus physically and user can view the picture more vividly.

However, it does not provide a setting that allows the user to on or off the notification. If the user does not want to receive any notification from the application, this will cause the user to be bored and eventually uninstall the application.

This mobile application has plenty of features that can be considered to include in this project. One of them is the categories of events and news. By using this feature, the students can view the events more easily without needing to browse through the entire post, sometimes they may miss out the event as well. Next, the live chat engine can also be taken into consideration. Live chat engine allows the students and guest to communicate with the administrator without needing the administrator to give them their personal phone number.

2.2.1 Mobile Applications Comparison Matrix

Table 2-1 Comparison matrix of information and document sharing mobile application

Application Name features \	Moodle	UM mobile application	Segi mobile application	Inti Mobile application	Taylor's
Calendar	Yes	No	No	No	Yes
Download documents	Yes	Yes	Yes	Yes	Yes
View information	Yes	Yes	Yes	Yes	Yes
Different modes	Yes	No	No	No	Yes
Private chat or live chat	Yes	No	Yes	Yes	Yes
Search engine	Yes	No	No	No	No
Feedback from user	Yes	Yes	No	No	Yes
QR code scanner	No	Yes	No	No	No
Gallery	No	No	Yes	No	Yes
Image carousel	No	No	No	Yes	Yes
Manage user accessibility	Yes	Yes	No	No	Yes
Customize application	Yes	No	No	No	No
Upload information and document	Yes	Yes	Yes	Yes	Yes
Manage information uploaded	Yes	Yes	Yes	Yes	Yes

2.2.2 Conclusion

Every mobile application for their university has different unique features. Every feature serves different purposes. From the general feature- view and download information and documents to specific features such as QR code scanner. All these features make up the mobile application as a whole. Taylor's mobile application has the best features among all the mobile applications that have been evaluated and studied.

The overall layout of this mobile application is neat and tidy which eases the user to find the information they wanted. All the information is arranged in an orderly manner. Features that are chosen to be included in this project are:

- i. View and download information and document
- ii. Search engine
- iii. Administrator manage students' accessibility to the information
- iv. Search engine
- v. Administrators upload and manage the information and document posted.

These features are useful to enhance the students' participations in the events and actively view the information and document posted. Search engine allows the student to search the information more rapidly while the private chat allows the students to communicate with the lecturer or person in charge of a specific event.

2.3 Comparison of System development methodologies

There are numbers of development methodologies, each methodology has different implementation which is used in different application development. There are general phases in every development methodology which are planning, analysis, design and implementation. Five development models will be discussed in this section, they are waterfall model, agile software development model, rapid application development model, spiral model and prototype model.

a) Waterfall model

Adenowo and Adenowo (2013) claimed that waterfall model is one of the traditional approaches that is proven user-friendly over time, it is also a

linear and sequential development model. There are several phases in the waterfall model: Requirement analysis, design, implementation, testing and maintenance (Petersen, Wohlin, Baca, 2009). Adenowo and Adenowo (2013) further stressed that the result from the previous phase will become the input of the following phases. One phase should be completed to move on to another stage.

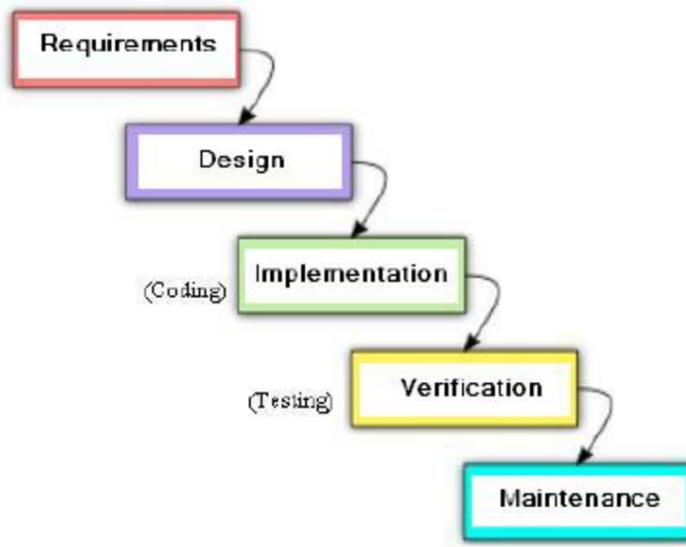


Figure 2-6 The phases of waterfall methodology (Gechter, Ronzani and Rioli, 2014)

There are some advantages and disadvantages of waterfall methodology. On one hand, the advantages are:

- **Easy to control by separating each phase into division.**
By segregating the sections, a schedule will be set with due date in each section, therefore, the tasks and sections can be done through one by one which ease the control of the entire project (Sharma, 2016).
- **Minimized the quantity of resources needed** (Saxena, and Upadhyaya, 2016)

The resources required is minimal because one stage should be completed before moving on to the other stage, therefore the resources control is always minimizing the amount needed.

- **Prevent overlapping of phases** (Sharma, 2016).
In order to continue with the next stage, the previous stage must be accomplished as the outcome from the previous stage will become the input

of the following stage. Thus, this can prevent any intersection of phases to occur.

On the other hand, the disadvantages of waterfall methodologies are:

- **It is not iterative**

The requirement gathered for the first phase will be used for the entire project, if there is a change in requirement in the middle of 3rd or 4th stage, the entire methodology needs to be performed again. Balaji and Murugaiyan (2012) illustrated that any alteration of client's requirements, will not be implemented in the current phase.

- **Hard estimation of resources in every phase**

Sharma (2016) clarified that resources such as time and cost are very difficult to be estimated as the resources needed for each stage remains unknown. Some stages might need more time to complete while some need less. Large variation of the resources needed between the estimated and actual will affect the entire project to be delayed or overrun cost.

b) Agile software development model

Sharma, Sarkar and Gupta (2012) discussed that Agile model is iterative and incremental, requirements and specifications are modifiable based on client's wish. It has different methodologies that agile can be implemented, they are extreme programming and Scrum. Sharma, Sarkar and Gupta (2012) further discussed that extreme programming focuses on developing the application, it needs high client's cooperation thus, the success rate of the project is high, meanwhile, the productivity of scrum approach is also very high, this approach emphasizes on managing the project. Table 2.2.2.1 shows the differences between extreme programming and scrum approach.

Table 2-2 Differences between scrum and Extreme programming (XP)
(Chereches, n.d.)

Scrum	XP
<ul style="list-style-type: none"> Changes in sprint are not allowed Once tasks for a certain sprint are set, the team determines the sequence in which they will develop the backlog items The Scrum Master is responsible for what is done in the sprint, including the code that is written The validation of the software is completed at the end of each sprint, at Sprint Review 	<ul style="list-style-type: none"> As long as the team hasn't started working on a particular feature, a new feature, of equivalent size can be swapped into the iteration in exchange for an un-started feature Tasks are taken in a strict priority order Developers can modify or refactor parts of code as the need arises The software needs to be validated at all time, to the extent that tests are written prior to the actual software

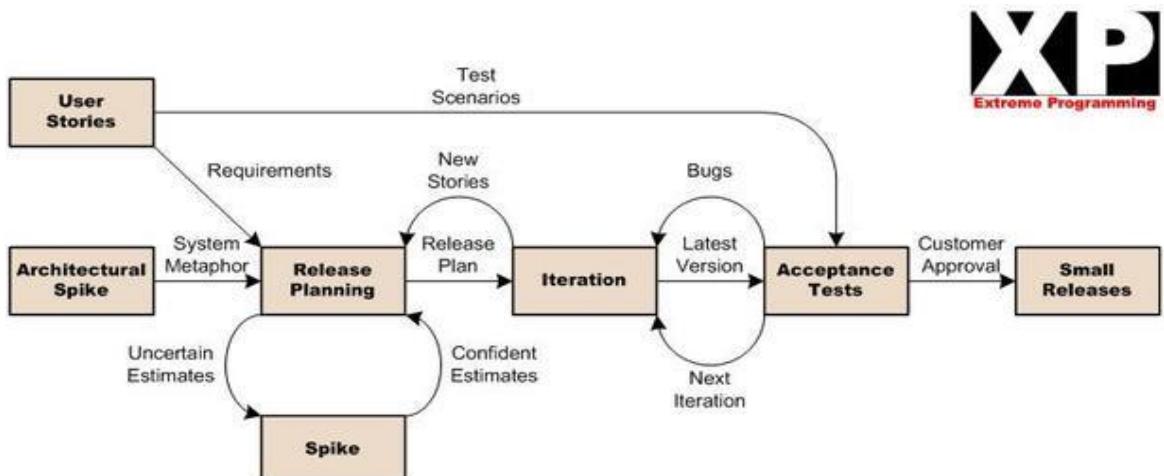


Figure 2-7 Extreme Programming (XP) (Antossoftwaredtopics, 2016)

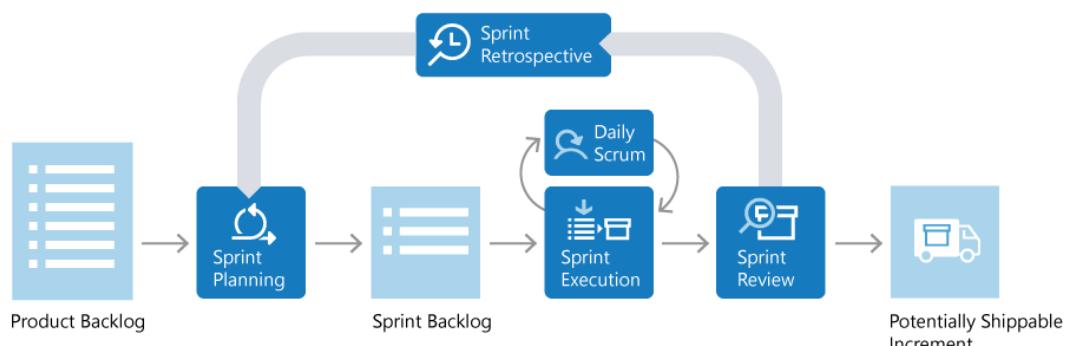


Figure 2-8 Scrum approach (Boer, 2017)

Agile methodology has several strengths and limitations, the strengths of agile model are:

- **Achieve high client's satisfaction level** (Sharma, Sarkar and Gupta, 2012)
Its iterative property allows the requirements and specifications can be altered at each iteration based on the client's evaluation. Hence, at the final stage of deployment of application, this methodology often meets most the client's requirements hence, obtaining highest client's contentment.
- **Better knowledge transfer** (Peterson and Wohlin, 2009)
This methodology requires more interaction between developers and clients. The both parties need to communicate more to acquire feedback and refinement. Therefore, in the process of communication in each iteration, it develops a better knowledge transfer.

Besides the strengths, the limitations of agile methodology are:

- **Need more experienced and skilled developers** (Peterson and Wohlin, 2009)
This methodology is an implementation-centered model. Hence, more skillful developers are expected in the project to accommodate to changes from time to time. A less experienced developer might cause the project unable to cope with the requirements modification from the clients.
- **Frequently change of requirements causes wasting resources** (Sharma, Sarkar and Gupta, 2012)
Indeed, modification of requirements allows the developer easier to meet client's satisfaction. However, requirements regularly change might cause the schedule of developing the project to be delayed and resources such as cost and human resources to be wasted.

c) **Rapid application development model**

According to Sabale and Dani (2012), rapid application development (RAD) is fast due to its adaptability and responsive to modifications in a short development phase, it has high user involvement thus the acceptance of user on the product delivered is also high and the risks and errors can be reduced at the early stage.

It uses two types of methodology – Phased development and Prototyping. Fatima et.al (2014) illustrated that in phase development, the project is fragmented into different sections that are developed consecutively, while in prototyping, it works all the phases simultaneously until it achieves the highest client's satisfaction.

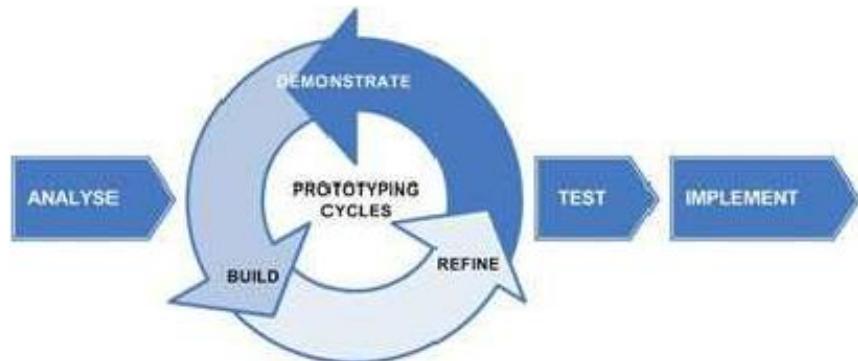


Figure 2-9 Rapid Application Development (RAD) model (Parhizkar et.al., 2015)

The advantages of using RAD are:

- **Additional requirements can be added in the middle of development process.** (Chandra, 2015)
This methodology has several iterations that requires the involvement of clients. Its iteration property allows the requirements can be changed from time to time upon client's request.
 - **Development schedule can be shortened** (ISTQB exam certification, 2017)
The development time can be decreased because the application produced is tailored to the client's needs. It is built based on client's requirements and specifications. It also refined and reevaluate until the client is satisfied with the final product.
 - **High user participation** (Thakur, n.d.)

In this model, client takes part in evaluating and giving feedback for the prototype produced. Then, after the feedback is given, the prototype will then further refine and client reevaluate. This forms an iteration: the iteration will continue to develop until client's acceptance is high.

In contrast, the disadvantages of Rapid Application Development are:

- **Requires high cost** (ISTQB exam certification, 2017)

The requirements change from time to time cause the cost to build the application is high. It requires more experienced and higher skill developer to build the product, the cost to employ a more skilled developer is higher than the ordinary developer, thus the cost needed is higher. Besides the developers, there are other factors that cause the cost to be increased such as resources.

- **Advantageous for larger scale project** (Thakur, n.d.)

Since the project cost is usually high for this model, thus, it is not encouraged that smaller projects use this methodology as the projects may not be able to cope with the cost estimated which eventually cause the project to fail.

d) Spiral model

According to Thakur (2015), the spiral model is also known as the risk-driven model, its exclusive risk pattern gives the developers a guidance to integrate one or more development models. The project will go through four quadrants which are planning, risk analysis, development and evaluation, each quadrant has distinct phases, until the software implementation is available to be deployed in the working environment (Despa, 2014).

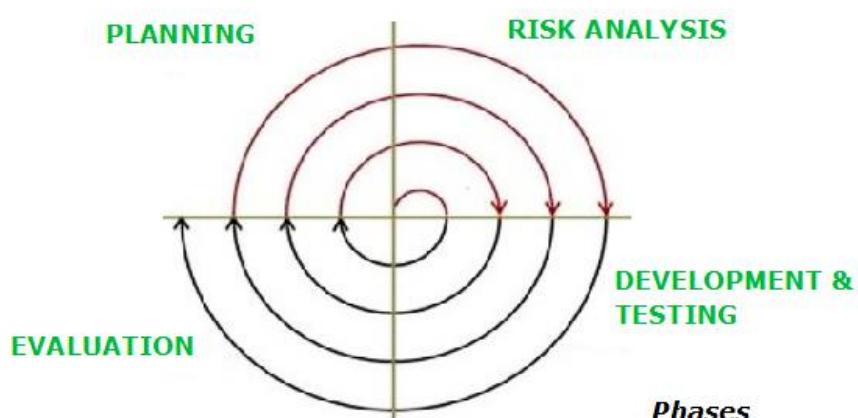


Figure 2-10 Phases of spiral model (n.a., 2016.)

There are some strengths and limitations in this spiral model, the strengths are:

- **Able to handle well in higher risk projects** (Munassar and Govardhan, 2014)

Its iteration property allows it to handle better in higher risk projects. In the second quadrant is where the risk analysis should be performed. The process will go through second quadrant which is the risk analysis in every iteration.

- **Allows changes of requirement during the development process** (Chandra, 2015)

This methodology allows alteration of requirements because it is iterative, it will go through all the quadrants which indicate the phases. Therefore, changes of requirements can be accepted during the development process.

- **Easy and effective project observation** (Alshamrani and Bahattab 2015)

This model focuses not only on the implementation but also the documentation. In every iteration, it has documentation as well as implementation therefore, it eases the process of project monitoring.

Meanwhile, the limitations of spiral methodology are:

- **Goal must be completely comprehended** (Chandra, 2015)

Although this model is iterative, if the developers do not understand well enough of the goal of the project, it will eventually lead to faulty software developed.

- **High dependency on the risk analysis quadrant** (Munassar and Govardhan, 2014)

The project success relies on the risk analysis, if the project fails, the main reason for it might be the dependency on the risk analysis. This model is mostly based on the risk analysis which means if the developer does not have enough experience in risk analysis, he will most probably fail the project.

e) Prototype model

According to Saxena and Upadhaya (2016), prototype model is a model that allows the requirements from client to be changed over time. In this

beginning of this model, a primary prototype will be built and evaluated from clients to get feedback, the prototype will then be refined and rebuilt until it achieves the highest acceptance from the clients then the implementation will be developed.

It emphasizes more on developing the actual implementation instead on focusing on the documentation, thus, the real implementation could be deployed beforehand (Sabale and Dani, 2012).

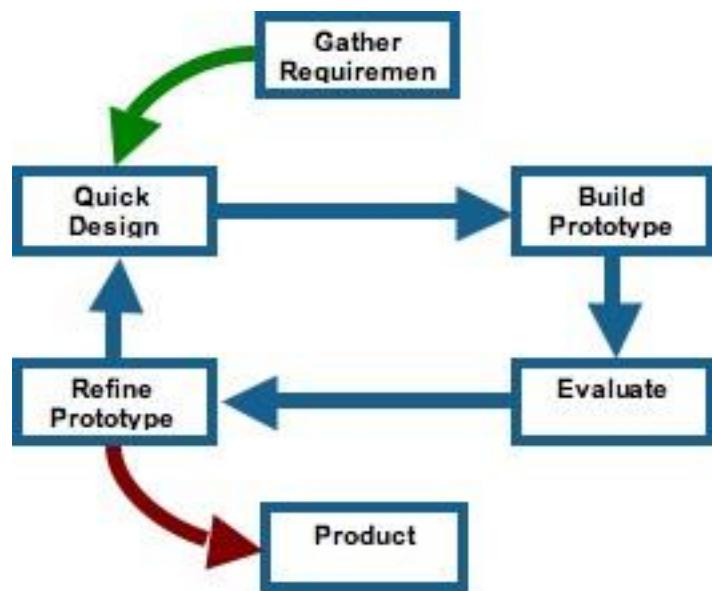


Figure 2-11 Phases of prototyping model (Sarjusingh, Castellanos and Mohammed, 2009)

Some of the pros and cons of using prototyping methodology have been revealed. The pros of using this model are:

- **Involve stakeholders' participation** (Saxena and Upadhaya, 2016)
Due to the refining and re-evaluating process, every iteration needs user participation to complete the process, the user's opinions and evaluations are vital in this model.
- **Beneficial with unclear user requirements** (Chandra, 2015)
It's iterative property with refine and evaluate process, the prototype can be built without a fully defined requirement. As the process goes, the requirements can be added in the mid of the development process.

- **Errors can be found in the early stage of development** (Saxena, and Upadhaya, 2016)

The trial and error process allow the developers to reveal the stakeholder's dissatisfaction and errors in the early phase of development process. These errors can be fixed as soon as they are found. Hence, the final deliver product meets most the clients' requirement and contentment.

In contrast, the cons of the prototyping model are:

- **Not suitable for big projects** (Chandra, 2015)

At every stage of appraisal and refinement, it requires the cooperation of stakeholders. This methodology is suitable for small projects as it needs to keep the stakeholders up-to-date and in contact very frequently.

- **Might cause impractical time and cost anticipation** (Ogedebe and Jacod 2012)

As the requirements and specifications increase in the development process, the cost for building the real implementation might be underestimated and the schedule will be prolonged. This is due to the addition of requirements over the time of refining the prototype.

2.3.1 Development methodologies comparison matrix

Table 2-3 Comparison matrix of various methodologies (Sabale and Dani, 2012, pp.23)

Methodology/ Features	Waterfall	Agile	Rapid Application Development (RAD)	Spiral	Prototype
Requirement gathering	In the beginning	Often change	Often change	In the beginning	Often change
cost	low	Very high	high	high	high
Changes control	hard	hard	easy	easy	easy
Phases overlap	no	yes	no	yes	Yes
User involvement	In the beginning	Highly involved	Highly involved	Highly involved	Highly involved
Success rate	low	high	high	high	high

2.3.2 Conclusion

In conclusion, every methodology has its own properties, advantages and disadvantages. Different scale and situation of projects use different kind of methodology. Choosing the right methodology will ease the process of development, else, it will cause the project to fail. Selecting a right model is as important as defining a correct goal for the project.

In this project, Prototyping methodology will be chosen as the system development methodology. This is because there is not much requirements in the beginning of this project. This methodology allows the requirements to be changed after each iteration. Furthermore, the goal of this project is to create a centralized mobile application for the lecturers, head of department to share information and documents and view the information posted. Therefore, the user involvement for this project is vital as it has 2 different parties to be considered.

The level of changes control in this methodology is easy which means that the modifications can be easily controlled to prevent the application to be

developed out of bound and out of scope. The adaption to changes allows the application to be developed more user friendly so that it eases the process of communication and information sharing between the lecturers and students after the application is deployed.

CHAPTER 3

METHODOLOGY

3.1 Introduction

The methodology adopted in this project is the prototyping methodology. It has several phases and different functions in each phase. The phases in the prototyping methodology are initiation, iteration, development and testing and deployment. In this chapter, the detail work of every phase will be discussed.

3.2 Project Initiation

In the initiation phase, the first step is the requirement elicitation by using various methods: qualitative methodology and quantitative methodology. These two methods are used to make the problem statements concrete and give solid evidence to the problems proposed and acquire some requirements and specifications for the application. Next, Work breakdown structure and Gantt chart are developed to illustrate the schedule for each phase so that the application can be developed within the specified and estimated time. Furthermore, the system architecture selected in the application development is the Model View Controller. Further discussion about the MVC are discussed in this section. Last but not least, in the project initiation phase, a quick design is developed for the user to evaluate so that the phase can continue with the iteration phase.

3.2.1 Requirement specification and gathering

Two methodologies are used to obtain the requirements and problems from the stakeholders - students, lecturers and HOD which are qualitative methodology and quantitative methodology. Besides, literature review is also used in requirement gathering.

3.2.1.1 Qualitative methodology

Mundar, Matitek and Jakus (2012) explained that the qualitative methodology is emphasized on the collection and interpretation of data. This methodology does not use statistical method to deduce a conclusion.

i. Direct observation

Students in UTAR DIECS have been observed for the problems studied. The duration for this direct observation is from the beginning of the semester until end of July 2018.

ii. Interview

In this interview methodology, two lecturers and head of department are chosen to be interviewed. This combination of the interviewees is due to the lecturers and HOD have different position in UTAR DIECS. HOD as the head of department, one lecturer is the Final Year Project coordinator and another lecturer is the Internship Program coordinator. The purpose of the interviews is to gather information about how the lecturers and HOD upload information and documents relative to their position.

3.2.1.2 Quantitative methodology

Mundar, Matitek and Jakus (2012) further illustrated that the quantitative methodology is concentrated at the statistical validated outcome from existing data.

i. Questionnaires

Questionnaires have been distributed to 30 students to obtain their feedback via google form. There are 15 questions in total. The structure of the questionnaires is closed questions, four dichotomous questions and three questions of short answer questions.

Besides that, another set of questionnaires have also been distributed to thirteen lecturers through UTAR email. In the questionnaire, there is a total of fourteen questions. The structure of the questions is mainly short answer questions and three closed question.

3.2.1.3 Literature review

The importance of literature review is to review the features that are useful to be included in the project. Besides that, it also allows to study how similar application can be implemented. Thus, improving the robustness and feasibility of the application to be developed.

In the literature review stage, five similar mobile applications have been evaluated and compared with their features. Some important features are extracted out to be included in this project. The mobile applications that have been studied and evaluated are Moodle mobile, UM mobile, Segi Mobile, Inti mobile and Taylor's.

Besides the comparison between five different similar existing mobile application, five system development methodologies have also been studied to determine the most suitable methodology to be used in this project. The five methodologies that have been studied are waterfall, agile, Rapid application development, spiral and prototyping.

3.2.2 Project Plan

In order to ensure the application to be developed is within the schedule and the scope of the application is not out of bound, Work breakdown Structure and Gantt chart are used to schedule the project and identify the scope of the project.

3.2.2.1 Work Breakdown Structure

The work breakdown structure is to breakdown the scope of the project. Tasks are divided level by level based on the scale of the tasks. The work breakdown structure in this project refers to Appendix A.

3.2.2.2 Gantt Chart

A Gantt chart is used to schedule the project with different sections. Each phase will be given a duration to accomplish the task based on the work breakdown structure produced as in Appendix B.

3.2.3 Application Architecture

The application architecture chosen is the Model View Control architecture. This architecture is also known as MVC architecture. A model is the data source (i.e. database) which is represented by MySQL. MySQL allows the user to retrieve, update and delete the data. A view which is the user interface of the application allows the user to view the data displayed and allows the user to select the operations to be performed whereas the controller coordinates the operations performed by the user with the model.

The overall process of this architecture is the view receives input or operation from the user, then it will send the input to the controller which will organize the action to be performed. Then the method will be called by the controller to retrieve data from the model. Next, the model will send the data back to the controller for it to coordinate the action to display the data back to the view. Figure 3.1 shows the flow of model-view-control architecture process.

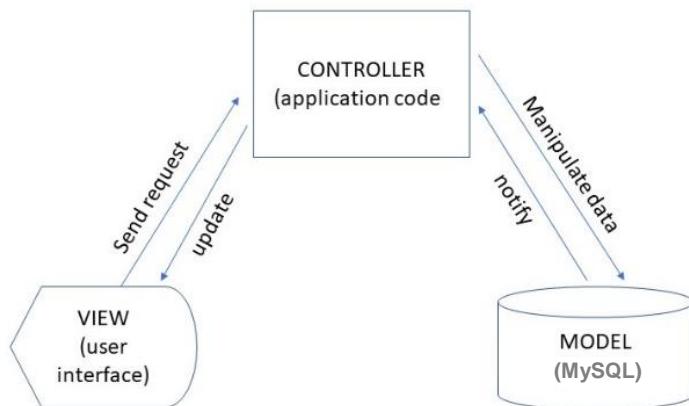


Figure 3-1 Model View Control Architecture

3.2.4 Quick design

A low fidelity prototype which is the paper-based prototype is developed after the requirements gathered from the users. Figure 3.1 referring to the paper-based prototype. The prototype is hand-drawn with 4 scenes in a piece of paper. There are 22 screens in total. Each screen links to another for different features.

3.3 Iteration Process

This iteration phase is feature-driven. Therefore, another different feature will be added into the next iteration. There are four general stages in each iteration namely design, prototyping, evaluation and review.

3.3.1 First Iteration

In the first iteration, features such as students are able to view, search and download documents and administrators are able to upload and manage contents are the primary feature of the application to be developed. This iteration is separated into four phases:

i. Design phase

The structure of the prototype and how the feature should be added is sketched. Interfaces for administrators and students are outlined differently to fulfill the features and requirements.

ii. Prototyping phase

A prototype is produced by using Axure RP Pro based on the design in the design phase. The prototype included the linkage from one screen to another screen to create a flow.

iii. Evaluation phase

6 students and 4 lecturers are chosen to evaluate the prototype produced. Then, the students and lecturers are given a short survey to evaluate the prototype. Next, the respondents' feedback is studied.

iv. Review phase

The feedback from the respondents are reviewed and studied to narrow down the section to be refined. Next, the prototype is refined and continued with the second iteration.

3.3.2 Second Iteration

Continue from the first iteration, additional feature is added in to this iteration which is students will be able to search information. This iteration is also divided into four levels:

- i. Design phase

After the refinement from the previous phase, an additional feature is added into this phase which is the addition of searching information. The design of interface for notification is sketched and outlined.

- ii. Prototyping phase

Addition of notification for updates and posts are added into the prototype via Axure RP Pro.

- iii. Evaluation phase

After the prototype is produced, 6 students and 4 lecturers are chosen again to evaluate the prototype with the addition of new features. The evaluators will be given another short survey to analyze the limitations of the prototype.

- iv. Review phase

The feedbacks from the evaluators are reviewed and studied. After the refinement of prototype, it will move on to the third iteration.

3.3.3 Third Iteration

Next, the third phase which organization chart are added as extra features in the prototype. The students are able to view the overall organization chart of UTAR DIECS and view the details of every lecturer. This iteration is separated into 4 stages:

- i. Design phase

In the design phase of the third iteration, an additional feature is added into this phase which is the organization chart. The organization chart structure is sketched and outlined in the interface design.

- ii. Prototyping phase

The feature is added into the prototype through Axure RP Pro.

iii. Evaluation phase

Similar to the second iteration, 6 students and 4 lecturers are chosen as the evaluators to the prototype. The evaluators are given a short survey to evaluate the prototype.

iv. Review phase

With the given feedbacks from the evaluators, the feedbacks will be reviewed to restrict the area to be refined.

3.4 Development phase

In the development phase, various tools are used to build the mobile application such as react native framework, Visual Studio Code, Android studio, MySQL and Axure RP Pro.

3.4.1.1 Build frontend of the application

React native framework will be used to build the interfaces of the mobile application. Besides, Android Studio is used to launch the java virtual machine (JVM). Visual Studio Code is also used to edit the code written in JavaScript.

3.4.1.2 Construct backend of the application

For the backend of the application, MySQL is used as the database of the application, php is used to develop the Application Programming Interface (API) that connects the interfaces to the database. The php script is edited in Visual Studio Code

3.4.1.3 Review code

After the completion of code writing, the overall code is reviewed again to find the logical error of the algorithm so that the overall quality of the code can be improved.

3.5 Testing phase

In testing phase, various testing is performed to improve the quality of the mobile application.

3.5.1.1 Unit testing

In unit testing, all the features and component are tested one by one. Test cases for each component are produced to run the unit tests. In the test cases, it has several test cases that make the application fail and several test cases that make the application success.

3.5.1.2 Integration testing

Next, in integration testing, it is to test the combination of two or more modules and components. The combined units are tested in this section. Test cases for this integration test are produced.

3.5.1.3 Usability Testing

The usability testing is to test whether all the functions are worked properly and what user think about the application, whether it is user friendly or hard to use. It is a type testing that evaluate user satisfaction level towards the mobile application.

3.5.1.4 User acceptance testing

Furthermore, in user acceptance testing, 6 students and 4 lecturers are chosen to test the mobile application. A short survey is given to the evaluator to determine the limitations of the mobile application. The purpose of user acceptance testing is to test the acceptance of user towards the mobile application.

3.6 Deployment phase

3.6.1 Prepared final report

After the application is tested with various testing from the testing phase, A final report with the implementation methodologies is produced. The purpose of this final report is to prepare a documentation for the implementation of the mobile application. This

report gives an overview of how the mobile application is being developed and the main objectives of the mobile application.

3.6.2 Prepared presentation

Presentation slides indicating the purpose, objectives and general flow of the mobile application are produced. This presentation is to present the mobile application to the users. It summarizes the mobile application, problem found and the main objectives and goals of this project.

CHAPTER 4

PROJECT SPECIFICATION

4.1 Introduction

This chapter is to show the requirements obtained from the interview and questionnaires. Use case diagram and use case description will also be shown to display the flow of the mobile application.

4.2 Use Case Diagram

Use case diagram is produced to show the task and workflow for the administrators and students. The use case diagram is shown in appendix C.

4.3 Use Case Description

Table 4-1 View information and document use case

use case ID	1
Use case name	View information and document
Actors	Student
Description	The student view information and document posted by administrators.
Preconditions	Student should be legit UTAR DIECS student
Flow of events:	<ol style="list-style-type: none"> 1. Perform login as student use case 2. Student selects the information and documents to be viewed. 3. System displays the selected information and documents
Alternative flow of events:	<ol style="list-style-type: none"> 2.1. information and documents selected are not found <ol style="list-style-type: none"> 2.1.1. system displays a message indicating information and document have been deleted 2.1.2. use case terminates.

Table 4-2 Search information use case

use case ID	2
Use case name	search information
Actors	Student, admin
Description	The student and admin search information and document.
Preconditions	Student should be legit UTAR DIECS student Admin should be legit UTAR DIECS academic staff
Flow of events:	<ol style="list-style-type: none"> 1. Student and admin enter the keyword of the information posted. 2. System searches for information and displays the post and document.
Alternative flow of events:	<ol style="list-style-type: none"> 2.1. information and document with entered keyword is not found <ol style="list-style-type: none"> 2.1.1. system displays a message indicating information and document is not found 2.1.2. use case terminates.

Table 4-3 View user profile use case

use case ID	3
Use case name	View user profile
Actors	student
Description	The student views user profile
Preconditions	Student should be legit UTAR DIECS student
Flow of events:	<ol style="list-style-type: none"> 1. Student chooses to view the user profile 2. System displays the details of the student such as name, student ID, gender, course of study, date of birth, email address and phone number

Table 4-4 Update user profile use case

use case ID	4
Use case name	Update user profile
Actors	student
Description	The student updates user profile
Preconditions	Student should be legit UTAR DIECS student
Flow of events:	<ol style="list-style-type: none"> 1. Perform view user profile use case. 2. Students chooses to update user profile 3. Students updates the user profile by entering the email address and phone number. 4. System displays a message indicating the update is successful
Alternative flow of events:	<p>4.1 server connection error</p> <p>4.1.1 System displays a message indicating the mobile application is not connected to the server</p> <p>4.1.2 use case terminates.</p>

Table 4-5 Select activity to participate

use case ID	5
Use case name	Select activity to participate
Actors	student
Description	The student selects activity to participate
Preconditions	Student should be legit UTAR DIECS student
Flow of events:	<ol style="list-style-type: none"> 1. Perform use case view information and document. 2. Student chooses to select activity to participate 3. Student selects the information post 4. Student selects the joining button on the post 5. System displays the link to the registration form of the activity and a message indicating successful response

Alternative flow of events:
5.1 server connection error
5.1.1 System displays a message indicating the mobile application is not connected to the server
4.1.2 use case terminates.

Table 4-6 Login as student use case

use case ID	6
Use case name	Login as student
Actors	Student
Description	The student logs into account
Preconditions	Student should be legit UTAR DIECS student
Flow of events:	
	<ol style="list-style-type: none"> 1. Student logs in by entering the student ID and password. 2. System displays a message indicating the login is successful
Alternative flow of events:	
	<ol style="list-style-type: none"> 2.1 Account with entered student ID and password are not found 2.1.1 System displays a message indicating the incorrect student ID and password entered.
	4.1.2 use case terminates.

Table 4-7 View organization board use case

use case ID	7
Use case name	View organization board
Actors	Student, admin
Description	The student and admin view UTAR DIECS organization board
Preconditions	Student should be legit UTAR DIECS student Admin should be legit UTAR DIECS academic staff
Flow of events:	
	<ol style="list-style-type: none"> 1. Student or admin chooses to view the organization board 2. System displays the organization board with lecturers' photo, name and position.

Table 4-8 Login as administrator use case

use case ID	8
Use case name	Login as administrator
Actors	Administrators (lecturers and HOD)
Description	The administrators log in to account
Preconditions	The administrators should be legit UTAR DIECS staff.
Flow of events:	<ol style="list-style-type: none"> 1. Administrators log in by entering the staff ID and password. 2. System displays a message indicating the login is successful
Alternative flow of events:	<ol style="list-style-type: none"> 2.1 Account with entered staff ID and password are not found <ol style="list-style-type: none"> 2.1.1 System displays a message indicating the incorrect staff ID and password entered. 4.1.2 use case terminates.

Table 4-9 Manage students' accessibility use case

use case ID	9
Use case name	Manage students' accessibility
Actors	Administrators (lecturers and HOD)
Description	The administrators manage the student accessibility to the post
Preconditions	The administrators should be legit UTAR DIECS staff.
Flow of events:	<ol style="list-style-type: none"> 1. Perform create post use case 2. Administrators choose to manage students' accessibility to the information and document 3. Administrator selects the group of students to view the post
Alternative flow of events:	<ol style="list-style-type: none"> 3.1 The default option for students' accessibility is all students <ol style="list-style-type: none"> 3.1.1 All UTAR DIECS students will be able to view the information and document posted

Table 4-10 Create post use case

use case ID	10
Use case name	Create post
Actors	Administrators (lecturers and HOD)
Description	The administrators upload information and document
Preconditions	The administrators should be legit UTAR DIECS staff.
Flow of events:	<ol style="list-style-type: none"> 1. Perform login as administrator use case 2. Administrators choose to upload information and document 3. Administrators enter the title, description, date for new information post. 4. Perform manage students' accessibility use case 5. Administrators select images and documents for the post. 6. System creates a new information post and sends a notification to students indicating the post is created.
Alternative flow of events:	<p>6.1 Server connection error</p> <p>6.1.1 System displays a message indicating the mobile application is not connected to the server</p> <p>6.1.2 Use case terminates.</p>

Table 4-11 Update post use case

use case ID	11
Use case name	Update post
Actors	Administrators (lecturers and HOD)
Description	The administrators edit the information and document posted
Preconditions	The administrators should be legit UTAR DIECS staff.
Flow of events:	<ol style="list-style-type: none"> 1. Perform login as administrator use case 2. Administrators choose to edit information and document uploaded 3. Administrators enter the title, description, date for information update.

<p>4. Perform manage students' accessibility use case</p> <p>5. Administrators select images and documents for the update.</p> <p>6. System updates information and document and sends a notification to students indicating the post is updated.</p>
<p>Alternative flow of events:</p> <p>6.1 Server connection error</p> <p>6.1.1 System displays a message indicating the mobile application is not connected to the server</p> <p>6.1.2 Use case terminates.</p>

Table 4-12 Delete information use case

use case ID	12
Use case name	delete information
Actors	Administrators (lecturers and HOD)
Description	The administrators delete the information and document posted
Preconditions	The administrators should be legit UTAR DIECS staff.
Flow of events:	<p>1. Administrators choose to delete information and document uploaded</p> <p>2. System displays a message indicating the confirmation of deletion</p> <p>3. System deletes the record and display a message indicating post is deleted.</p>
Alternative flow of events:	<p>2.1 administrators choose to cancel the event</p> <p>2.1.1 System redirects the screen back the post</p> <p>2.1.2 Use case terminates.</p>

Table 4-13 Track students' involvement use case

use case ID	13
Use case name	Track students' involvement
Actors	Administrators (lecturers and HOD)
Description	The administrators track the number of students take part in the event posted
Preconditions	The administrators should be legit UTAR DIECS staff.
Flow of events:	<ol style="list-style-type: none"> 1. Administrators choose to track the students' involvement 2. System displays the number of students registered for the event and the students' names and student ID.
Alternative flow of events:	<ol style="list-style-type: none"> 2.1 No student takes part in the event <ol style="list-style-type: none"> 2.1.1 System displays a message indicating no record found. 2.1.2 Use case terminates.

4.4 Functional and Non-functional requirements

4.4.1 Functional requirements

The functional requirements of the information and document sharing system are as below:

- The system shall allow students to be able to login to their own account.
- The system shall allow students to be able to view information and document posted by the administrators.
- The system shall allow students to be able to search for the information and documents by entering the keyword.
- The system shall allow students to choose to take part or not-to-take-part in an event.
- The system shall allow students to view the UTAR DIECS organization board.
- The system shall allow the administrators (lecturers and HOD) to upload documents and post information.

- The system shall allow the administrators (lecturers and HOD) to manage the information and documents uploaded such as edit and delete.
- The system shall allow the administrators (lecturers and HOD) to track the involvement of students for the events.
- The system shall allow the HOD to upload and manage the organization board.

4.4.2 Non-functional requirements

- The system shall be able to auto refresh the home page for every five minutes.
- The system shall be able to reconnect to the server after three seconds when the server connection is failed.
- the system shall allow administrator to login to the information and document sharing system through mobile phones.
- Reinstallation of the mobile application shall not affect the data of the user in the database.

4.5 Fact findings

Two surveys and interviews with two lecturers and HOD are conducted. The analysis of the surveys and interviews done will be discussed in this section. The interview questions and the questionnaires can be referred in appendix.

4.5.1 Survey on students

A survey has been done with a group of students in UTAR DIECS. Thirty sets of questionnaires have been distributed to thirty students of UTAR DIECS. All thirty students have provided their feedbacks. The responses from the students are summarized below:

1. Sources to access information and document

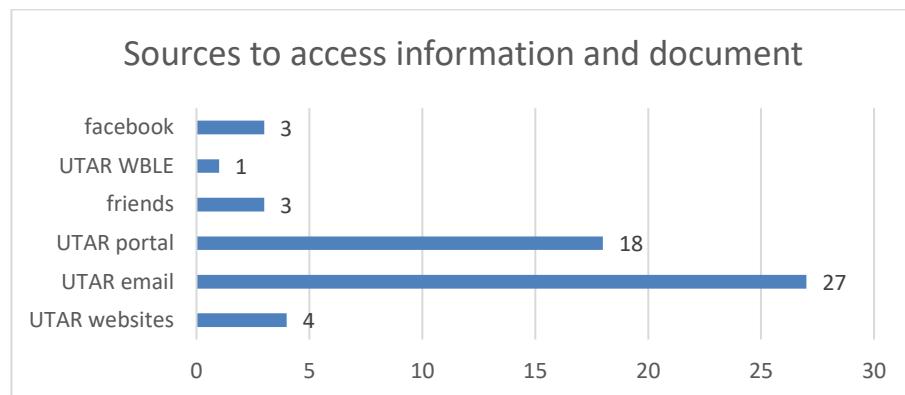


Figure 4-1 Ways to retrieve information and document by students

Based on Figure 4-1, the most usual way students access information through UTAR email. In contrast, the least frequent source is UTAR WBLE which has only one student among thirty students. This shows the rate for students to access to WBLE is very low compared with UTAR email. In my opinion, UTAR email often visited by students compared with WBLE is because WBLE is mostly academic resources. Instead, UTAR email has a lot more other information such as vacancy, workshop and many more.

2. Categories of information and document accessed by students

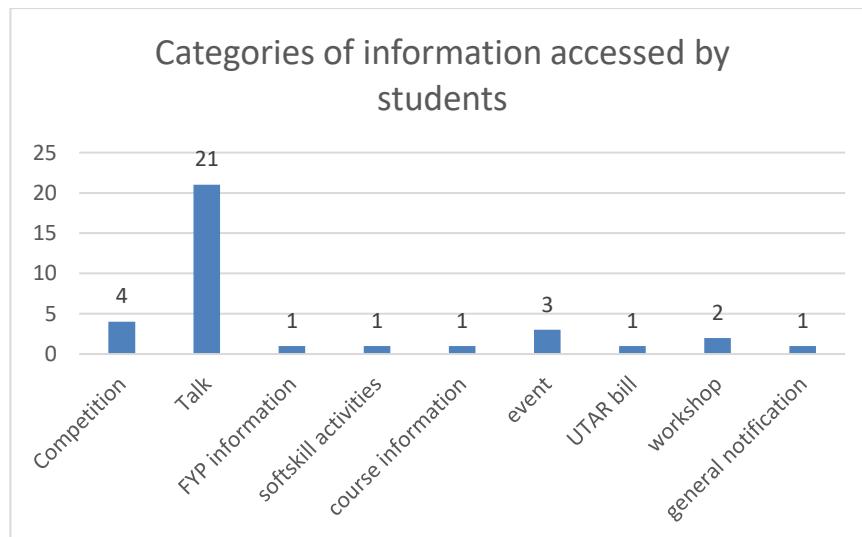


Figure 4-2 Type of information and documents accessed by students

According to Figure 4-2, talk is the most frequently accessed category of information by students. This shows the students in UTAR DIECS is more interested in various kind of talks. FYP information, soft skill activities, course information, UTAR bill and general information do not usually retrieved by students. In my view, the

3. Frequency of event participation

3. How often do you take part in the events?

30 responses

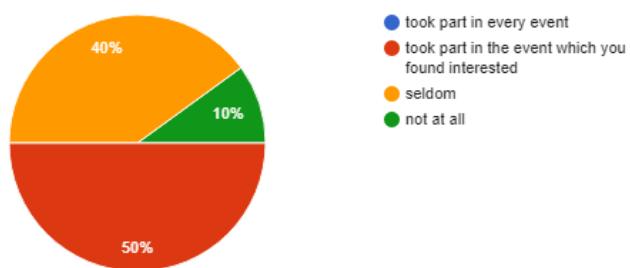


Figure 4-3 Students' event participation frequency

Figure 4-3 shows the percentage of students participate in events. 50% of students took part in the events which they only found interested, 40% of students seldom took part in events and 10% of students never took part in any event before. This pie chart shows that students do not actively participate in the events held in UTAR campus. Students' participation is very important in every event. Meanwhile, students' attendance is perpendicular to the attention of events in students.

4. Person enquiry

4. Who do you ask if you have any inquiries about the information/event?

30 responses

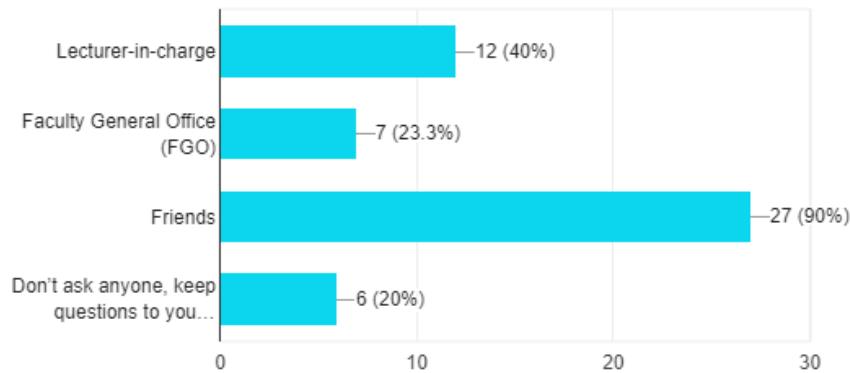


Figure 4-4 Persons that students enquire when problem arises

According to Figure 4-4, the majority person that usually the students consult is friends followed by lecturer-in-charge. In contrast, minority of students chose to keep the questions to themselves. In my opinion, friends are the closest person to the students. When there are any inquiries or problems, friends are always the first person to ask and prompt. Therefore, students tend to get answer from friends rather than approach the lecturer-in-charge.

5. Ways to approach the person-in-charge

5. How do you approach the person in-charge if you have problems or questions?

30 responses

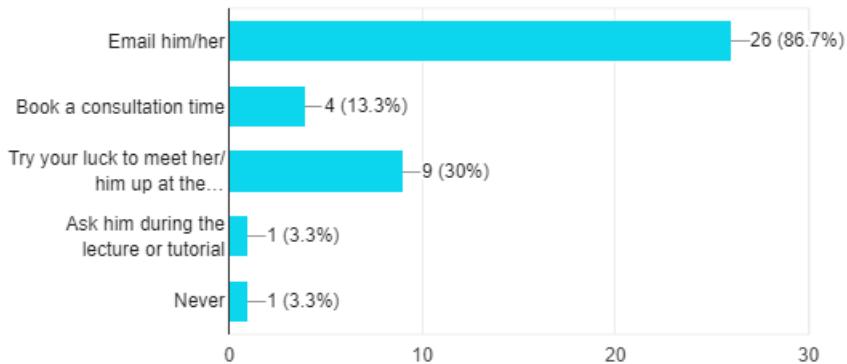


Figure 4-5 The ways student approached the person-in-charge of the events and information

The horizontal bar chart referring to Figure 4-5 indicates the methods students usually consult the person-in-charge when there is confuse and enquiry. About 86 percent of students chose to email the person-in-charge while 30 percent of students meet the lecturer in his office. In my view, email is always the best communication tool for the two persons to communicate with each other. It does not require the both persons to meet up face-to-face nor liaising through phone. But problems might arise when the lecturer does not always view their emails. The lecturer might now be able to solve and reply the student on time.

6. Acknowledgement of lecturer in-charged tasks

6. Do you clearly know that which lecturer(s) is in-charge of which task?

29 responses

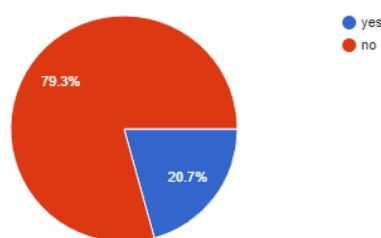


Figure 4-6 Students' acknowledgement of lecturer in-charged tasks

Based on the pie chart in Figure 4-6, almost 80 percent of students do not know which lecturer is in charge of his respective task while only about 20 percent of students has this concern. This shows most of the students are actually do not know who to approach when they have questions.

7. Problems in accessing information and documents

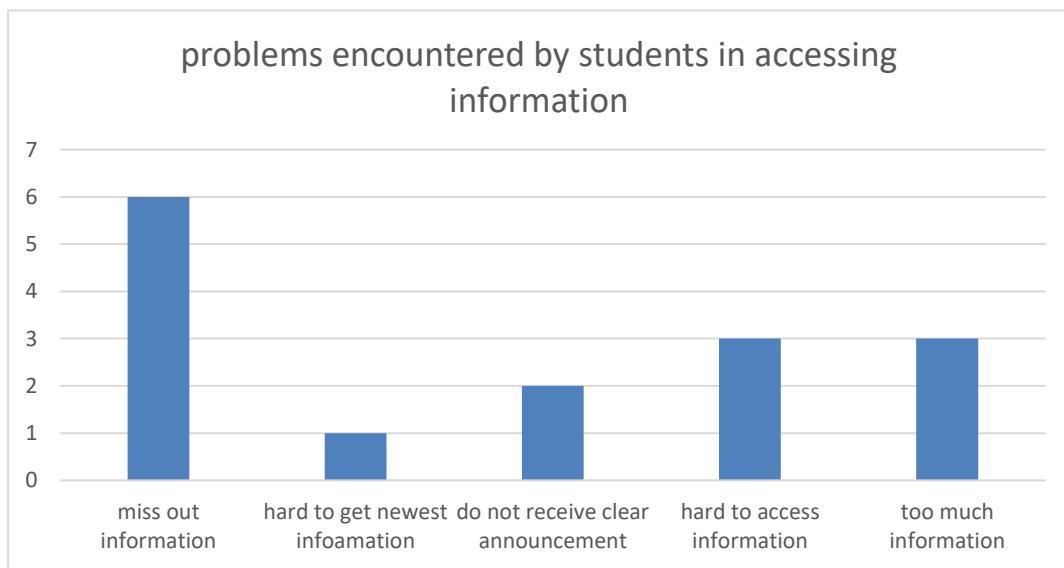


Figure 4-7 Problems faced by students in retrieving information

As in Figure 4-7 which shows the problems students faced when accessing to information and document, the highest number of students missed out important information whereas the other problems students encountered are hard to access information, too much information posted, do not receive clear announcement and hard to get newest information. In my opinion, sometimes students missed out important information because it has too much information posted. Thus, students may not have idea on how to retrieve it. The problems proposed are some are interrelated.

8. Students' acknowledgement of UTAR DIECS organizational board

11. As a student in UTAR DIECS, do you know the organizational board? (i.e. HOD, HOP)

30 responses

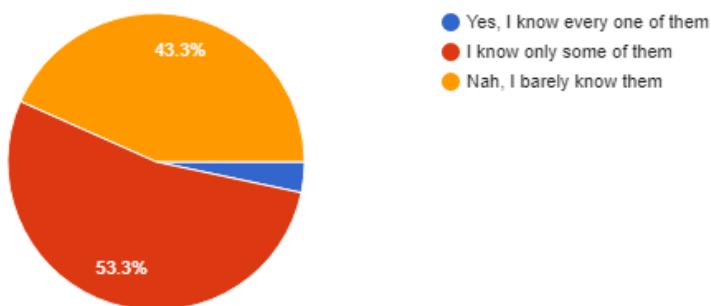


Figure 4-8 Percentage of students' acknowledgement of the department organizational board

In accordance with Figure 4-8, more than half of the students know only some of the department organizational board member. About 43 percent of students do not know the organizational board in UTAR DIECS whereas only 3 percent of students know all of the board members. In my point of view, in an organization, it is vital to know every one of the organization board. The existence of the organizational board is to ensure the students' behavior and study are within the acceptable boundary. Everyone in the organization board has different role and handles different tasks. Therefore, acknowledgement of the organizational board members allows the students to approach to the personnel to get their problems resolved.

9. Features that are required to be included in the application.

14. What feature(s) do you think shall be included in the application? (you may choose more than 1)

30 responses

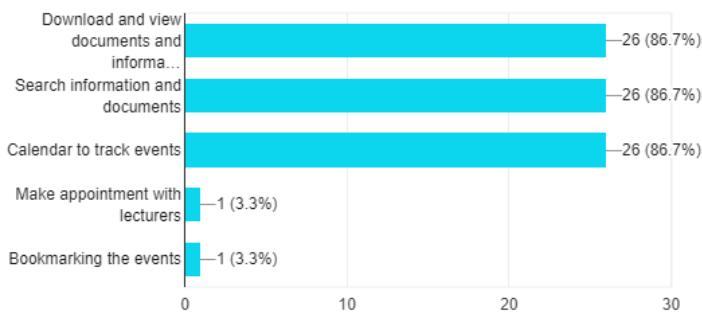


Figure 4-9 Features needed in the mobile application

Figure 4-9 shows the features required to be included in the mobile application. Three of the features are equally important to be included which are download and view documents and information, search information and documents and calendar to track events. In my opinion, the first two features are the primary features in the mobile application. The third feature is as important as the first two is because it allows the students to view the on-going event clearly rather than scrolling through a page of words.

10. Importance of private chat room

15. Do you think that having a forum or private chat room is good to enhance communication...lecturers, HOD and students?

30 responses

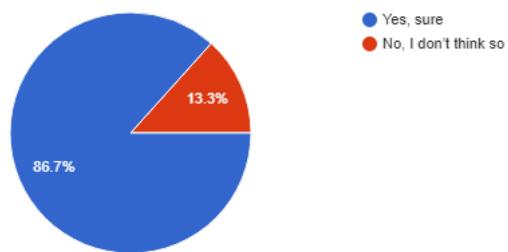


Figure 4-10 Additional feature of having a private chat room

Figure 4-10 indicates that almost 87 percent of students agree to have a private chat room in the mobile application. In my point of view, a private chat room is important for the students to communicate with lecturers without needing to approach them face-to-face nor via email.

4.5.2 Survey on lecturers

Thirteen set of questionnaires have been sent to thirteen academic staff in UTAR DIECS. thirty percent which is 4 persons of academic staffs have provided feedbacks. The responses are analysed and summarized as below:

1. Sources of posting information and documents

2. How do you normally post information and documents?

4 responses

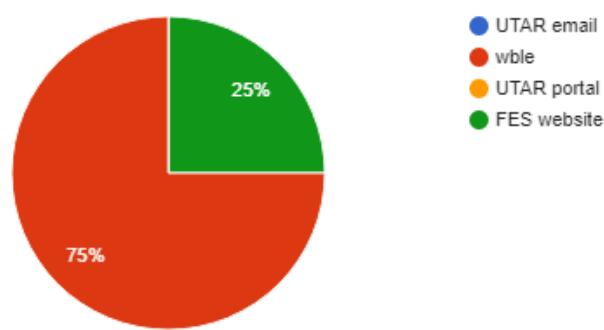


Figure 4-11 Sources to post information and documents

Seventy-five percent of the respond shows the main source for academic staffs in UTAR DIECS to upload information and document is UTAR WBLE as in Figure 4-11. Meanwhile, another 25 percent of lecturers usually post information in LKC FES website. In my opinion, posting information in UTAR WBLE is more convenient as it targets on a group of students instead of all students in UTAR DIECS. Some information might only target a portion of students rather than all students. Therefore, UTAR WBLE will be the more preferable choice for the lecturers.

2. Categories of information usually posted

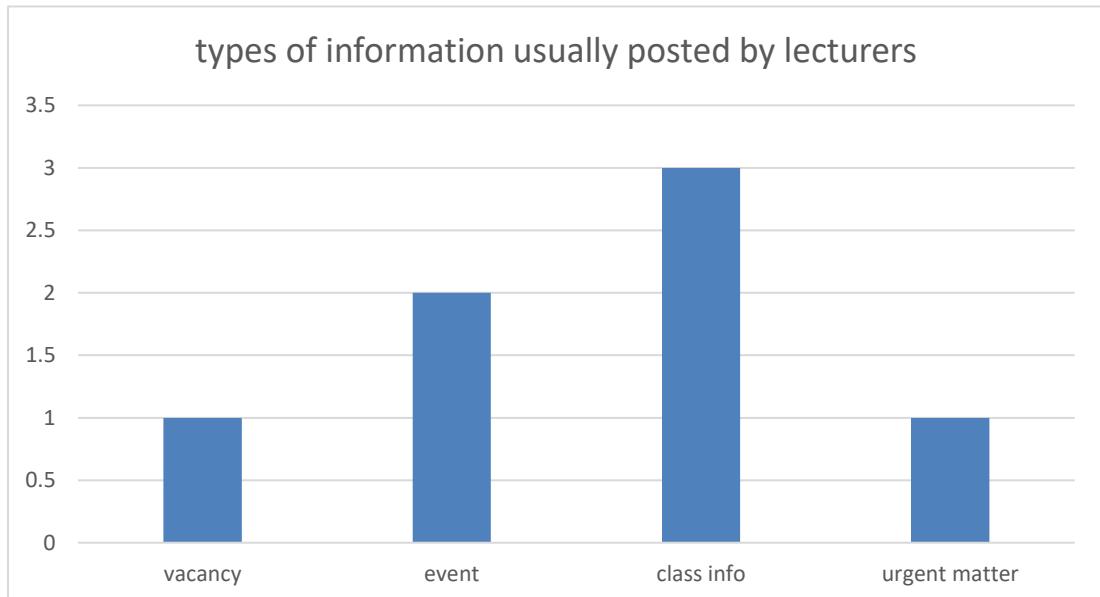


Figure 4-12 Categories of information uploaded by lecturers

The most common information posted by lecturers is class information in accordance with Figure 4-12. Besides class information, events are also often posted. Urgent matters and vacancy are equally important after events. In my point of view, lecturers manage students' matters, more information about the class will be the main and major concern of lecturers. Hence, lecturers will post more class information rather than other types of information.

3. Method to inform students when emergency occurs

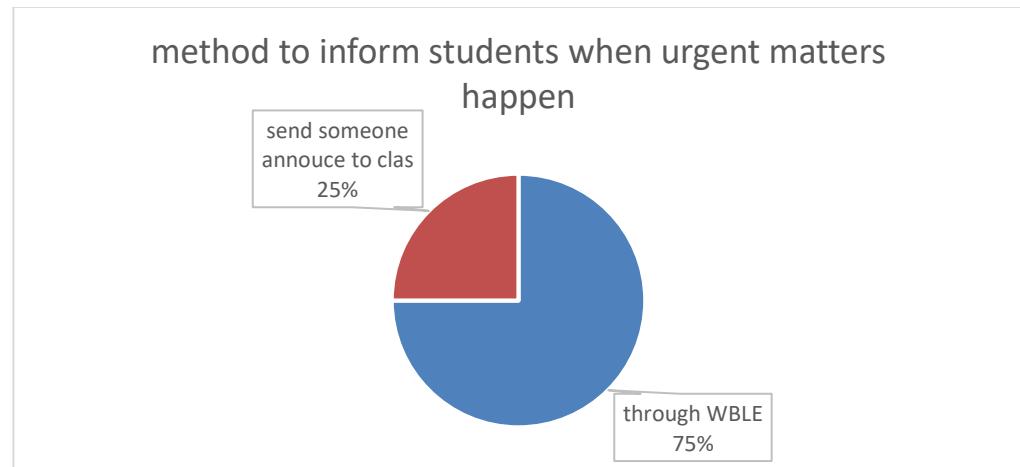


Figure 4-13 Method to notify students when emergency occurs

Based on Figure 4-13, the primary way for the lecturers to inform students when something emergency occur is through WBLE while the alternate way is to send someone to announce to class. In my view, urgent matters are usually for the target group of students, students of a specific class. Therefore, the more preferred and suitable choice to inform students is via WBLE as it can be accessed by the particular type of students.

4. Problems encountered by posting information and document in UTAR WBLE

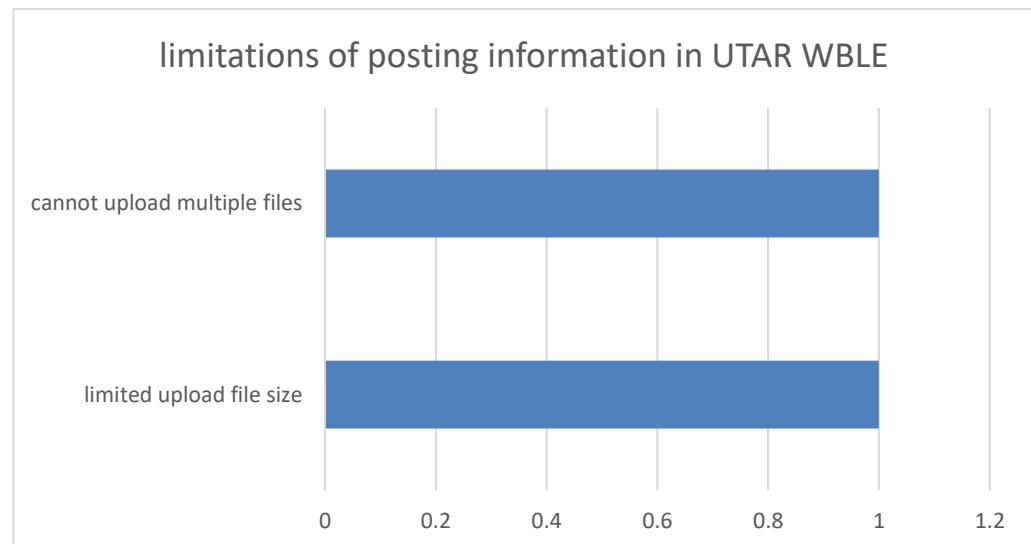


Figure 4-14 Problems faced in posting information in UTAR WBLE

Some drawbacks of uploading information and documents through WBLE are limited file size and it does not allow multiple files to be uploaded. According to Figure 4-14, both of these limitations are equally important. In my estimation, documents upload to WBLE need to be done one by one as it only allows one file to be uploaded each time. This process is time-consuming because the process needs to be repeated until all the documents are uploaded. Besides, limited file size is also very troublesome when the document size is more than the allowed file size.

5. Way to ensure students notified about the changes made for the document uploaded

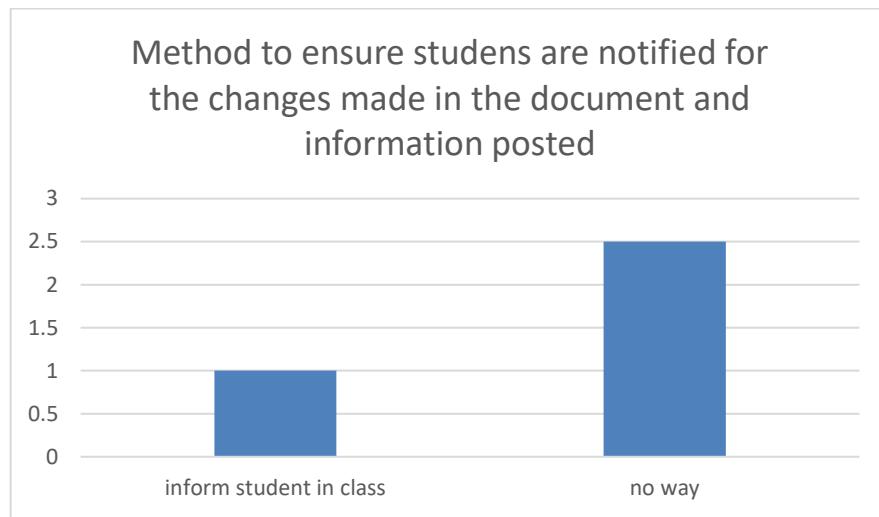


Figure 4-15 Method ensure students are aware for the updates of information and documents

Most of the lecturers have no idea on how to ensure the students are aware of the changes made based on Figure 4-15. whereas, one way to ensure the students' notification is through constantly inform the students to check WBLE frequently so that they can be notified on time. From my standpoint, students' notification and awareness of the changes are vital as if the students are not aware about the changes made, students might miss out the information.

6. Communication channels when students have questions with the information posted

10. When a student has some problem regarding the information you have posted, ...ommunicate with that student?

4 responses

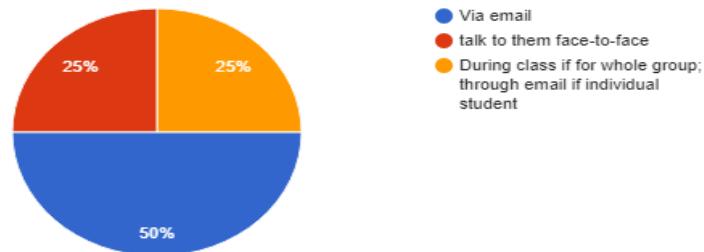


Figure 4-16 Communication medium used to liaise with students

About 50 percent of lecturers liaise with students through email while a quarter of lecturers communicate with students face-to-face and inform during class respectively. To my mind, communication channel is significant as the channel affects the clarity of message being passed. Using a wrong channel might cause misunderstanding between message sender and message receiver.

7. Features to be included in the mobile application to be developed

13. What features do you think should be included in the application? (you may choose more than 1)

4 responses

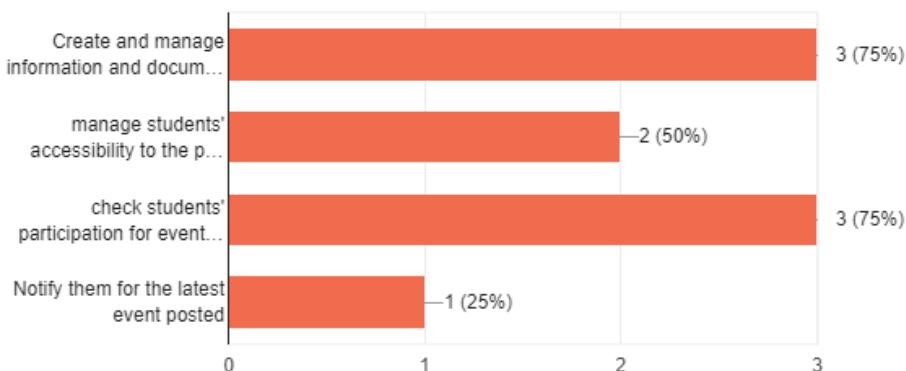


Figure 4-17 Additional features to be included in the mobile application

Based on figure 4-17, aside the primary feature which is create and manage information and documents, check students' participation is equally important. Next, extra the features that can also be added in the mobile application are manage students' accessibility to the information posted and notification for the latest event posted. In my opinion, check student's participation for the events saves lecturer-in-charge a lot of works as they do not need to calculate the number of students take part manually. A student involvement report will be generated and updated at every student's registration.

4.5.3 Interview with academic staffs

Three interviews have been conducted with HOD, and two lecturers, the lecturers in-charge of two different tasks namely, Final Year Project and Industrial Training respectively. Summary of the interviews will be discussed in this section.

i. Interview with HOD

From the interview, many of the students do not know whom to go to when problems exist. They also do not aware about the person in charge and lecturers that take part of different tasks such as FYP coordinator and IT coordinator. There is a lot of students have issues with their study. There is two main ways usually to communicate with this kind of students:

- Staff-student feedback system allows the HOD to view the complaint from students such as the facilities and lecturers.
- When the students have problems in their study, first they will approach the academic advisor. After the meeting the problems cannot be resolved, the students will approach HOD.

Two main ways of communicating with students which are email and walk-by office. Besides, there are two primary sources for the HOD to post information and documents that are UTAR LKC FES website at the DIECS section and UTAT LKC FES Facebook page. The limitation of these sources is the students' awareness of the information and documents posted. HOD usually post the information in multiple sources. The problem can be found in the sharing the

information and document is students may overlook email. Thus, the students might miss out the information posted.

If a mobile application is to be developed, the most important part is the students must subscribe and install the mobile application, the information in the mobile application must be categorized. The additional features that can be included in the mobile application are the information must be sent to a target group, it can be one information to all students in the department or one information in one targeted group. Next, the mobile application can also show the courses that will be offered next semester. Moreover, a Frequently Asked Question (FAQ) section that allows the students to view different type of questions such as procedure of application for leave, add or drop courses, information about barring system and alert the students to check the attendance before the bar list is displayed.

ii. Interview with Final Year Project coordinator

Based on the interview with FYP coordinator, the sources to upload information and documents regarding FYP are UTAR WBLE and UTAR website. Some issues have been found in posting FYP information and documents are:

- The FYP coordinator does not know whether the students are reading the information or not.
- UTAR WBLE does not show the importance of the information according to timeline
- These sources do not categorize the information and kind of reports.

The FYP coordinator usually uploads the information and documents in single source which is UTAR WBLE. Students usually approach the FYP coordinator by emailing and making appointment. The limitations of these two approaches are the both the students and the coordinator might not be able to understand the message. When there are any emergency cases, the coordinator will inform the students through UTAR WBLE and physically paste a notification outside the classroom.

If a mobile application is to be developed, the application should allow the coordinator to post the information depends on the group of students and synchronize on all the platforms so that the information on all the platforms are tally. The additional feature that can be included in the mobile application is the categorization of information. The information can be classified into different

categories to ease the students and coordinator to post and view the information. Having a private chat room is good to be included in the mobile application because some of the lecturers might not willing to share their private phone number with the students.

iii. Interview with Industrial Training coordinator

In accordance with the interview, the sources that usually IT coordinator usually posted on are email and UTAR website. There are some issues revealed during the interview session:

- The IT coordinator first needs to compile a of students' email in order to post the information such as vacancy and notification of submission of document.
- The IT coordinator usually post information on only single source which is the UTAR email.
- When there are any changes in the post, he has to repeat the whole process as in re-create the post with the updated changes because the current system does not allow copy and paste.
- The IT coordinator faces this problem every time he has to make changes.
- Students usually consult him by writing him an email and walk-by to his office. These methods are not so efficient as in email, sometimes is hard to the give detail consultation and not all the students will actually approach him face-to-face.

If a mobile application is to be developed to solve the problems, it should be a centralized information and document sharing platform, it also allows communications among IT coordinator and students. The additional feature to be included in this mobile application a calendar to track the on-going events. A private chat room can also be included to improve the liaison between students and lecturers.

iv. Interview with FGO

From the result of the interview, under LKC FES, there are nine faculties. Every department has an internal committee which is External Relationship Committee (ERC). Each of the department has one representative to the committee. Any staff who receives the talk or any other event from external companies will send the

information to the ERC member. Then the ERC member will update in the google sheet. After that, the google sheet will be compiled weekly. Next, the information will be broadcasted to Facebook, UTAR website and notice board.

CHAPTER 5

SYSTEM DESIGN

5.1 Introduction

this section comprises three types of design namely user interface design, system design and database design.

5.2 User Interface design

There are mainly two different types of users in this system. They are academic staff and students in UTAR DIECS. Each user has different user interfaces. Some of the interfaces might be almost the same for both types of users.

5.2.1 UI design navigation model

This model shows the navigation of the overall system for both student and academic staff. The root page starts from login page follow by student home page or admin home page depending on which type of user the user log in as. After the user land on the home page, by sliding left, a navigation drawer is displayed with different link to different pages. The link to different pages is illustrated with figure 5-1.

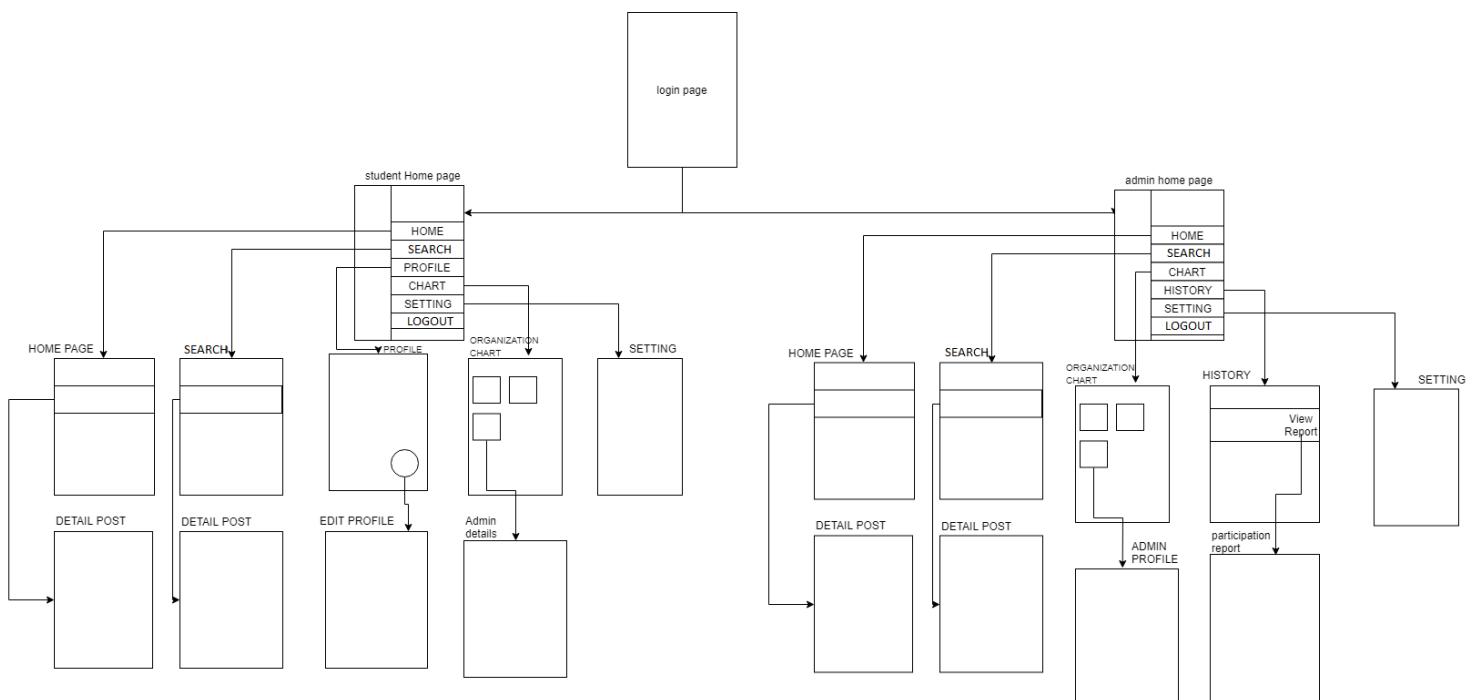


Figure 5-1 UI design navigation model

5.2.2 UI for login page

The figures below show the login page for both academic staff and student respectively. The login page for both student and academic staff requires input of user ID and password for authentication.

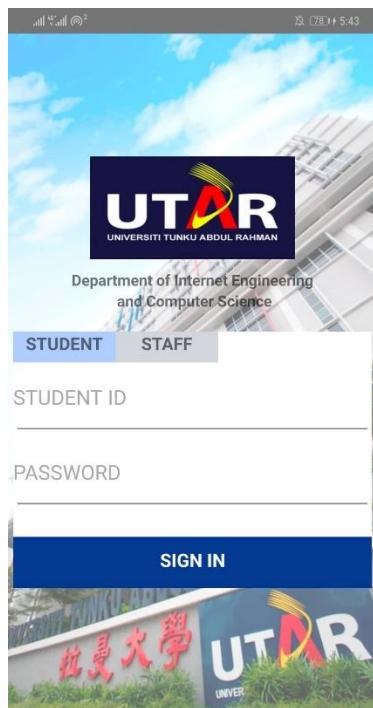


Figure 5-2 UI design for student login
page

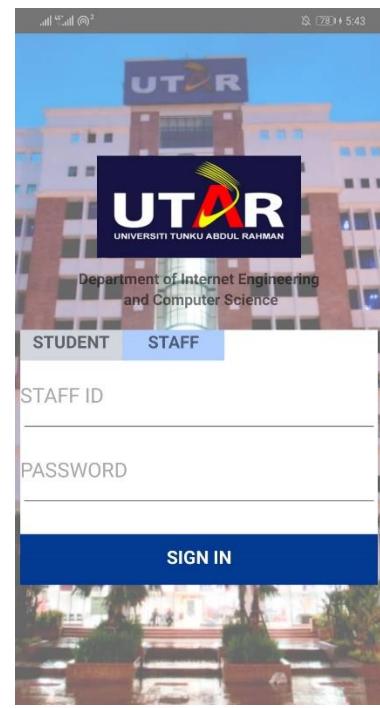


Figure 5-3 UI design for admin login
page

5.2.3 UI for student

5.2.3.1 Home page

This page shows the viewable information for students.

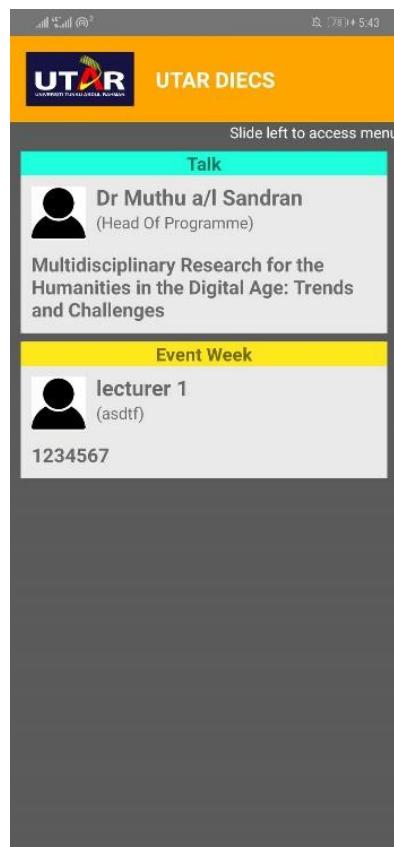


Figure 5-4 Home page for student

5.2.3.2 View information and choose to take part in the event

This screen allows student to view details of the information and decide to take part or not to take part in the event.

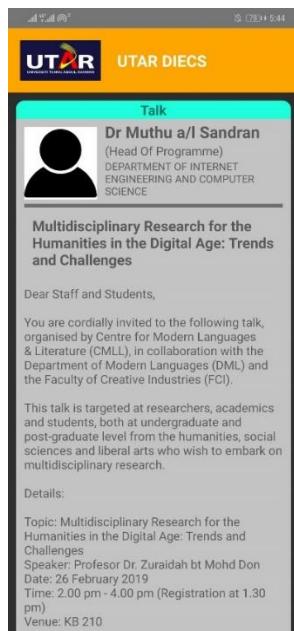


Figure 5-5 Information detail screen for student

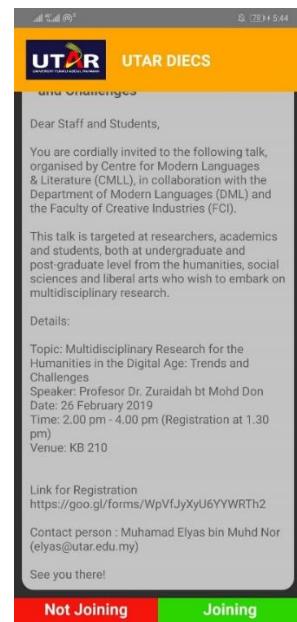


Figure 5-6 Student chooses to join or not to join the event

5.2.3.3 Search information

This screen allows student to search the information by entering the keyword, if the keyword does not match with the result, no result will be displayed on the screen.

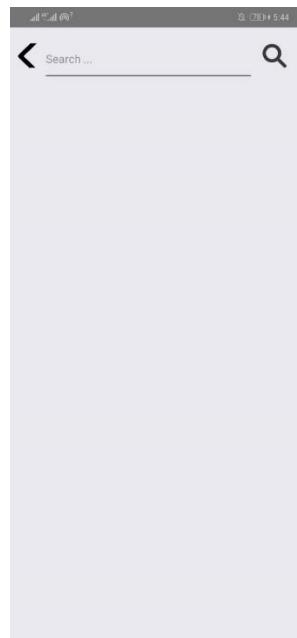


Figure 5-7 Search screen for student

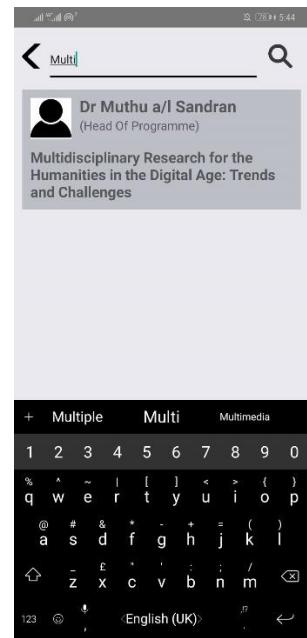


Figure 5-8 Search result by entering keyword

5.2.3.4 Side drawer navigation for student

This drawer navigation displays a list of menus that allows students to access to different functionalities in the application.

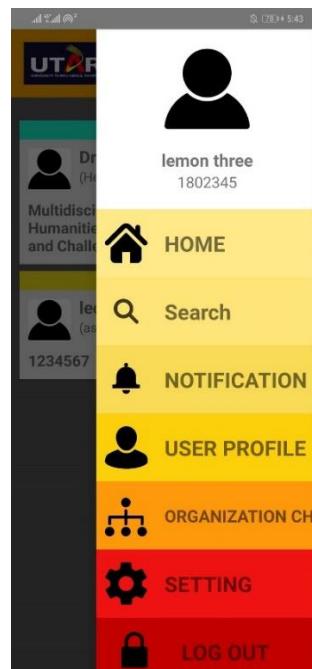


Figure 5-9 Side drawer navigator for student

5.2.3.5 User profile management

the screens below allow student to view and manage their own profile by editing the phone number and email address.

Figure 5-10 User profile screen for student

Figure 5-11 Edit profile for student

5.2.3.6 View organization chart and lecturer profile

These screens allow students to view organization chart and lecturer's profile in UTAR DIECS.



Figure 5-12 Organization chart in
UTAR DIECS



Figure 5-13 Lecturer profile

5.2.4 UI for admin

5.2.4.1 Home page for admin

Home page displays a list of information post created by other admins and the admin himself.

Slide left to access menu

Talk

Dr Muthu a/l Sandran
(Head Of Programme)

Multidisciplinary Research for the
Humanities in the Digital Age: Trends and
Challenges

Talk

Dr Muthu a/l Sandran
(Head Of Programme)

updated post 1

General Information

Dr. Ali bin Abu
(Head of department)

sample post 3

Event Week

Dr. Ali bin Abu
(Head of department)

sample post created by 1

+

Figure 5-14 Home page for admin

5.2.4.2 Post management

These screens allow the admin to perform Creation, Modification and Deletion of post.

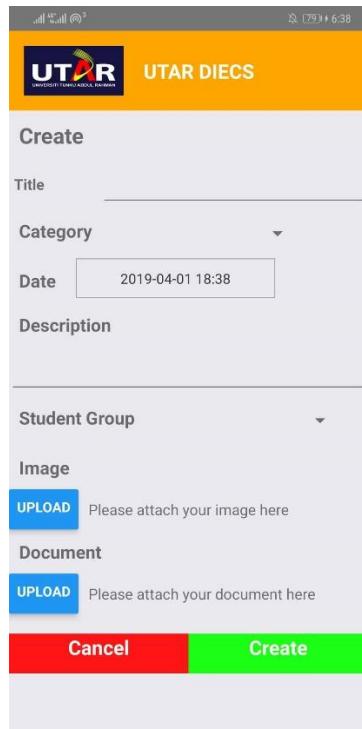


Figure 5-15 Create post for admin

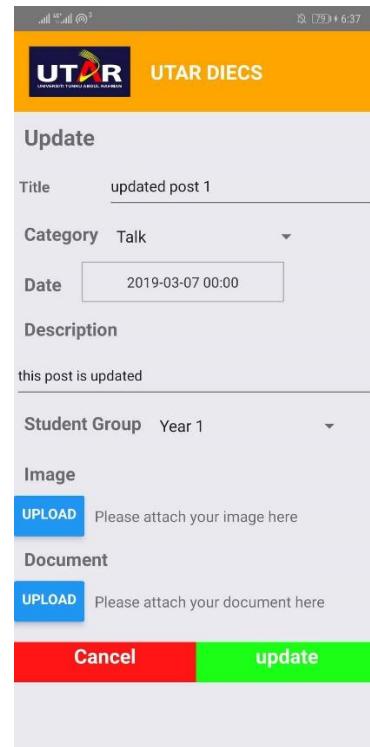


Figure 5-16 Update post for admin

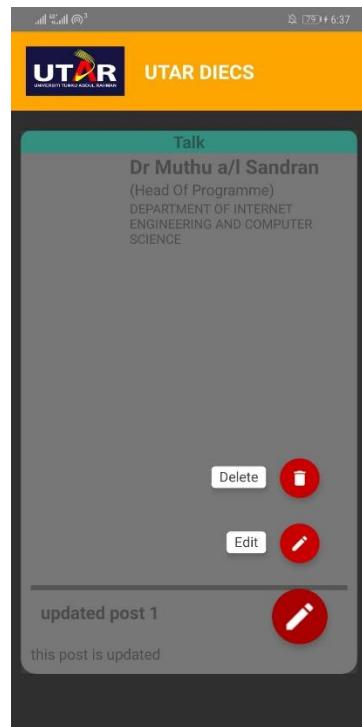


Figure 5-17 Admin chooses to edit or delete the post

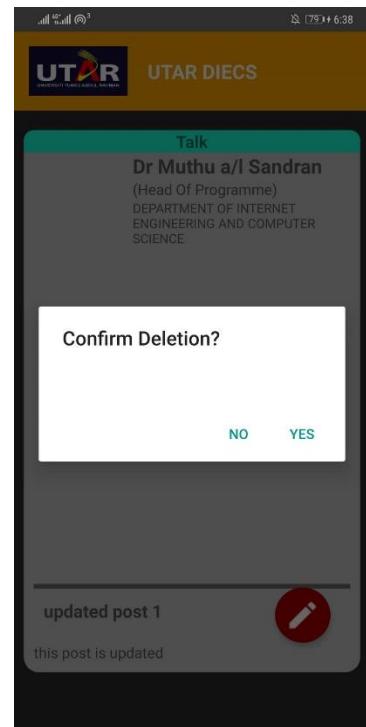


Figure 5-18 Admin chooses to delete the post

5.2.4.3 Side drawer navigation for admin

The drawer navigation bar provides a list of menus that allows admin to perform different functionalities



Figure 5-19 Side drawer for admin

5.2.4.4 Search information

This screen allows student to search the information by entering the keyword, if the keyword does not match with the result, no result will be displayed on the screen.

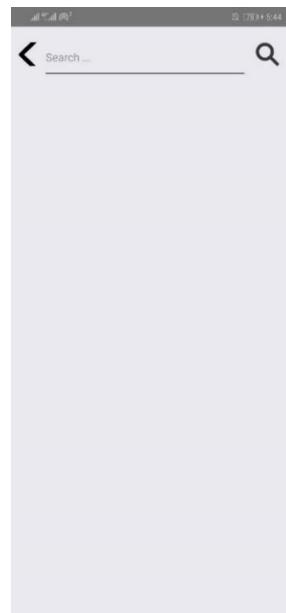


Figure 5-20 Search screen for admin

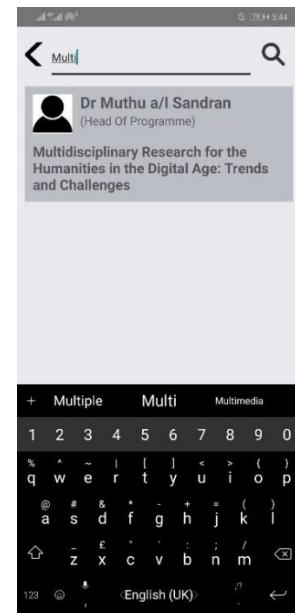


Figure 5-21 Search result by entering keyword

5.2.4.5 View student participation report

These screens allow admin to view posted information, and report for student's participation.

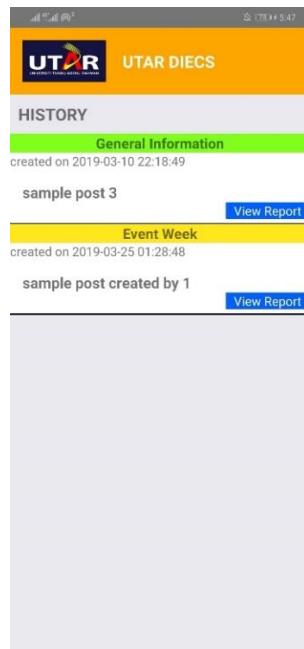


Figure 5-22 History of admin post

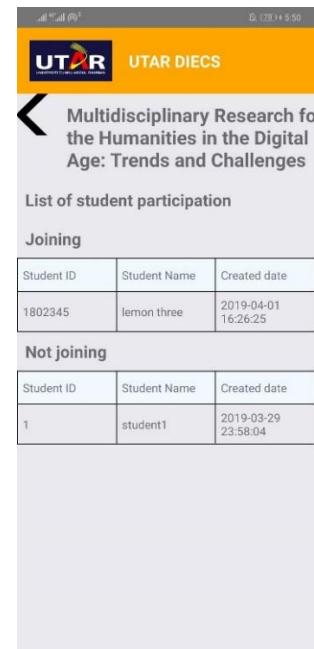


Figure 5-23 Student participation report for a particular event

5.2.4.6 View organization chart

These screens below provide admin to view organization chart and lecturer profile in UTAR DIECS.



Figure 5-24 Organization chart in UTAR DIECS

Name	Dr Muthu a/l Sandran
Faculty	Faculty of Computer Science
Department	ENGINEERING AND COMPUTER SCIENCE
Designation	Assistant Professor
Administrative Position	Head Of Programme
Departmental Administrative Position	Head of programme
Telephone number	03-2345678
Email Address	muthu@university.com
Qualifications	Doctor of Philosophy (Computer Science), University of Cambridge Master of Science(Computer Science), University of Cambridge Bachelor of Science(HONs), University of Cambridge

Figure 5-25 Lecturer profile

5.3 System design models

The system design models consist of Data Flow Diagram, system architecture and activity diagrams to illustrate the interactions between academic staffs and students.

5.3.1 Data flow diagram

Data flow diagram shows the data input and output of a system. Figures below display the input and output flow of data for admin and student respectively.

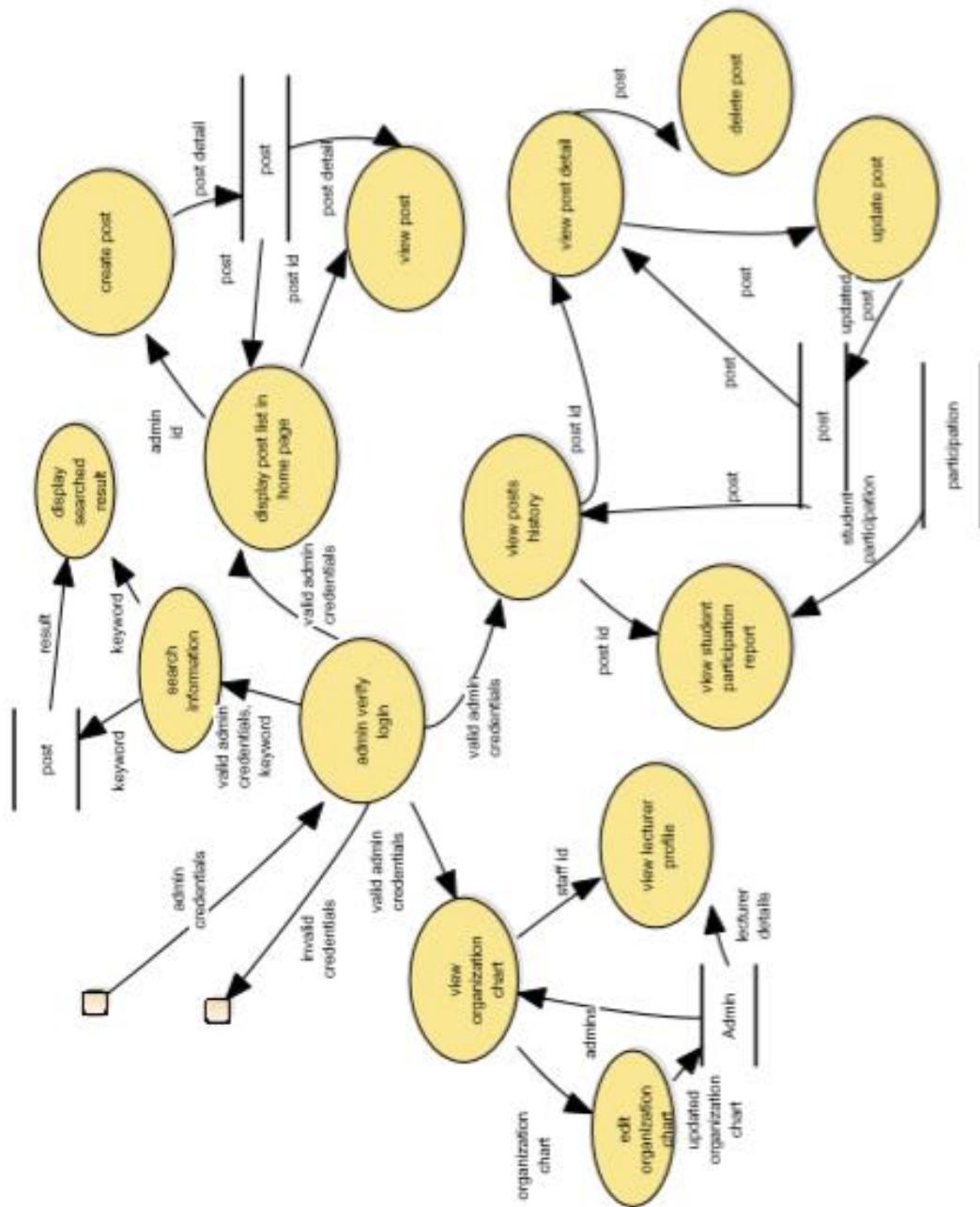


Figure 5-26 Data flow diagram for admin

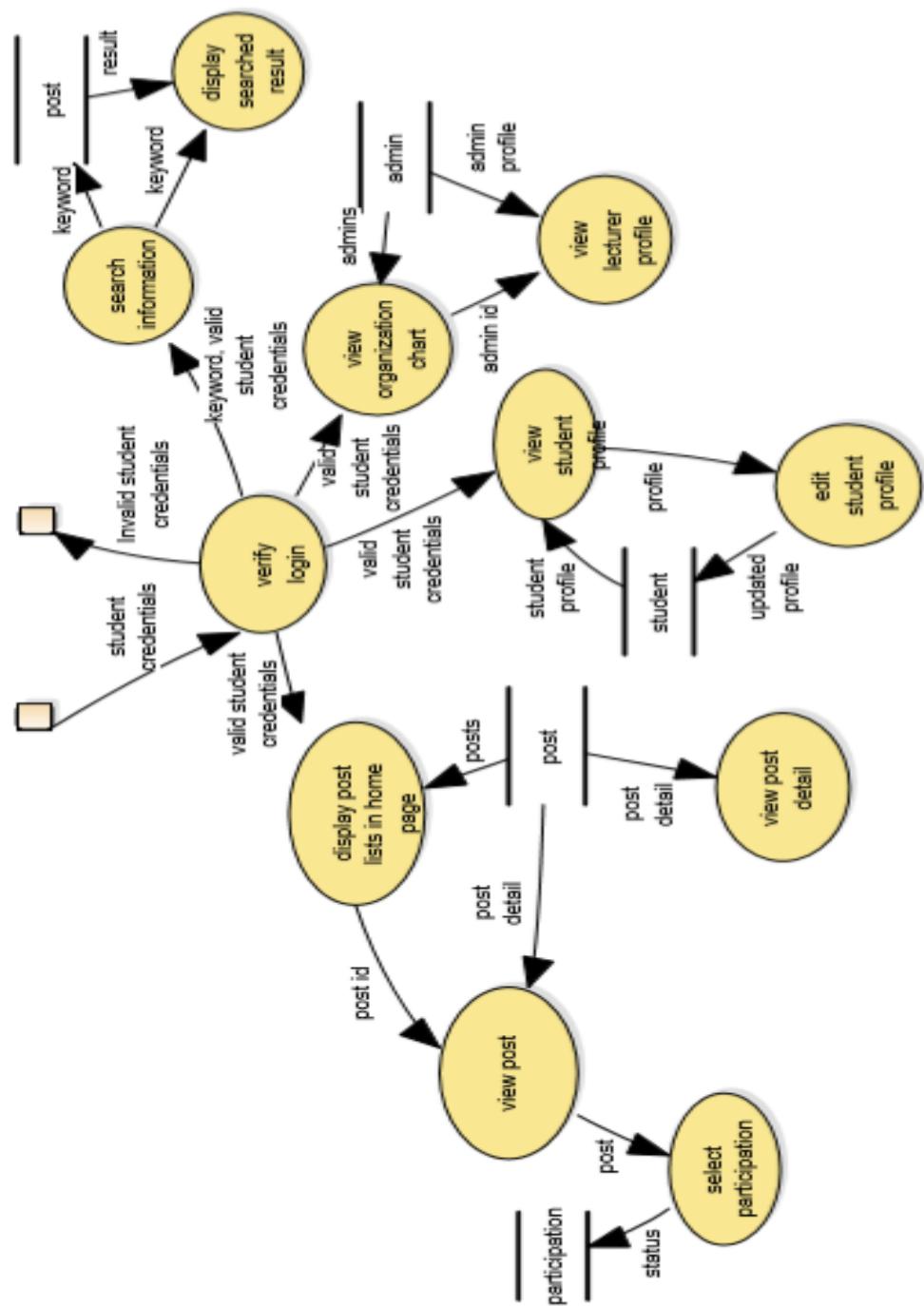


Figure 5-27 Data flow diagram for student

5.3.2 Activity diagrams for admin

5.3.2.1 Login verification

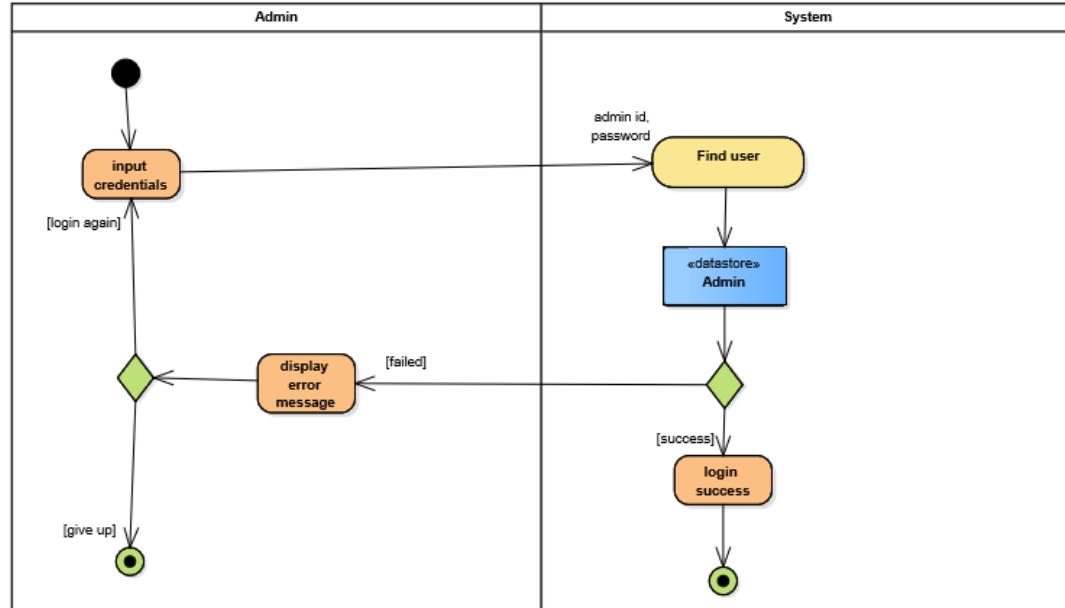


Figure 5-28 Activity diagram for login verification for admin

5.3.2.2 Search information

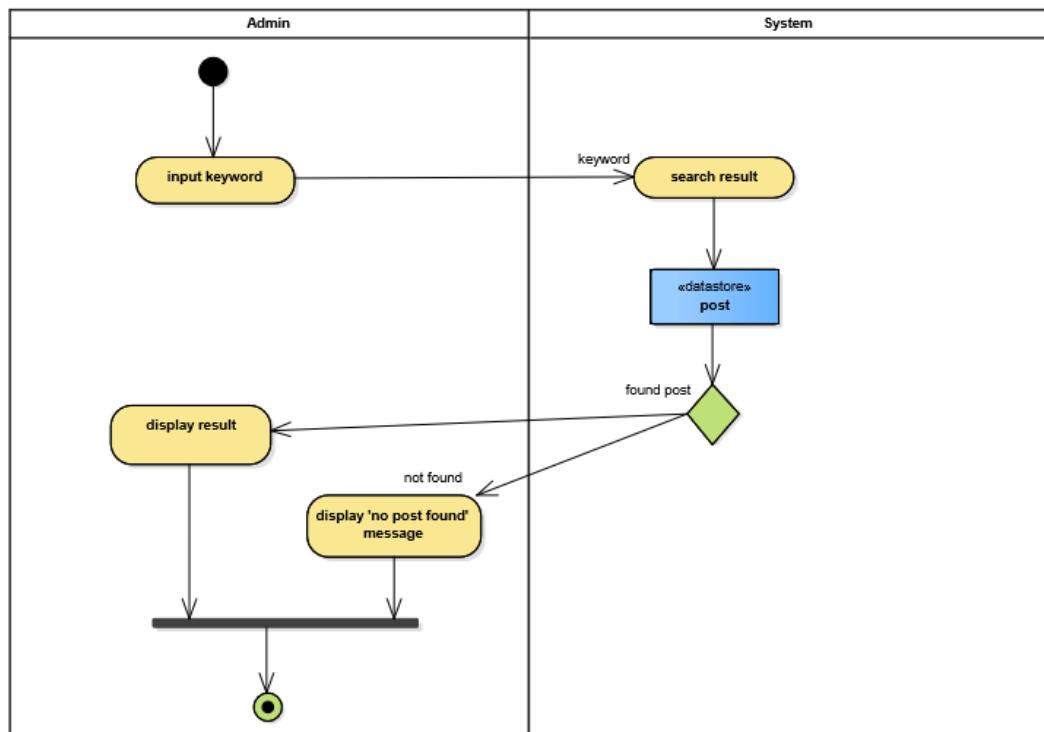


Figure 5-29 Activity diagram for searching information for admin

5.3.2.3 View information for admin

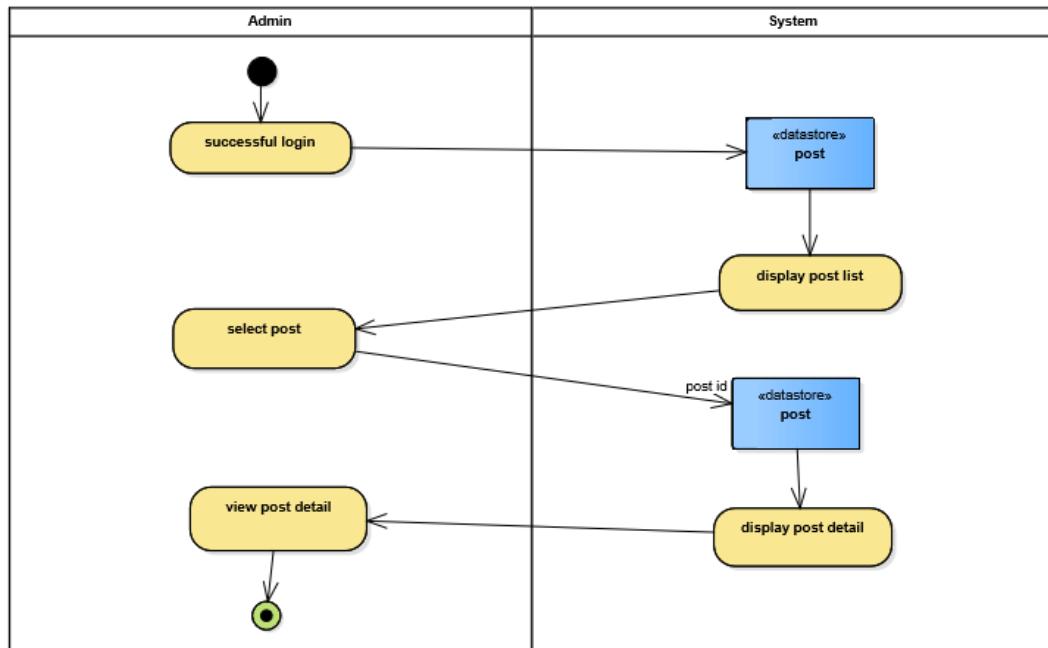


Figure 5-30 Activity diagram for view information for admin

5.3.2.4 Admin create post

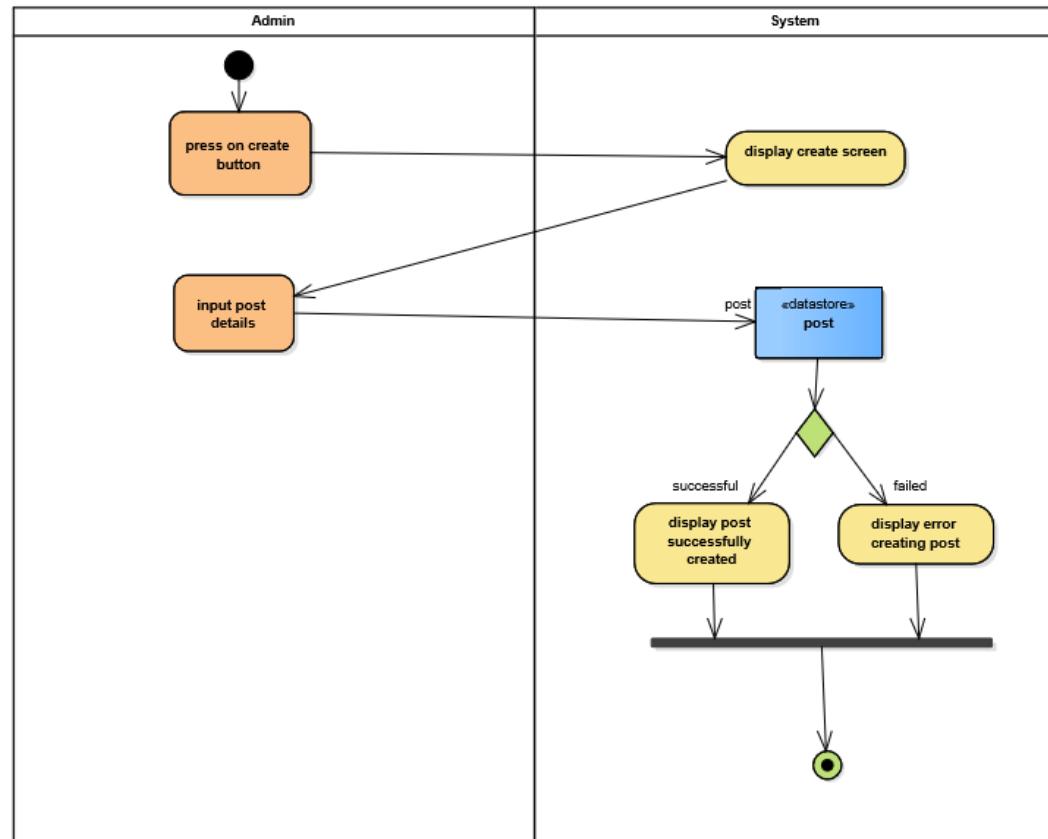


Figure 5-31 Activity diagram for admin create post

5.3.2.5 Admin edit post and view participation report

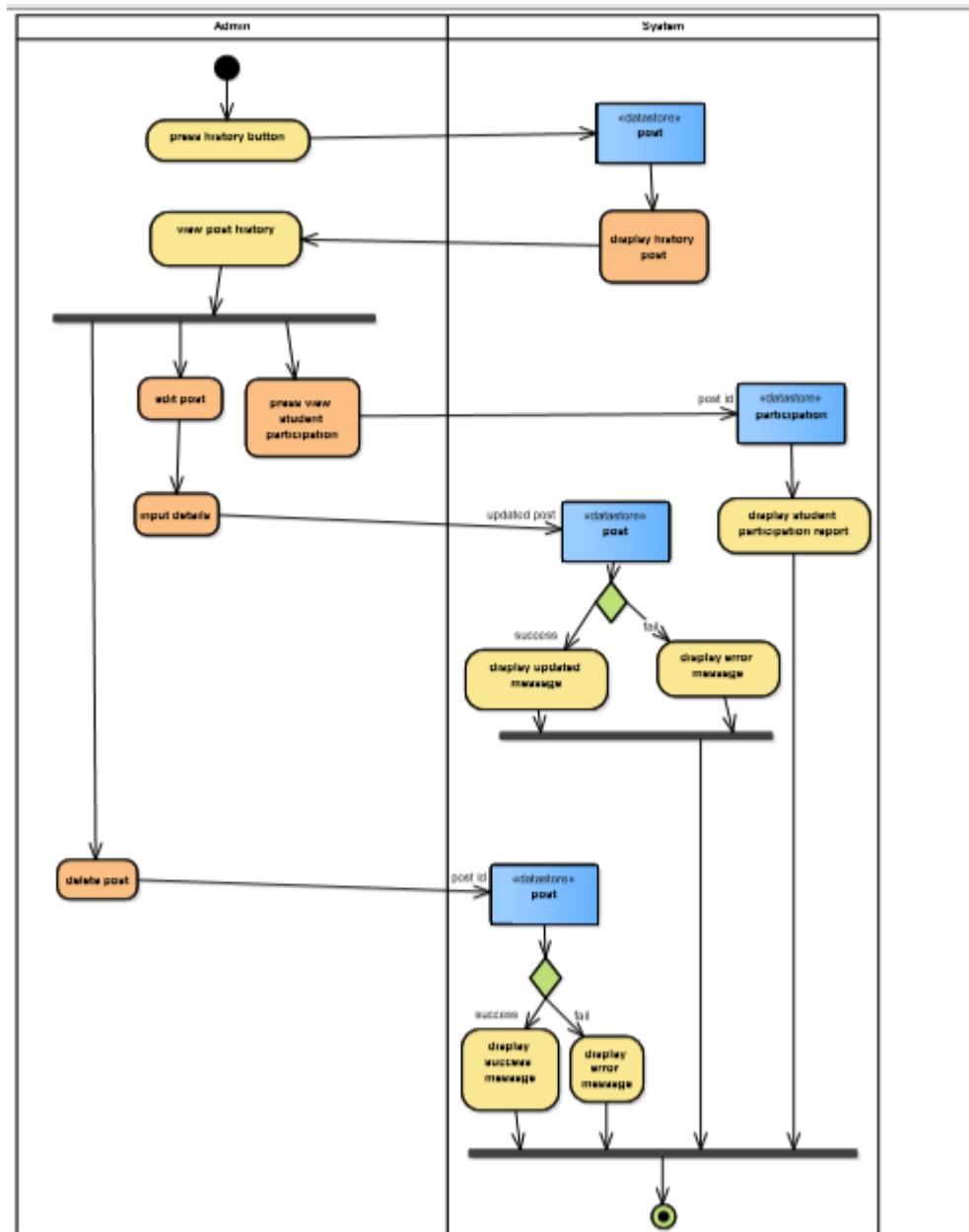


Figure 5-32 Activity diagram for admin edit post and view participation report

5.3.2.6 Admin view organization chart

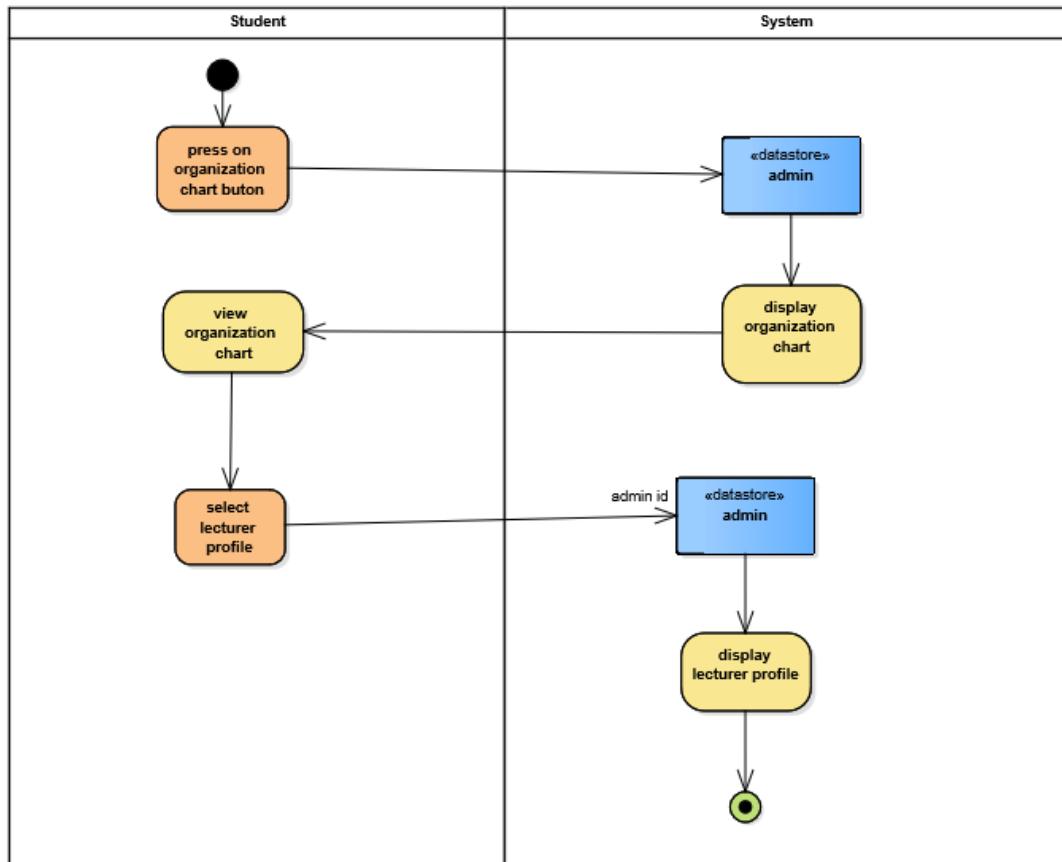


Figure 5-33 Activity diagram for admin view organization chart

5.3.3 Activity diagram for student

5.3.3.1 Login verification

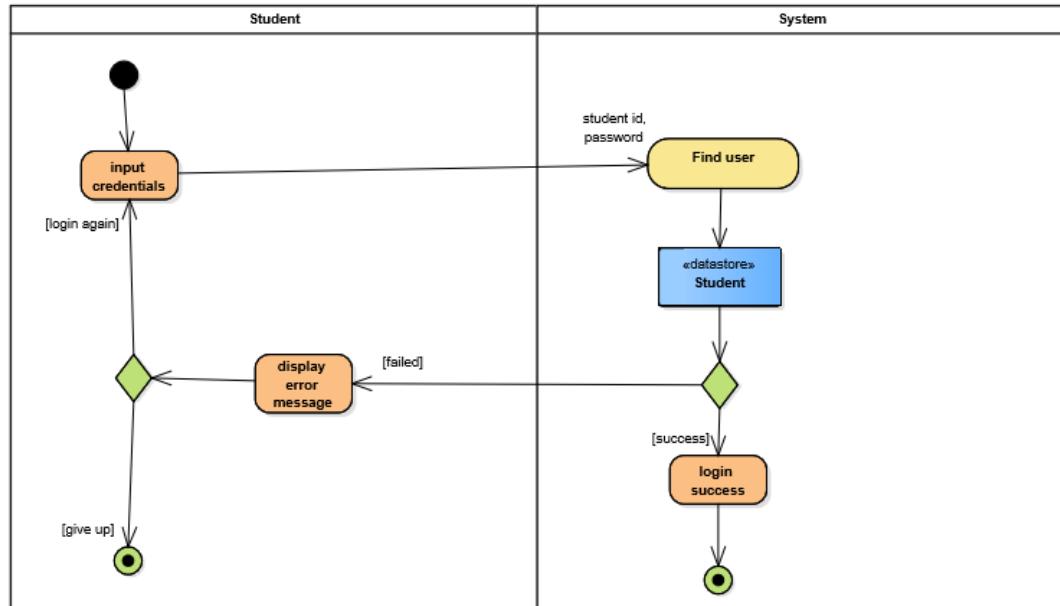


Figure 5-34 Activity diagram for student login verification

5.3.3.2 Search information for student

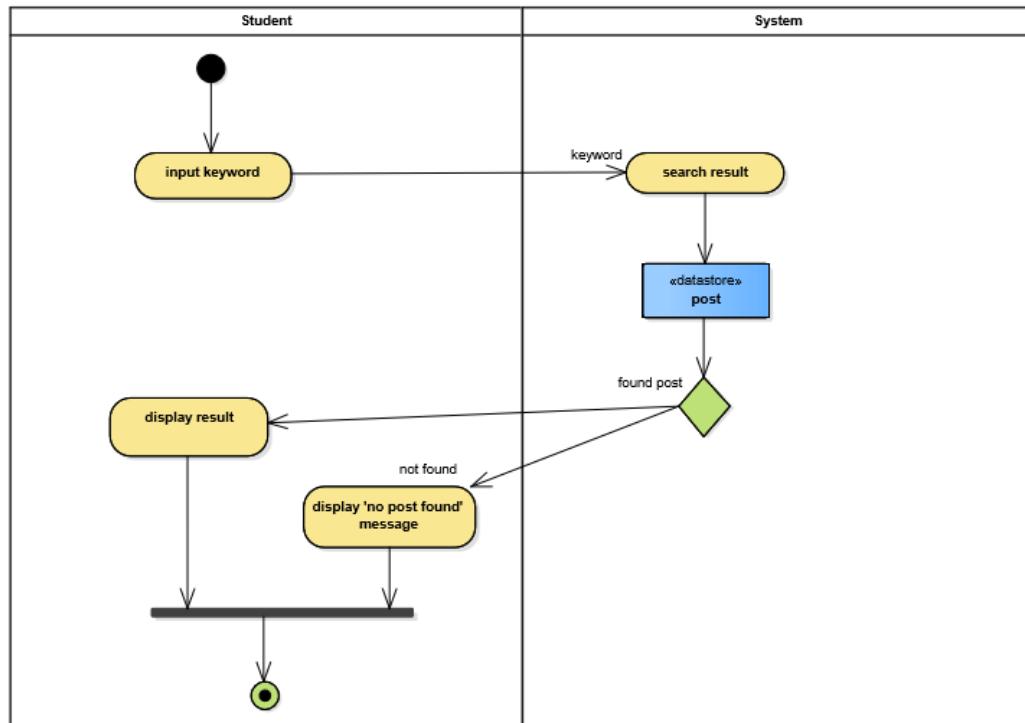


Figure 5-35 Activity diagram for student search information

5.3.3.3 Student view post and select participation

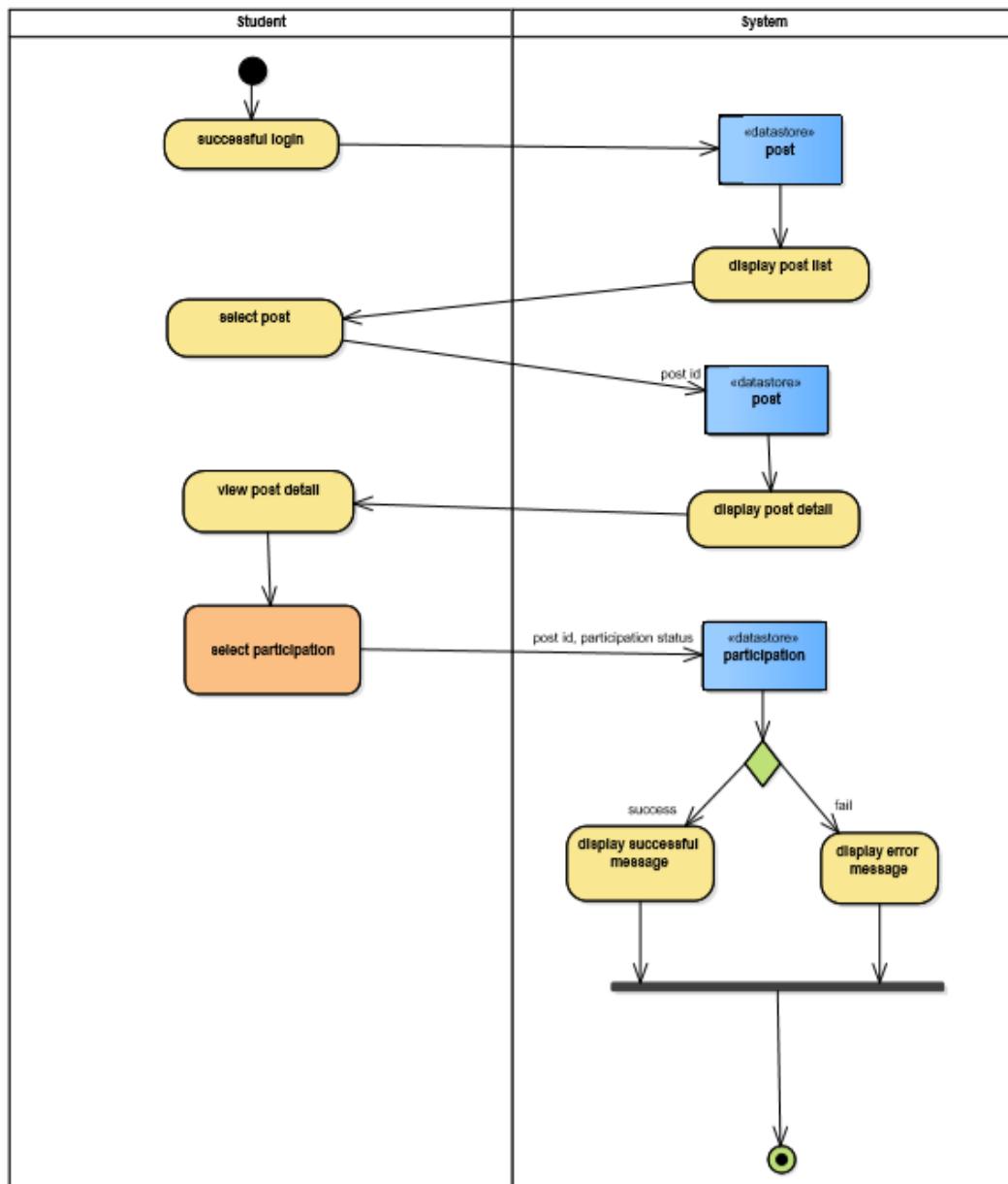


Figure 5-36 Activity diagram for student view post

5.3.3.4 Student view profile

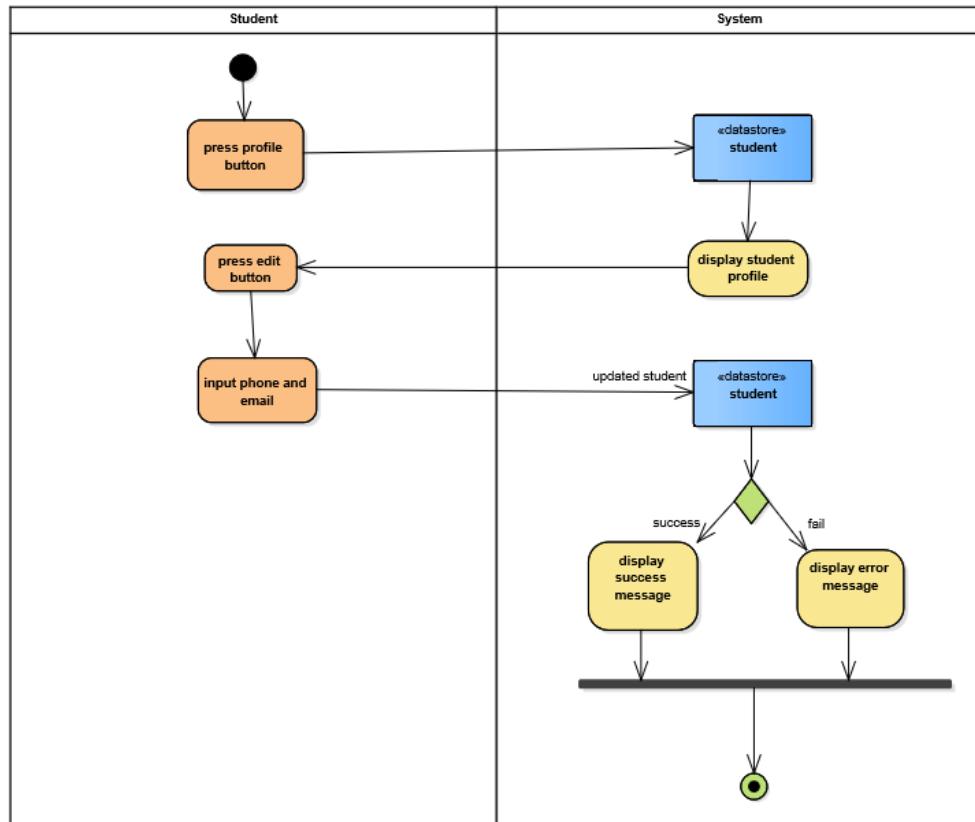


Figure 5-37 Activity diagram for student view profile

5.3.3.5 Student view organization chart and lecturer profile

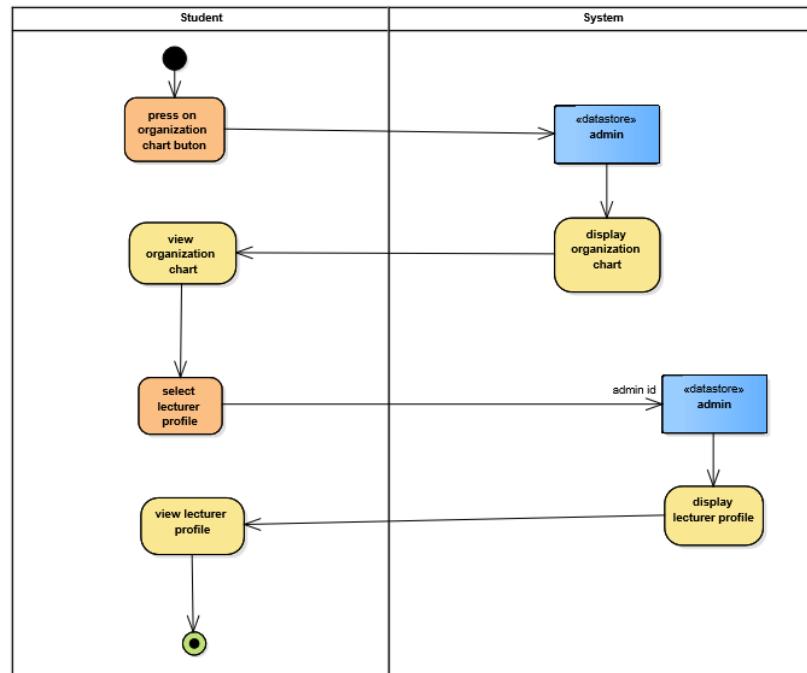


Figure 5-38 Activity diagram for student view organization chart and lecturer profile

5.4 System architecture

The system architecture adopted in the mobile application is model view controller (MVC). View is represented by the mobile application; controller is represented by Application Programming Interface (API) and model is represented by the database MySQL. Academic staffs and students in UTAR DIECS view input on the mobile application. The data is displayed from the database through API. When users perform action, users key in input and the input is sent to the database via API. Figure 5-39 illustrated the MVC data input and output flow.

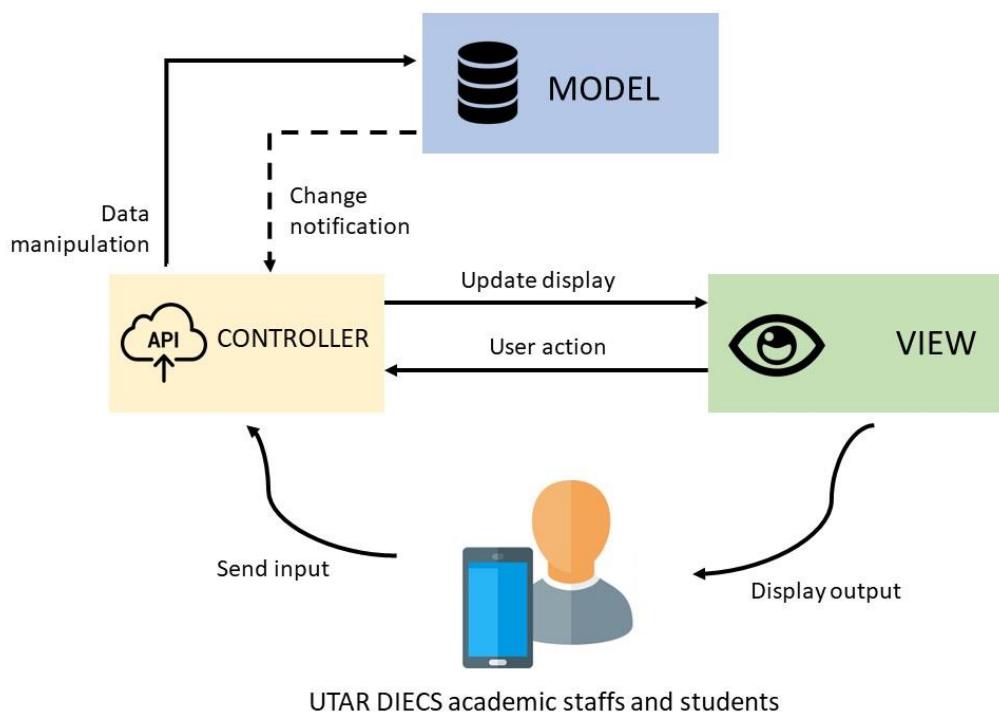


Figure 5-39 System architecture

5.5 Database design

5.5.1 Physical Entity Relationship Diagram

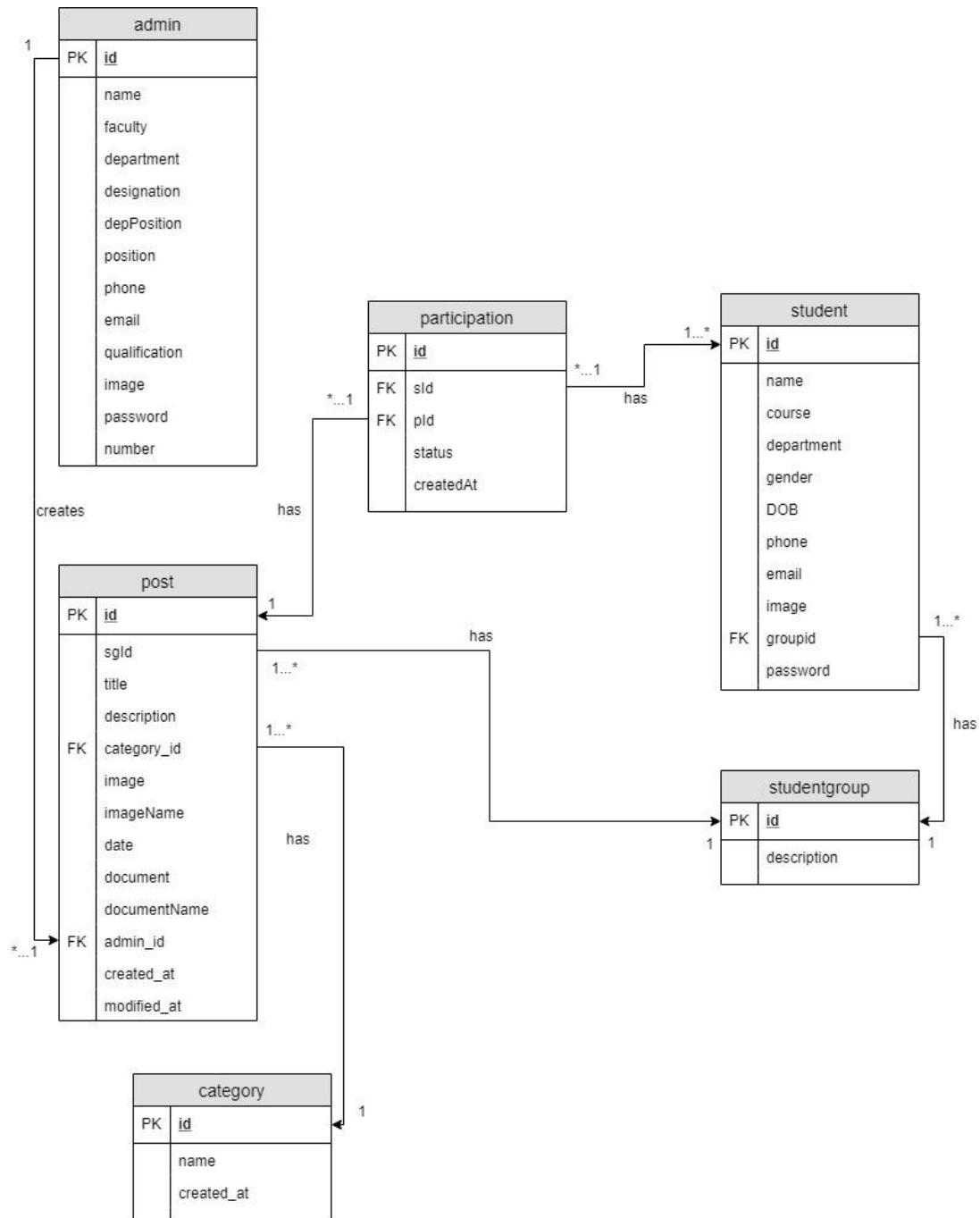


Figure 5-40 Physical entity relationship diagram

5.5.2 Logical Entity Relationship Diagram

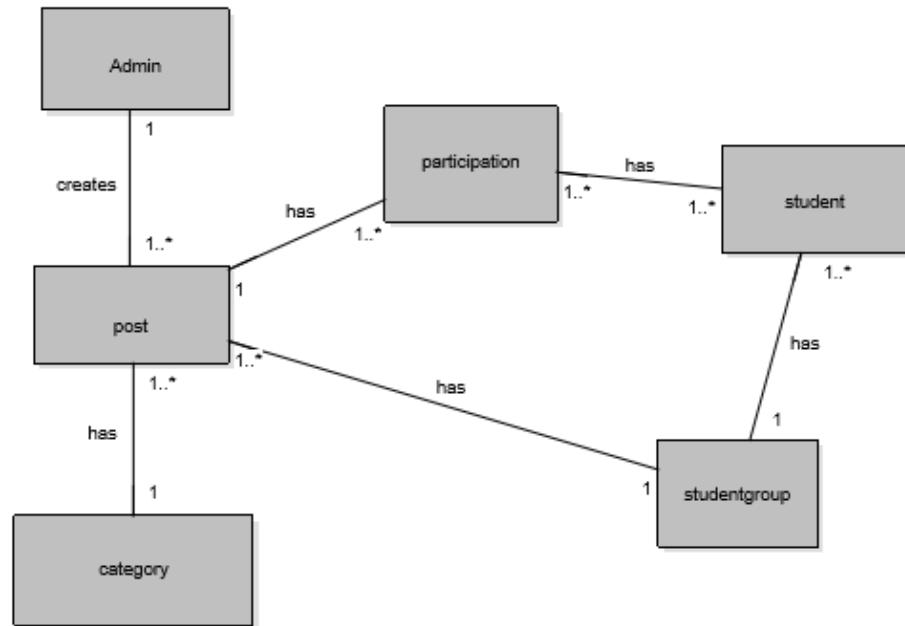


Figure 5-41 Logical entity relationship diagram

Table 5-1 Description for Entity Relationship Diagram

Table Name	Description
Admin	Contains information for every admin in UTAR DIECS including academic staffs, Head of department
Post	Contains information for every post
Student	Contains information for every student in UTAR DIECS
Participation	Contains information for every student's participation
Category	Contains information for every category of post
Studentgroup	Contains information for every category of student

5.5.3 Data dictionary

Entity name: admin

Table 5-2 Data dictionary for admin entity

Attribute	Description	Data type	PK/FK	NULL
id	Unique identification for academic staff	Varchar	PK	N
Name	Name of academic staff	Varchar		N
Faculty	Faculty of academic staff is working in	Varchar		N
Department	Department of academic staff is working in	Varchar		N
Designation	Current designation/ permanent position	Varchar		Y
Position	Current administrative position in university level	Varchar		Y
depPosition	Current administrative position in departmental level	Varchar		Y
Phone	Office phone number of academic staffs in UTAR	Varchar		Y
Email	Email address of academic staff	Varchar		Y
Qualification	Qualification in study experience	Varchar		N
Image	Location of profile picture stored in the system	Varchar		Y
Password	Password for the academic staff's account access	Varchar		N
number	Flag to determine the order of administrative position in departmental level:1 for HOD, 2 for HOP, 3 for coordinators position, 4 for lecturer	Varchar		N

Entity name: category

Table 5-3 Data dictionary for category entity

Attribute	Description	Data type	PK/FK	NULL
id	Unique identification for category	Integer	PK	N
Name	Name of the category	Varchar		N
Created_at	Date for the category is created at	Date		Y

Entity name: participation

Table 5-4 Data dictionary for participation entity

Attribute	Description	Data type	PK/FK	NULL
Id	Unique identification for student participation	Integer	PK	N
sId	Student ID for student in UTAR DIECS	Integer	PK	N
pId	Post ID for student participating in	Integer	PK	N
Status	Flag to determine the participation status: 0 for joining, 1 for not joining	Enum		N
createdAt	Date for the participation is created	Datetime		N

Entity name: post

Table 5-5 Data dictionary for post entity

Attribute	Description	Data type	PK/FK	NULL
Id	Unique identification for post	Integer	PK	N
Title	Title of the post	Varchar		N
Description	Description of the post	Varchar		N
Category_id	Category of the post	Integer	FK	N
Image	Image uri of the post	Varchar		Y
ImageName	Image name of the post	Varchar		Y
Date	Date of the post	Datetime		N
Document	Document uri of the post	Varchar		Y
DocumentName	Document name of the post	Varchar		Y

admin_id	Creator of the post	Varchar	FK	N
sgId	Student group of the post belongs	Integer	FK	N
Created_at	Creation date of the post	Datetime		N
modified_at	Modification date of the post	Datetime		N

Entity name: student

Table 5-6 Data dictionary for student entity

Attribute	Description	Data type	PK/FK	NULL
Id	Unique identification for student in UTAR DIECS	Varchar	PK	N
Name	Name of the student	Varchar		N
Course	Course the student undertaking	Varchar		N
Department	Department of the student studying in	Varchar		N
Gender	Flag to determine gender of student:0 for male, 1 for female	Enum		N
DOB	Date of birth of the student	Date		Y
Phone	Phone number of the student	Varchar		Y
Email	Email address of the student	Varchar		Y
Image	Location of picture stored in the system	Varchar		Y
Groupid	Student group the student belongs to	Integer	FK	N
password	Password for the student's account access	Varchar		N

Entity name: studentgroup

Table 5-7 Data dictionary for studentgroup entity

Attribute	Description	Data type	PK/FK	NULL
Id	Unique identification for studentgroup	Integer	PK	N
description	Description of student group	varchar		N

CHAPTER 6

SYSTEM IMPLEMENTATION

6.1 Introduction

This system possesses two types of users: academic staff and students in UTAR DIECS. These two types of users have their respective modules for accessing different functionalities. The modules for each user are displayed below:

Table 6-1 Modules for respective users

TYPE OF USERS	MODULES
Student in UTAR DIECS	Login verification Student participation report generation Profile management Searching information View organization chart
Academic staff in UTAR DIECS	Post management Searching information Login verification Student participation report View organization chart

6.1.1 Modules for student in UTAR DIECS

6.1.1.1 Login verification module

This module verifies student with the database via Application Programming Interface (API). After the student has enter the credentials, the application will check the input to verify the credentials entered are compliance with the data in the database. If the credentials entered matched with the data in the database, the student is able to land on the home page of the application. Else, an error message will be displayed.

To perform the login verification functionality, on the login page, student has to click on the student tab to enter the credentials: student ID and password. Then, the student has to click on ‘Login’ button. If the student does not enter student ID nor password, and error message indicating ‘please enter student ID or password’ will be showed. After the student enter both student ID and password, the login function will

send the credentials to the API to verify the credentials with data in database. If the data is matched, it will send a response to the application indicating the result found and allows student to redirect to the home page.

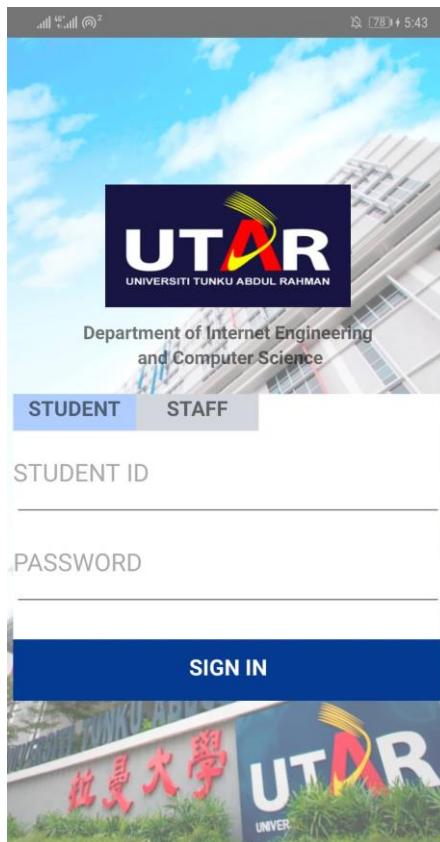


Figure 6-1 login page for student

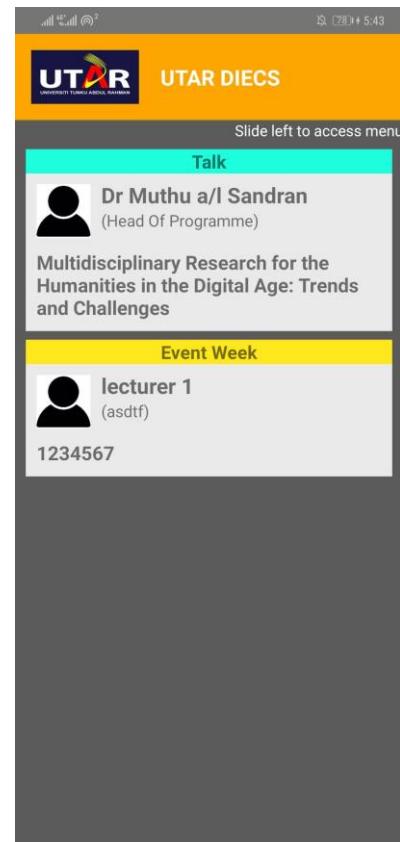


Figure 6-2 home page for student

```

login = () => {
  const { id, password } = this.state;
  if (id == "") {
    alert("Please enter Student ID.");
  }
  else if (password == "") {
    alert("Please enter password.");
  }
  else {
    fetch(config.settings.serverPath + '/php_rest_diecs/login/loginStudent.php', {
      method: 'post',
      header: {
        'Accept': 'application/json',
        'Content-type': 'application/json'
      },
      body: JSON.stringify({
        id: id,
        password: password
      })
    })
    .then((response) => response.json())
    .then((responseJson) => {
      if (responseJson == "ok") {
        this._saveSetting(this.state.id);
        this.props.navigation.navigate('studentDrawer', { id:id });
      } else {
        alert(responseJson);
      }
    })
    .catch((error) => {
  }
}

```

Figure 6-3 code segment for login page

```

public function login($id, $password)
{
    try {
        $result0 = $this->connect()->prepare("SELECT * FROM `student` WHERE id = :id and password = :password");
        $result0->bindParam(":id", $id);
        $result0->bindParam(":password", $password);
        $result0->execute();
        $row_count = $result0->rowCount();
        if ($row_count > 0){
            $result1 = $result0->fetch(PDO::FETCH_OBJ);
            echo json_encode('ok');

        }else{
            echo json_encode('Wrong ID or password');
        }
    } catch (PDOException $e) {
        exit($e->getMessage());
    }
}

```

Figure 6-4 code segment that verify credentials via API

6.1.1.2 Student participation report generation

This module provides student functionality of generating report for participating a particular event. After the student view the detail of the information, the student can decide to take part or not to take part in the event. This module consists of two submodules: view information and select participation.

6.1.1.2.1 View information

After student successfully logged into the system, the system will redirect the student to the homepage where a list of information will be displayed. From the list of information, student choose any of the post to view its detail. Each information is categorized into one category. There is currently a total of seven categories namely job opportunity, site visit, event week, general information, talk, extracurricular and competition or contest. Every category has different colour label such as green, yellow, red and blue. In the homepage, every time user load into the system it will trigger a function called load that will connect the application to the database through API to acquire the available post from the database. The students are grouped into 6 types of groups namely year 1, year 2, year 3, year 4, year 5 and all students. This means the admins can choose the students visibility and send the information to a targeted group.

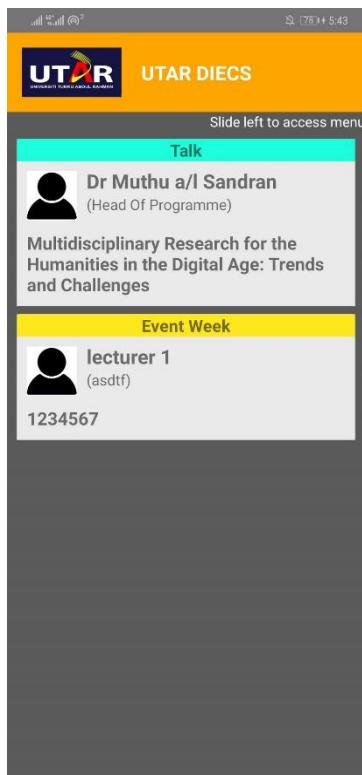


Figure 6-5 home page for student

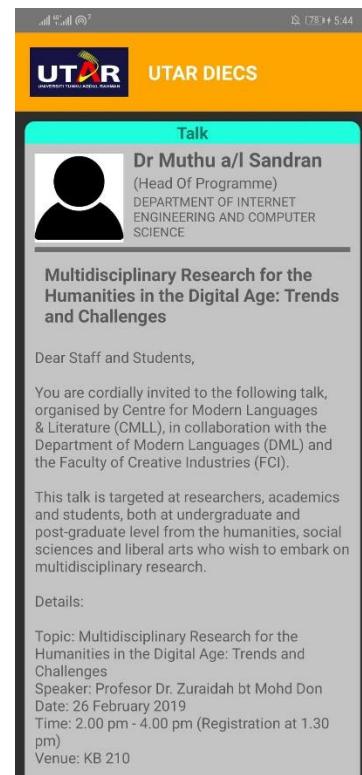


Figure 6-6 detail screen of information for student

```
categorySwitch(category_name) {
    switch (category_name) {
        case 'Job opportunity':
            return jobColour;
        case 'Site Visit':
            return siteColour;
        case 'Event Week':
            return eventColour;
        case 'General Information':
            return generalColour;
        case 'Talk':
            return talkColour;
        case 'Extra curricular':
            return extraColour;
        case 'Competition/Contest':
            return competitionColour;
    }
}
```

Figure 6-7 code segment to display different colour for different category

```

    _load() {
      let url = config.settings.serverPath + '/php_rest_diecs/api/post/read_group.php?id=' + this.state.groupid;
      fetch(url)
        .then((response) => {
          if (!response.ok) {
            alert.alert('Error', response.statusText);
            throw Error('Error' + response.status);
          }
          return response.json()
        })
        .then((posts) => {
          this.setState({ posts: posts.data });
          this.setState({ isFetching: false });
        })
        .catch((error) => {
          console.log(error)
        });
    }
}

```

Figure 6-8 code segment that load data from database through API

```

//retrieve group of data
public function read_group(){
    //create query
    $query = "SELECT c.name as category_name, c.id as category_id, a.id as admin_id,a.image as admin_image,
    sg.description as sgdescription,sg.id as sgId,p.id,
    a.name as admin_name, a.department as admin_department ,a.position as admin_position,
    p.title , p.description , p.image , p.date ,p.document, p.created_at, p.modified_at
    FROM post p LEFT JOIN studentgroup sg ON p.sgid = sg.id
    LEFT JOIN Category c ON p.category_id = c.id
    LEFT JOIN Admin a ON p.admin_id=a.id
    WHERE sgId=6 OR sgId=:sgId
    ORDER BY p.created_at";

    $stmt = $this->conn->prepare($query);

    $stmt->bindParam(":sgId", $this->sgId);

    $stmt->execute();

    return $stmt;
}

```

Figure 6-9 API code segment that return post for specific group of students

6.1.1.2.2 Select participation

After the student has selected to view the detail of the information, the system will redirect the student to the detail of information screen that displays the detail of the selected post with two parameters passing to the screen namely student id and post id. At the bottom of the screen, there are two buttons that allow students to choose to participate or not to participate the event. After the student has pressed on any one of the two buttons, it will trigger a create function that will create a record indicating the status of participation of the student towards the event.



Figure 6-10 button for selecting participation

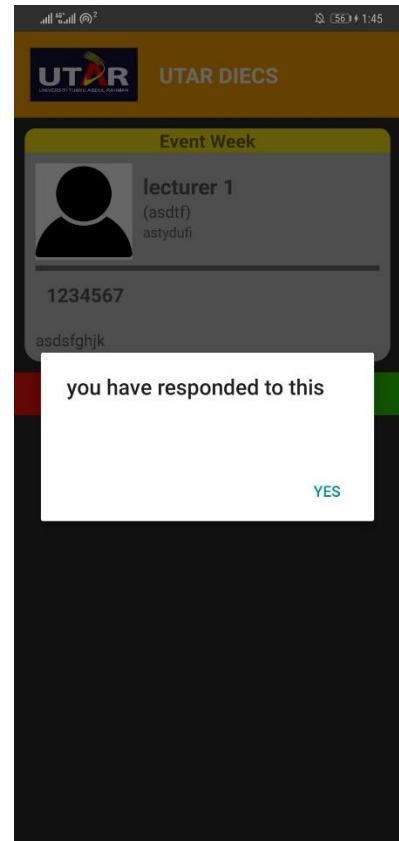


Figure 6-11 screen indicate response from student

```
redirect(){
  let url = config.settings.serverPath + '/php_rest_diecs/api/participation/create.php';

  fetch(url, {
    method: 'POST',
    headers: {
      'Accept': 'application/json',
      'Content-Type': 'application/json',
    },
    body: JSON.stringify({
      sid: this.state.sid,
      pid: this.state.id,
      status: this.state.status,
    }),
  })
  .then((response) => {
    if (!response.ok) {
      Alert.alert('Error', response.status.toString());
      throw Error('Error ' + response.status);
    }

    return response.text()
  })
  .then(() => {
    Alert.alert("you have responded to this","");
    [
      {
        text: 'Yes',onPress: () => this.props.navigation.goBack()
      }
    ];
    this.props.navigation.getParam('refresh');

  })
  .catch((error) => {
    console.error(error);
  });
}
```

Figure 6-12 code segment for creating participation

6.1.1.3 Profile management

Profile management module allows student to view and edit their own profile. This module consists of two submodules: view user profile and edit profile.

6.1.1.3.1 View user profile

In order to perform view user profile, user has to click on the user profile button on the side drawer navigator. After the user is landed on the user profile page, it will trigger a function named load that loads the all the student details from the database through API.

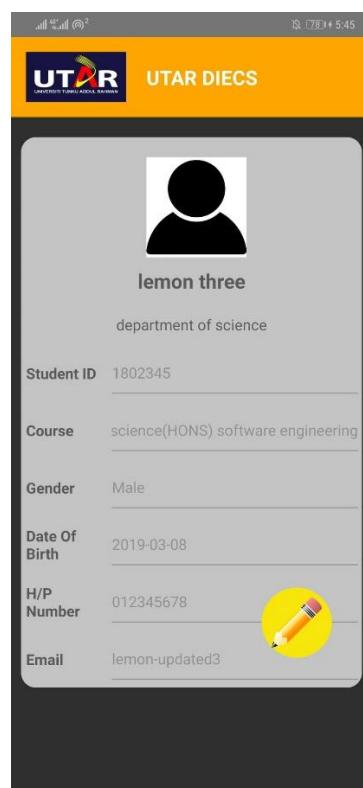


Figure 6-13 user profile page for student

```

    __load() {
      let url = config.settings.serverPath + '/php_rest_diecs/api/student/read_single.php?id=' + this.state.id;
      fetch(url)
        .then((response) => {
          if (!response.ok) {
            alert.alert('Error', response.statusText);
            throw Error('Error' + response.status);
          }
          return response.json();
        })
        .then((responseJson) => {
          this.setState({ name: responseJson.name,
            department: responseJson.department,
            image: responseJson.image,
            course: responseJson.course,
            gender: responseJson.gender,
            phone: responseJson.phone,
            email: responseJson.email,
            DOB: responseJson.DOB });
        })
        .catch((error) => {
          console.log(error)
        });
    }
}

```

Figure 6-14 code segment for loading user details from database through API

6.1.1.3.2 Edit profile

By clicking on the pencil icon located at the bottom right of the user profile screen, the student is able to navigate to the edit profile screen where user can edit their phone number and email address. After student has entered their desired email address and phone number, students click on the pencil icon again to perform update. When the student clicks on the pencil icon again, it will trigger the update function that will update the data to the database through API.

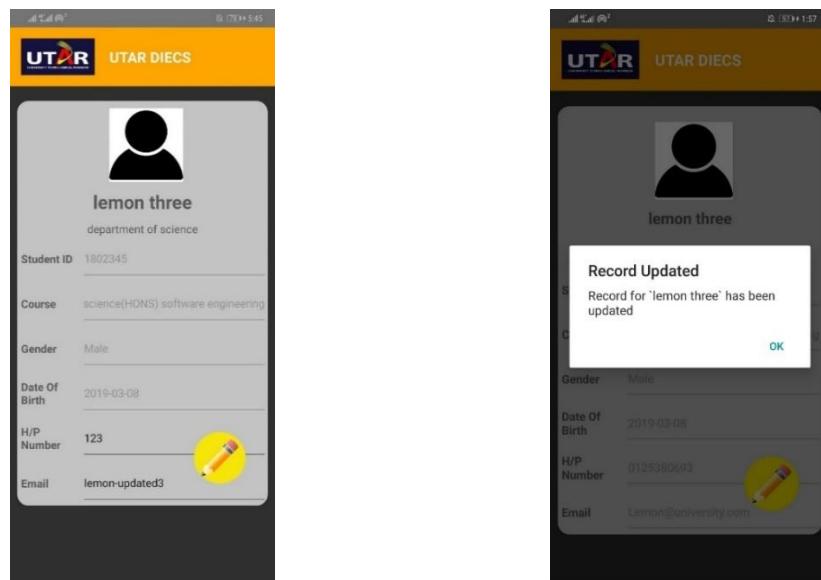


Figure 6-15 update profile page for student

Figure 6-16 message indicates profile is successfully updated

```

    _update() {
      let url = config.settings.serverPath + '/php_rest_diecs/api/student/update.php?id=' + this.state.id;
      fetch(url, {
        method: 'PUT',
        headers: {
          'Accept': 'application/json',
          'Content-Type': 'application/json',
        },
        body: JSON.stringify({
          phone: this.state.phone,
          email: this.state.email,
        }),
      })
      .then((response) => {
        if (!response.ok) {
          Alert.alert('Error', response.statusText);
          throw Error('Error' + response.status);

        }
        return response.json()
      })
      .then(() => {
        Alert.alert('Record Updated', 'Record for ' + this.state.name + ' has been updated');
        this.props.navigation.navigate('StudentProfile');
      })
      .catch((error) => {
        console.log(error)
      });
    }
}

```

Figure 6-17 code segment for update function

6.1.1.4 Search information

This module allows the student to search information by entering a keyword. This action can be performed by pressing on the search button on the side drawer navigation. It will navigate the student to the search information page. When student enters a keyword on the search bar, it will trigger a loadPost function that will send the keyword to database to match the keyword with the post by title, description, category name and admin name. in other word, this search function allows student to search by title, description, category name and admin name. if the result is matched with the database, it will return and display the result in the application.

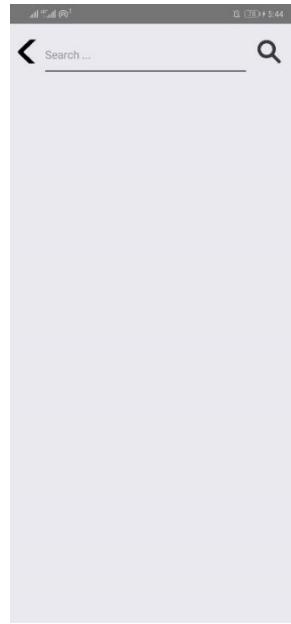


Figure 6-18 Search user interface

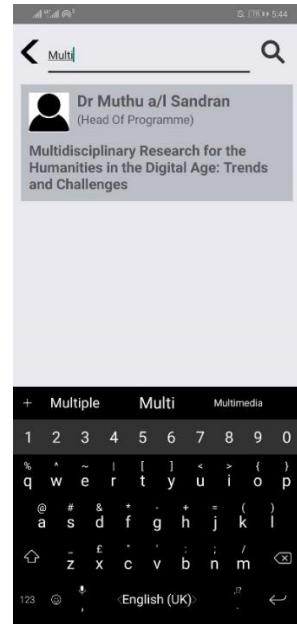


Figure 6-19 Result displayed by entering keyword

```

loadPost() {
  let url = config.settings.serverPath + '/php_rest_diecs/api/Search/search.php?keyword=' + this.state.keyword;
  fetch(url)
    .then((response) => {
      if (!response.ok) {
        alert.alert('Error', response.statusText());
        throw Error('Error' + response.status);
      }
      return response.json();
    })
    .then((responseJson) => {
      this.setState({ data: responseJson.data });
    })
    .catch((error) => {
      console.log(error);
    });
}
  
```

Figure 6-20 Code segment for loadPost function

6.1.1.5 View organization chart

This module allows student to view organization chart and a specific lecturer profile. To perform this functionality, student has to press on the organization button on the side drawer navigation. Then, the student will be redirected to an organization chart page where student can view the organizational chart. The darker colour of the box of the lecturer indicates the higher position the lecturer held in the departmental level. The order of the lecturers is positioned by a column named number in the database which consists of 4 numbers: 1 for head of department, 2 for head of programme, 3 for departmental position such as internship coordinator, fyp coordinator and information

and technology society advisor and 4 for lecturers without any specific position. Student can choose to view the profile of any one of the lecturers by pressing on the box of the specific lecturer. This will navigate the student to the lecturer profile page to view the profile of the selected lecturer.

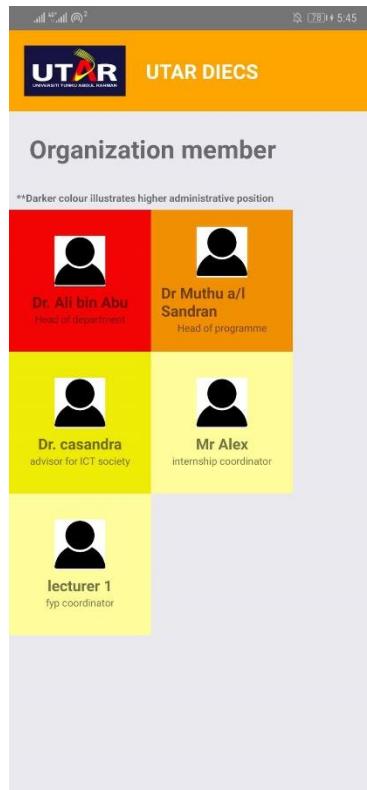


Figure 6-21 Organization chart in
UTAR DIECS



Figure 6-22 Profile of a selected lecturer

```

load() {
  let url = config.settings.serverPath + '/php_rest_diecs/api/admin/read.php';
  fetch(url)
    .then((response) => {
      if (!response.ok) {
        Alert.alert('Error', response.status.toString());
        throw Error('Error' + response.status);
      }
      return response.json();
    })
    .then((responseJson) => {
      this.setState({ admins: responseJson.data });
      this.setState({ isFetching: false });
    })
    .catch((error) => {
      console.log(error);
    });
}
  
```

Figure 6-23 Code segment for loading organization chart

```
positionSwitch(number){  
    switch(number){  
        case '1':  
            return "#f20707";  
        case '2':  
            return "#f19006";  
        case '3':  
            return '#efeb09';  
        case '4':  
            return "#ffffd9b";  
    }  
}
```

Figure 6-24 Code segment for assigning different colour for different administrative position

6.1.2 Modules for academic staff in UTAR DIECS

6.1.2.1 Post management

This module allows the academic staff in UTAR DIECS to perform various functionalities and separated into two submodules such as create post, update and delete post.

6.1.2.1.1 Post creation

In order to create a post, the academic staff has to press on the plus icon located on the homepage. This will navigate the academic staff to the create post screen. After the admin is landed on the create post page, it will require the admin to enter input such as title, description, date, category, image, group and document. After all the fields are selected and entered, admin has to press on the create button to trigger the create function that will create a record for the post in the database through API.

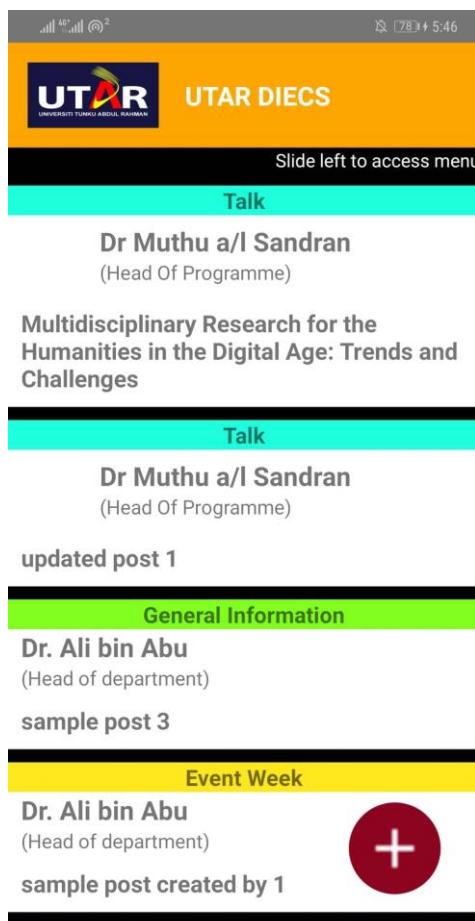


Figure 6-25 Home page for admin

The screenshot shows the "Create" screen of the UTAR DIECS mobile application. The top bar includes the UTAR logo and the text "UTAR DIECS". The screen is titled "Create". It contains several input fields:

- Title**: A text input field.
- Category**: A dropdown menu.
- Date**: A date input field set to "2019-04-01 18:38".
- Description**: A text input field.
- Student Group**: A dropdown menu.
- Image**: A section with a "UPLOAD" button and a placeholder text "Please attach your image here".
- Document**: A section with a "UPLOAD" button and a placeholder text "Please attach your document here".
- Create**: A green button on the right side of the screen.

Figure 6-26 Create page for admin

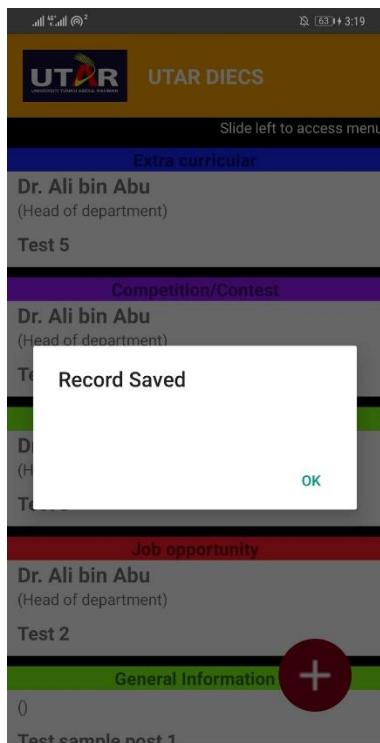


Figure 6-27 Message indicating record saved

```
_create() {
  let url = config.settings.serverPath + '/php_rest_diecs/api/post/create.php';

  fetch(url, {
    method: 'POST',
    headers: {
      'Accept': 'application/json',
      'Content-Type': 'application/json',
    },
    body: JSON.stringify({
      title: this.state.title,
      description: this.state.description,
      category_id: this.state.category_id,
      image: this.state.image,
      date: this.state.date,
      document: this.state.document,
      admin_id: this.state.admin_id,
      sgId: this.state.sgId,
    })
  })
    .then((response) => {
      if (!response.ok) {
        Alert.alert('Error', response.statusText);
        throw Error('Error ' + response.status);
      }

      return response.text()
    })
    .then(() => {
      Alert.alert('Record Saved');
      this.props.navigation.getParam('refresh');
      this.props.navigation.goBack();
    })
    .catch((error) => {
      console.error(error);
    });
}
```

Figure 6-28 Code segment for create function

6.1.2.1.2 Update and delete post

This function allows academic staff to edit their own information created earlier. To perform this action, admin has to press on the history button located on the side drawer navigation. After that, the admin will be navigated to a history screen where all the posts created by logged on admin will be displayed. After that, admin can choose to view any post to perform update action by selecting one of the posts. This will lead the admin to a detail of the information screen with a pencil icon which shows function of edit and delete. When admin clicks on edit button, it will lead admin to edit page, on the other hand, when admin clicks on delete button it will pop up a message to ask whether admin want to delete the post. These two functions trigger update and delete function respectively. If admin clicks on edit button, admin will be redirected to edit page where admin has to enter the details to update the post. After that, admin has to press on update button and it will trigger the update function to pass the edited data to the database via API. If admin clicks on delete button, it will prompt a message asking the admin ‘are you sure to delete the post’, if the admin clicks on yes, it will trigger the delete function which will delete the record in

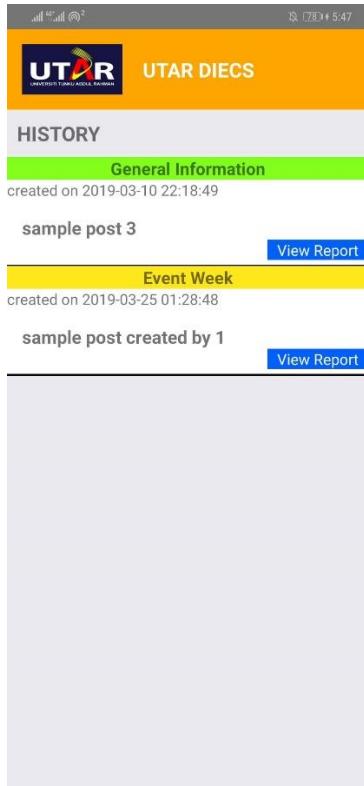


Figure 6-29 History page for admin

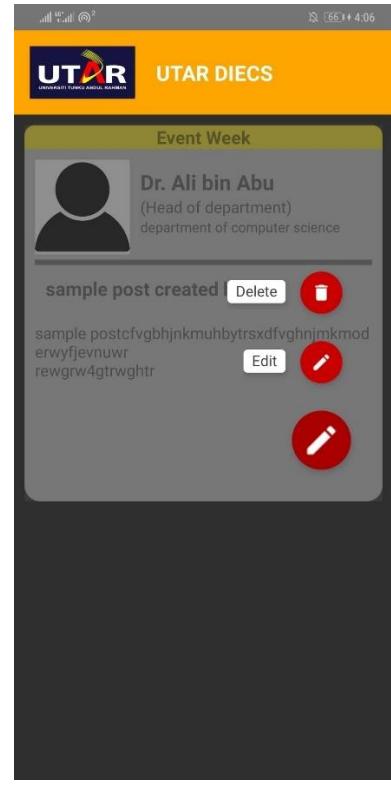


Figure 6-30 Admin chooses to edit or delete

This screenshot shows a mobile application interface for 'UTAR DIECS' with a form titled 'Update'. The form includes fields for 'Title' (updated post 1), 'Category' (Talk), 'Date' (2019-03-07 00:00), 'Description' (this post is updated), 'Student Group' (Year 1), 'Image' (with an 'UPLOAD' button and placeholder 'Please attach your image here'), and 'Document' (with an 'UPLOAD' button and placeholder 'Please attach your document here'). At the bottom are 'Cancel' and 'update' buttons.

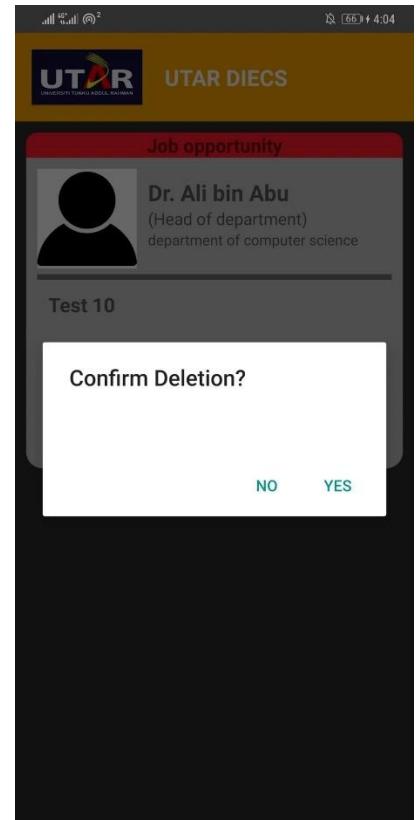
Figure 6-31 Update screen for admin
the database through API.

Figure 6-32 Message prompt for confirm deletion

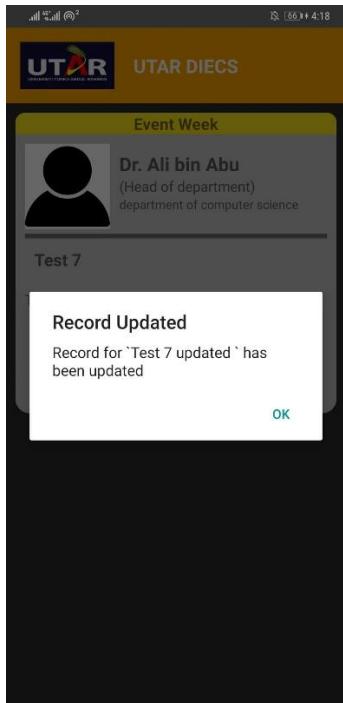


Figure 6-33 Message showing record is updated

```
_update() {
  console.log('update pressed')
  let url = config.settings.serverPath + '/php_rest_diecs/api/post/update.php?id=' + this.state.id;

  fetch(url, {
    method: 'PUT',
    headers: {
      'Accept': 'application/json',
      'Content-Type': 'application/json',
    },
    body: JSON.stringify({
      title: this.state.title,
      description: this.state.description,
      category_id: this.state.category_id,
      image: this.state.image,
      date: this.state.date,
      document: this.state.document,
      admin_id: this.state.admin_id,
      sgId: this.state.sgId,
    })
  })
  .then((response) => {
    if (!response.ok) {
      Alert.alert('Error', response.status.toString());
      throw Error('Error ' + response.status);
    }

    return response.json()
  })
  .then(() => {
    Alert.alert('Record Updated', 'Record for ' + this.state.title + ' has been updated');

    this.props.navigation.getParam('refresh');
    this.props.navigation.getParam('indexRefresh');
    this.props.navigation.goBack();
  })
  .catch((error) => {
    | console.error(error);
  });
}
```

Figure 6-34 Code segment for update function

```
delete() {
  Alert.alert('Confirm Deletion?', '', [
    {
      text: 'No',
      onPress: () => { },
    },
    {
      text: 'Yes',
      onPress: () => {
        let url = config.settings.serverPath + '/php_rest_diecs/api/post/delete.php?id=' + this.state.id;

        fetch(url, {
          method: 'DELETE',
          headers: {
            'Accept': 'application/json',
            'Content-Type': 'application/json',
          },
          body: JSON.stringify({
            id: this.state.id,
          })
        })
        .then((response) => {
          if (!response.ok) {
            Alert.alert('Error', response.status.toString());
            throw Error('Error ' + response.status);
          }

          return response.json()
        })
        .then((responseJson) => {
          if (responseJson.affected == 0) {
            Alert.alert('Error deleting record');
          }

          this.props.navigation.getParam('refresh');
          this.props.navigation.goBack();
        })
        .catch((error) => {
          console.error(error);
        });
      },
    ],
  ], { cancelable: false });
}
```

Figure 6-35 Code segment for delete function

6.1.2.2 Search information

This module allows academic staff to search a particular information by entering keyword. To perform this action, the admin has to press on the search button on the side drawer navigation bar. This will redirect the admin to a search screen where admin can input keyword and get result from database through API. If the result is found, it will display the result. On the other hand, if the result is not found, it will not display any result.

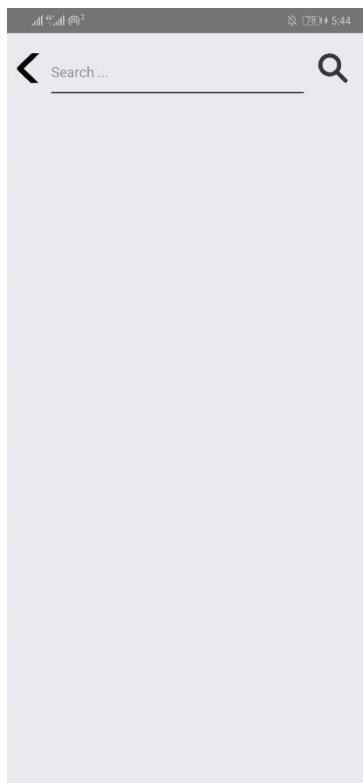


Figure 6-36 Search page for admin

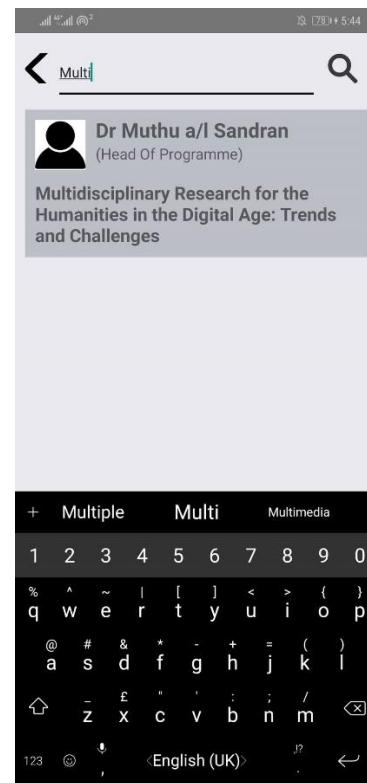


Figure 6-37 Search result displayed by entering keyword

```

loadPost() {
  let url = config.settings.serverPath + '/php_rest_diecs/api/Search/search.php?keyword=' + this.state.keyword;
  fetch(url)
    .then((response) => {
      if (!response.ok) {
        alert.alert('Error', response.statusText());
        throw Error('Error' + response.status);
      }
      return response.json();
    })
    .then((responseJson) => {
      this.setState({ data: responseJson.data });
    })
    .catch((error) => {
      console.log(error);
    });
}
  
```

Figure 6-38 Code segment for loading search result from database

6.1.2.3 Login verification

This module verifies the user as admin through sending the credentials to database to find a match via API. The admin will enter the credentials such as Staff ID and password. After admin has entered the credentials, the credentials will be sent to the database through API via login function. If the credentials match with the data in the database, a response will be sent indicating match found. After that, verified admin will be navigated to admin home page.

If admin does not provide any one of the credentials, an error message will be displayed. Then, admin has to enter both Staff ID and password in order to get access to the application. If the credentials the admin entered does not match with the data in the database, an error message showing invalid staff ID or password will be displayed.

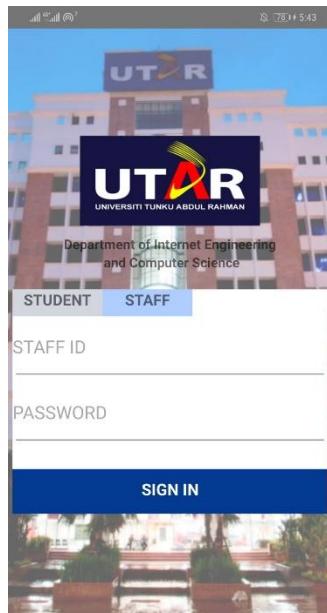


Figure 6-39 Admin login page



Figure 6-40 Admin home page after
successful login

```

login = () => {
  const { id, password } = this.state;
  if (id == "") {
    alert("Please enter Staff ID.");
  }
  else if (password == "") {
    alert("Please enter password.");
  }
  else {
    fetch(config.settings.serverPath + '/php_rest_diecs/login/loginAdmin.php', {
      method: 'post',
      header: {
        'Accept': 'application/json',
        'Content-type': 'application/json'
      },
      body: JSON.stringify({
        id,
        password: password
      })
    })
      .then((response) => response.json())
      .then((responseJson) => {
        if (responseJson == "ok") {
          this._saveSetting(this.state.id);
          this.props.navigation.navigate('adminDrawer', { id: id });

        } else {
          Alert.alert(responseJson);
        }
      })
      .catch((error) => {
        console.error(error);
      });
  }
  Keyboard.dismiss();
}

```

Figure 6-41 Code segment for login function

6.1.2.4 Student participation report

This module allows admin to view student participation report for the event posted. Every time after clicked on ‘JOINING’ or ‘NOT JOINING’ button as mention in 6.1.1.2, a record will be created in the database. To perform this functionality, admin has to press on the history button, it will navigate the admin to a history page which displays all the post created by the admin. Then, admin can choose to display the student participation report by pressing on the view report button on the list of posts. After the view report button is pressed, the admin will be landed on the student participation report page which displays the record of student joining or not joining the particular event. This result is loaded from the database named participation. It is the record created when student clicks on ‘joining’ or ‘not joining’ button. From the participation report, admin can determine the interest level of the students towards the event.

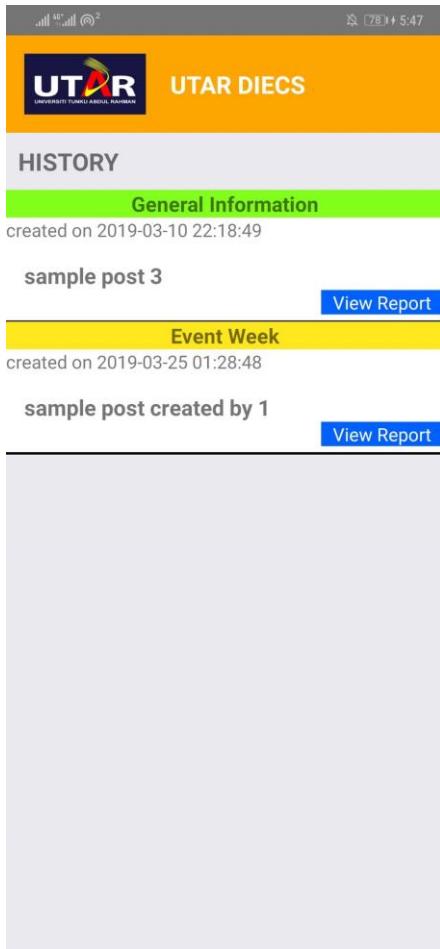


Figure 6-42 History page for admin

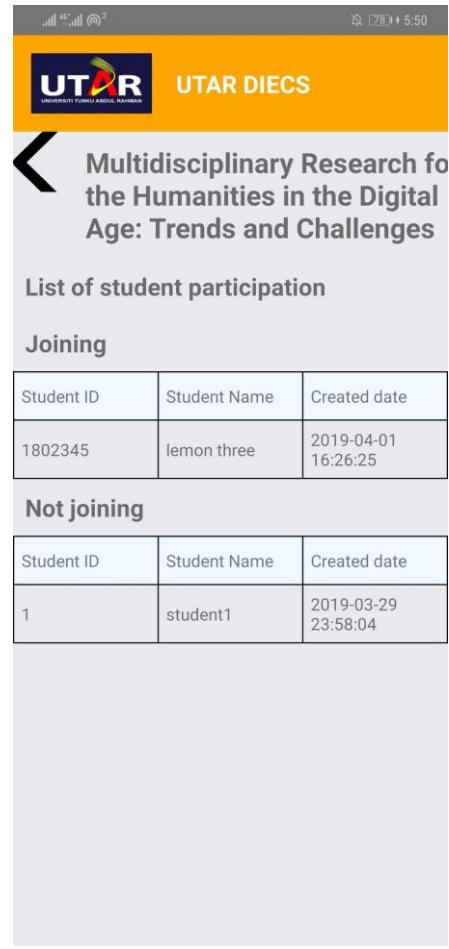


Figure 6-43 Student participation report for a particular event

```
_load() {
let url = config.settings.serverPath + '/php_rest_diecs/api/participation/read_single.php?id=' + this.state.id
fetch(url)
  .then((response) => {
    if (!response.ok) {
      alert.alert('Error', response.status.toString());
      throw Error('Error' + response.status);
    }
    return response.json()
  })
  .then((responseJson) => {
    this.setState({ post: responseJson.data });
    this.setState({ isFetching: false });
  })
  .catch((error) => {
    console.log(error)
  });
}
```

Figure 6-44 Code segment for loading event's student participation report

6.1.2.5 View organization chart

This module allows academic staff to view organization chart and lecturer profile. This action can be performed by pressing the organization chart button on the side drawer navigation bar. It will redirect admin to organization chart screen which displays the organization chart. The organization chart is ordered by colour. Darker colour indicates higher administrative position in the department. The order of lecturers is displayed by the number column in the database table. It is displayed in descending order which is mentioned in 6.1.1.5. Admin is able to view lecturer profile by pressing on any one of the boxes.

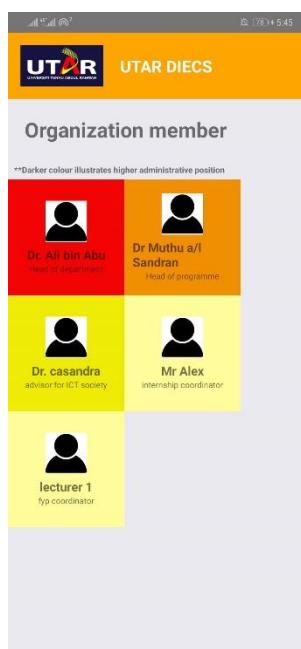


Figure 6-45 Organizational chart in
UTAR DIECS



Figure 6-46 Lecturer profile

```
//retrieve all data
public function read(){
    //create query
    $query = " SELECT * FROM Admin ORDER BY number";

    $stmt = $this->conn->prepare($query);

    $stmt->execute();

    return $stmt;
}
```

Figure 6-47 API code segment that shows displaying order of organizational chart by
number

CHAPTER 7

SYSTEM TESTING

7.1 Introduction

To ensure the mobile application is within the scope, the requirements are fulfilled, four different testing have been conducted. The testing conducted include unit test, integration test, usability test and user acceptance testing. For usability test and user acceptance testing, six students and four lecturers in UTAR DIECS have been chosen as the evaluator.

7.2 Testing objectives

The objectives of testing are defined as below:

- i. Ensure the students are able to view and download the contents posted by the admins.
- ii. Check if the students and lecturers are able to search for relevant document.
- iii. Ensure students are able to view their own profile and make changes to it
- iv. Check if the student can choose to join or not joining the event.
- v. Ensure the students and lecturers are able to view the current UTAR DIECS organizational board
- vi. Ensure the lecturers are able to manage posts
- vii. Check if the lecturers can track the involvement of students for the post

7.3 Testing strategy

7.3.1 Testing scope

In this system, the components to be tested are listed as per below:

- i. User Interface of the mobile application
- ii. All functionalities as listed in scope statement

iii. Usability testing

In contrast, the components that will not be tested are listed as below:

- i. Performance test of the application
- ii. Database testing

7.3.2 Testing type

Types of testing to be tested in this system are unit test, integration test, usability test and user acceptance test.

According to Software Testing Fundamental (2019), unit test is a type of software testing that tests every unit component of a software. The goal of unit test is to validate that each component of the software is able to perform as designed. A unit is the smallest testable part of a software.

Next, Guru.com (2019) stated that integration is defined as software components are integrated logically and tested as a group. A software project possesses multiple modules, it is usually coded by different programmers. Therefore, integration testing mainly focuses on data communication between these modules.

Furthermore, Experience UX (2019) illustrated that usability testing is the testing to see how easy is the application to use. It involves real users just like user acceptance testing. The difference between these two tests is usability testing test how user-friendly the application is while UAT tests ensure the application can perform the functionality in accordance to the list of specifications.

Moreover, Techopedia.com (2019) explained that user acceptance testing UAT normally involves user to ensure that the application can handle the functionalities according to specifications. UAT is also known as beta testing. It is critical that must be performed before the developed software is deployed.

7.4 Test cases and results

7.4.1 Unit test

Table 7-1 Unit test case for login verification

Test Case no	1		Test case name	Verify login							
Designed by	Lee Kai Li		Design date	28-March-2019							
Module	Student, admin										
Executed by	Lee Kai Li			Execution date	02-April-2019						
Pre-conditions											
User requires a valid identification number (ID) and password to login											
Test case summary	Test steps	Test data	Expected result	Post condition	Actual result	Status (PASS/FAIL)					
Enter valid user ID and valid password	1. Enter ID	Valid ID	Successful login	User is able to login to homepage	Login successful	Pass					
	2. Enter Password	Valid Password									
	3. Click 'Login' button										
Enter invalid user ID and valid password	1. Enter ID	Invalid ID	A message "Invalid ID" is shown		Error message displayed	Pass					
	2. Enter Password	Valid Password									
	3. Click 'Login' button										
Enter valid user ID and invalid password	1. Enter ID	Valid ID	A message "Invalid password" is shown		Error message displayed	Pass					
	2. Enter Password	Invalid Password									
	3. Click 'Login' button										
Enter invalid user ID and invalid password	1. Enter ID	Invalid ID	A message "Wrong ID or password" is shown		Error message displayed	Pass					
	2. Enter Password	Invalid Password									
	3. Click 'Login' button										

Table 7-2 Unit test case for view information and document

Test Case no	2	Test case name	View Information and document
Designed by	Lee Kai Li	Design date	28-March-2019
Module	Student, admin		
Executed by	Lee Kai Li	Execution date	02-April-2019

Pre-conditions

User should be a legit UTAR DIECS students or lecturer.

User needs to login to the system

Test case summary	Test steps	Test data	Expected result	Post condition	Actual result	Status (PASS/FAIL)
Select existing information	1. Select information to be viewed	Existing Information	Successfully view information selected	User is able to view the detail of information selected	Able to view information	Pass
	2. View information					
select deleted information	1. Select information to be viewed	Deleted information	A message “no post is found” is shown		No post displayed	Pass
	2. View information					

Table 7-3 Unit test case for search information and document

Test Case no	3		Test case name	Search Information and document							
Designed by	Lee Kai Li			Design date	28-March-2019						
Module	Student, admin										
Executed by	Lee Kai Li			Execution date	02-April-2019						
Pre-conditions											
User should be a legit UTAR DIECS students or lecturer.											
User needs to login to the system											
Test case summary	Test steps	Test data	Expected result	Post condition	Actual result	Status (PASS/FAIL)					
Enter valid keyword	1. Enter valid keyword	Valid keyword	Search result is found and displayed	User is able to view the detail of information searched	Entered keyword ‘multi’ and result is showed	Pass					
	2. Click on search button										
Enter invalid keyword	1. Enter invalid keyword	Invalid keyword	A message “no post is found” is shown		No result is found	Pass					
	2. Click on search button										

Table 7-4 Unit test case for view user profile

Test Case no	4		Test case name	View user profile							
Designed by	Lee Kai Li			Design date	28-March-2019						
Module	Student										
Executed by	Lee Kai Li			Execution date	02-April-2019						
Pre-conditions											
User should be a legit UTAR DIECS students.											
User needs to login to the system											
Test case summary	Test steps	Test data	Expected result	Post condition	Actual result	Status (PASS/FAIL)					
Student view their own profile	1. Click on user profile	User profile	User profile of the student is displayed	User is able to view their own profile after logged in	Able to view profile after logged in	pass					
	2. View user profile										

Table 7-5 Unit test case for update user profile

Test Case no	5		Test case name	Update user profile							
Designed by	Lee Kai Li			Design date	28-March-2019						
Module	Student										
Executed by	Lee Kai Li			Execution date	02-April-2019						
Pre-conditions											
User should be a legit UTAR DIECS students.											
User needs to login to the system											
Test case summary	Test steps	Test data	Expected result	Post condition	Actual result	Status (PASS/FAIL)					
Enter phone number and email address	1. Click on user profile	Phone number and email address	Phone number and email address are updated		Entered phone number and email address are updated	Pass					
	2. Edit user profile										
	3. Enter phone number and email address										
	4. Click on update button										

Table 7-6 Unit test case for view organization board

Test Case no	6	Test case name	View organization board					
Designed by	Lee Kai Li			Design date	28-March-2019			
Module	Student, admin							
Executed by	Lee Kai Li			Execution date	02-April-2019			
Pre-conditions								
User should be a legit UTAR DIECS students and lecturers.								
User needs to login to the system								
Test case summary	Test steps	Test data	Expected result	Post condition	Actual result	Status (PASS/FAIL)		
users view organization board	1. Click on organization board	Lecturer profile	Organization chart and lecturer profile are displayed	User is able to view the organization chart and lecturer profile	Able to view organization chart and lecturer profile	Pass		
	2. Click on any lecturer							
	3. View lecturer profile							

Table 7-7 Unit test case for create post

Test Case no	7	Test case name	Create a post
Designed by	Lee Kai Li	Design date	28-March-2019
Module	Admin		
Executed by	Lee Kai Li	Execution date	02-April-2019

Pre-conditions

User should be a legit UTAR DIECS lecturers.

User needs to login to the system

Test case summary	Test steps	Test data	Expected result	Post condition	Actual result	Status (PASS/FAIL)
Enter valid details of post to create	1. Click create button		Created information successfully	Student is able to view post created	Able to create post, updated in homepage	Pass
	2. Enter title	Valid title				
	3. Enter description	Valid description				
	4. Choose date	Valid date				
	5. Choose group	Valid group				
	6. Select image	Valid image				
	7. Select document	Valid document				
	8. Click create					

Table 7-8 Unit test case for update post

Test Case no	8		Test case name	Update a post							
Designed by	Lee Kai Li			Design date	28-March-2019						
Module	Admin										
Executed by	Lee Kai Li			Execution date	02-April-2019						
Pre-conditions											
User should be a legit UTAR DIECS lecturers.											
User needs to login to the system											
Test case summary	Test steps	Test data	Expected result	Post condition	Actual result	Status (PASS/FAIL)					
Enter valid details of post to update	1. Click history		Updated information successfully	Student is able to view post updated	Post is updated and displayed	Pass					
	2. Select post										
	3. Click update button										
	4. Enter title	Valid title									
	5. Enter description	Valid description									
	6. Choose date	Valid date									
	7. Choose group	Valid group									
	8. Select image	Valid image									
	9. Select document	Valid document									
	10. Click create										

Table 7-9 Unit test case for delete post

Test Case no	9		Test case name	Delete a post							
Designed by	Lee Kai Li			Design date	28-March-2019						
Module	Admin										
Executed by	Lee Kai Li			Execution date	02-April-2019						
Pre-conditions											
User should be a legit UTAR DIECS lecturers.											
User needs to login to the system											
Test case summary	Test steps	Test data	Expected result	Post condition	Actual result	Status (PASS/FAIL)					
Delete a post	1. Click history		Deleted information successfully		Able to delete the post, post is removed from home page	Pass					
	2. Select post										
	3. Click delete button										

Table 7-10 Unit test case for view student involvement report

Test Case no	10	Test case name	View student involvement report
Designed by	Lee Kai Li	Design date	28-March-2019
Module	Admin		
Executed by	Lee Kai Li	Execution date	02-April-2019

Pre-conditions

User should be a legit UTAR DIECS lecturers.

User needs to login to the system

Test case summary	Test steps	Test data	Expected result	Post condition	Actual result	Status (PASS/FAIL)
View student participation report	1. Click history		Student report is displayed		Student participation report is displayed with both joining and not joining status.	Pass
	2. Select post					
	3. Click view report button					

7.4.2 Integration test

Table 7-11 Integration test case and result

Modules involved	Test Case	Test execution step	Expected output
1. Searching information 2. Student participation report generation	Student chooses to join or not joining the event by searching the information	<ol style="list-style-type: none"> 1. Student presses on search button on the side drawer navigation. 2. Student enters keyword to search information 3. After information is found, select the information from the list of result displayed. 4. Perform selection on joining or not joining the event by pressing the button 'JOINING' or 'NOT JOINING'. 5. Response message is displayed. 	<ol style="list-style-type: none"> 1. 'you have responded to this post' message is displayed. 2. Created a record in the database.
1. Create post 2. Update post	Admin creates a post with wrong input, then update the post	<ol style="list-style-type: none"> 1. Admin presses plus button on home page to navigate to create page. 2. Admin then accidentally selects wrong input for date field without notice. 3. Admin presses on create button. 4. Record is created message is showed. 5. Admin realizes wrong input, then presses on history button on side drawer navigation drawer 6. Then presses on edit button which navigate to update page 	<ol style="list-style-type: none"> 1. 'this post is successfully updated' message is displayed. 2. The edited post is updated in the database 3. The post is refreshed and newly updated post is displayed.

		<p>7. Admin updates the date fields by selecting the correct date.</p> <p>8. Admins presses on update button</p> <p>9. A message of successful update is displayed</p>	
<p>1. Student participation report generation in student module</p> <p>2. Student participation report in admin module</p>	<p>Student perform selection of joining or not joining, admin view the participation report generated</p>	<p>1. Student chooses take part or not-to-take-part by pressing ‘JOINING’ or ‘NOT JOINING’ button.</p> <p>2. A message of ‘you have responded to this post’ is displayed</p> <p>3. A record is created in the database.</p> <p>4. When admin wants to view the participation report, the admin presses on the history button on the side drawer navigation bar.</p> <p>5. Admin chooses to view participation report for a particular event.</p> <p>6. The student participation report is displayed</p>	<p>1. In the report screen, it loads the record from the database</p> <p>2. Report for student participation is displayed.</p>
<p>1. Post management for admin</p> <p>2. View information submodule in student report generation module for student</p>	<p>Admin creates a post and students are able to view the post created.</p>	<p>1. Admin presses plus button to create the post.</p> <p>2. It navigates admin to the create page</p> <p>3. Admin enters relevant fields.</p> <p>4. Admin presses on create button</p> <p>5. A message of record is created is displayed</p>	<p>1. When admin creates the post, the record is created in the database</p> <p>2. A message of ‘record is created’ is displayed.</p> <p>3. When student logs in to the system, it automatically</p>

		<ol style="list-style-type: none">6. Student logs in to the system7. Student view the updated post from home page8. Student chooses to view detail of the post from the list of posts in home page	<p>loads the post list from the database.</p> <p>4. The detail of the information post is displayed.</p>
--	--	--	--

7.4.3 Usability test

7.4.3.1 Usability test form template

Table 7-12 User Satisfaction survey (adapted from System Usability Scale, Brooke, J. (1986))

	Strongly Disagree 1	2	3	4	Strongly Agree 5
1. I think that I would like to use this website/system for viewing information and related matter.					
2. I found the website/system unnecessarily complex.					
3. I thought the website/system was easy to use					
4. I think that I would need the support of a technical person to be able to use this website/system.					
5. I found this website/system was easily moved through without a lot of backtracking or data re-entry.					
6. I thought there was too much					

inconsistency in this website/system.					
7. I would imagine that most people would learn to use this website/system very quickly.					
8. I found the system/website very awkward to use.					
9. I felt very confident using the system/website.					
10. I needed to learn a lot of things before I could get going with this website/system.					

What did you like best about _____
the site?

What did you like least about _____
the site?

If you were to describe this site to a colleague in a _____ sentence or two, what would you say?

Do you have any other final comments or questions?

7.4.3.2 Usability test result

Table 7-13 Usability test result

Question	Evaluator										Average
	1	2	3	4	5	6	7	8	9	10	
1. Usability	2	4	3	3	3	3	3	4	4	4	3.3/4
2. complexity	3	4	3	3	2	3	4	4	3	4	3.3/4
3. Ease of use	3	3	2	3	4	3	3	4	4	4	3.3/4
4. Learnability	3	4	4	3	4	3	4	3	2	4	3.4/4
5. Navigability	3	3	2	3	2	2	4	3	4	4	3.0/4
6. Consistency	3	4	2	3	3	3	3	4	4	4	3.3/4
7. Learnability	2	4	1	3	3	3	3	3	4	4	3.0/4
8. Satisfaction	4	4	2	3	4	4	4	4	4	2	3.5/4
9. Satisfaction	2	4	2	3	3	3	4	4	4	3	3.2/4
10. Learnability	2	4	1	3	2	4	4	4	4	4	3.2/4
Total	27	38	22	30	30	31	36	37	37	37	32.5/40
SUS score	67.5	95	55	75	75	77.5	90	92.5	92.5	92.5	81.25

This satisfaction user survey scoring system is adapted from System Usability Scale, Brooke, J. (1986). The formula of SUS score calculation is as below:

1. For odd numbered questions, the user response is subtracted by 1
2. For even-numbered questions, the user response is subtracted from 5
3. This scales all value from 0 to 4 with 4 being the most positive response.
4. The converted response is summed up for each user and multiplied by 2.5.
5. This converts the range of possible values from 0 to 100.

7.4.4 User acceptance test

7.4.4.1 Test case for admin

Table 7-14 Test case for admin

Testing date			
Testing start time			
Testing end time			
Name of tester			
Test module	Test scenario	Pass/ fail	Comments
Login	<ol style="list-style-type: none"> 1. admin login to their own account 2. Enter the credentials as below: <ul style="list-style-type: none"> • Staff ID: s1300041 • Password: ali123 		
Post management	<u>Create post</u> <ol style="list-style-type: none"> 1. admin wants to create a post 2. presses on plus button on home page 3. enter title. 4. Select category 5. Enter description 6. Select date 7. Select group of students 8. Choose image 9. Choose document 10. Press on create button 		
	<u>Edit post</u> <ol style="list-style-type: none"> 1. Admin wants to edit a post 2. Presses on history button on side drawer 3. Admin selects on any post to view the details 4. Admin presses on pencil button 5. Admin chooses edit button 6. Admin update information by updating the any fields. 		

	<p>7. Admin presses update button.</p> <p><u>Delete post</u></p> <ol style="list-style-type: none"> 1. Admin wants to edit a post 2. Presses on history button on side drawer 3. Admin selects on any post to view the details 4. Admin presses on pencil button 5. Admin chooses delete button 6. A message prompt for confirm deletion 7. Admin selects ok 8. Post is deleted 		
Search module	<ol style="list-style-type: none"> 1. Admin wants to search information 2. Enter the keyword 'Multi' 3. Click on the search result and view the information 		
Student participation report	<ol style="list-style-type: none"> 1. Admin wants to view student participation report for the event created 2. Presses on history button on side drawer 3. Admin selects on any post and presses view report button 4. The report for particular event is displayed 		
View organization chart	<ol style="list-style-type: none"> 1. Admin wants view organization chart 2. Student presses on the organization chart button located on the side navigation drawer. 3. Student selects any lecturers to view lecturer profile. 		

7.4.4.2 Test case for student

Table 7-15 Test case for student

Testing date			
Testing start time			
Testing end time			
Name of tester			
Test module	Test scenario	Pass/ fail	Comments
Login	3. Student login to their own account 4. Enter the credentials as below: • Student ID: 1802345 • Password: lemon		
Participate in an event	11. Student wants to take part in an event 12. Click on 'JOIN' or 'NOT JOINING' to take part		
Search module	4. Student wants to search information 5. Enter the keyword 'Multi' 6. Click on the search result and view the information		
Profile management	<u>View Profile</u> 5. User clicks on user profile to view their own profile <u>Edit Profile</u> 1. User clicks on the edit button on user profile 2. Update the email and phone number as per below • Phone: 012-4567389 • Email: lemon@university.com		
View organization chart	4. Student wants view organization chart 5. Student clicks on the organization chart button. 6. Student clicks on any lecturers to view lecturer profile.		

7.4.4.3 Test result for admin

The test results are collected from four lecturers in UTAR DIECS.

Table 7-16 Test result for admin

Test module	No. of test conducted	No. of test passed	Comments
Login	4	4	
Post management	4	4	- Navigation control - Filter post by categories
Search module	4	4	
Student participation report	4	4	- Combine report with post description;
View organization chart	4	4	- Organization chart in hierarchy;

7.4.4.4 Test result for student

The test results are collected from 6 students in UTAR DIECS.

Table 7-17 Test result for student

Test module	No. of test conducted	No. of test passed	Comments
Login	6	6	
Participate in an event	6	6	
Search module	6	6	
Profile management	6	6	- Add email verification
View organization chart	6	6	

CHAPTER 8

CONCLUSIONS AND RECOMMENDATIONS

8.1 Conclusions

This mobile application contributes to lecturers and students in UTAR DIECS and allows them to share information and document in a more convenient way. This mobile application improves the mobility for students and lecturers in UTAR DIECS to access non-course-based information. With this mobile application, lecturers in UTAR DIECS as the admin of this mobile application are able to manage post on fingertip. Lecturers are able to create, update and delete information on mobile phone without needing to access to web browser at anytime and anywhere. Besides, lecturers can also search information in real-time to view the information posted by other lecturers and the lecturer himself. Furthermore, the lecturer can also view history of post created and view the student's participation report. Hence, the lecturers are able to analyse the student interest level towards the information created based on the student participation report.

Aside benefits for lecturers, this mobile application also brings advantages to the students in UTAR DIECS. Students are able to access information at anytime and anywhere. Each category of post is coloured with rainbow colours. There are currently seven categories namely job opportunity, site visit, event week, general information, talk, extracurricular and competition. Seven colour of rainbow colours represents seven categories respectively. The purpose of the colours is to allow students to recognize each category by looking at colours label. Students are able to differentiate the post by looking at the colour labels. Besides, the post created by admin are categorized into different groups in which only the specific group of students are able to view the post created. There are currently 6 types of groups by study year: year 1, year 2, year 3, year 4, year5 and all students. Moreover, students are able to search information by entering keyword. Result will be displayed that eases the students to search for relevant information.

Currently students are facing a problem lacking of knowledge towards the organization member in UTAR DIECS. They often don't know which lecturer is holding what position. Therefore, this mobile application provides an organization

chart to address this problem. Students are able to view the organization chart in the mobile application and also every lecturer's profile. with this functionality, students shall be able to identify which lecturer is holding which departmental administrative position.

8.2 Recommendations for future work

Despite the system is developed and fulfilled all the specifications stated in scope statement, the mobile application still has some limitations that can be improved in the future. The table below shows some future enhancement with suggestion that could improve the usability of the mobile application and provide more functionality to users.

Table 8-1 Table of recommendations for future work

Number	Limitation	Suggestions and recommendations
1.	No notification for admins and students	As an enhancement to the mobile application, notification that will be sent to the students when there is a post created and updated, notification that notifies the admin when student has responded to the post created, and notification that will be sent to the students when the event is started can be included in the mobile application.
2.	Include super admin from FGO	Currently, the target users for the mobile application are students and lecturers in UTAR DIECS. In the future, the mobile application can include super admin from FGO to control and oversee the information and document sharing among lecturers and students. Besides, the super admin can also manage the

		students and lecturers' information on the mobile application.
3.	Create category of the information	This mobile application currently has seven categories of post as stated in section 7.1. As an improvement, creation of categories can be added into the application
4.	Allow students and lecturer to change password	There is no way to change password for student and lecturer in this current mobile application developed. Therefore, when the students or lecturers forget their login password, they cannot access to the application.
5.	Allow lecturer to choose upload image by capturing photo when creating the post	The lecturer can only upload the images from local storage in the current application. As an enhancement, accessing to the camera feature can be added so that the lecturer can capture the photo in real life and upload it when creating the post.
6	Introduce organization chart management	This mobile application only allows students and lecturers to view organization chart and lecturer profile. As an improvement, function of editing, deleting and creating lecturer profile and manage the organization chart can be added.
7	Reorganize current grid organizational chart to hierarchical chart	The display of organization chart is in grid view whereby the departmental administrative position is indicated by colour. Darker colour illustrates higher administrative

		position. As an enhancement, the organization chart can be restructure to hierarchy form so that higher administrative position will be placed at higher level to provide a clearer view to students and lecturers.
--	--	---

REFERENCES

- Adenowo A. A. A. and Adenowo B. A., 2013. Software engineering methodologies: A review of the Waterfall Model and Object-oriented approach. *International Journal of Scientific & Engineering Research*. [online] 4(7), pp. 429. Available at: <<https://pdfs.semanticscholar.org/c3ea/72f018b454b2bc9c83835d13f67ab3ef5312.pdf>> [Accessed 2 August 2018].
- Antossoftwaretopics, 2016. [image] Available at:
<<https://antossoftwaretopics.wordpress.com/2016/08/26/extreme-programming/>> [Accessed 5 August 2018].
- Balaji S. and Murugaiyan M. S., 2012. Waterfall Vs. V-model vs. Agile: A comparative study on SDLC. *International Journal of Information Technology and Business Management* [online] 2(1), pp.27. Available at: <<http://jitbm.com/Volume2No1/waterfall.pdf>> [Accessed 3 August 2018].
- Boer G., 2017. *The Scrum Lifecycle*. [image] Available at:<<https://docs.microsoft.com/en-us/azure/devops/agile/what-is-scrum>> [Accessed 5 August 2018].
- Chandra V., 2015. Comparison between various software Development Methodologies. *International Journal of Computer Applications* [online] 131(9), pp. 9. Available at:
<<https://www.ijcaonline.org/research/volume131/number9/chandra-2015-ijca-907294.pdf>>[Accessed 3 August 2018].
- Chereches A., n.d. Scrum with Extreme Programming. [online] Today Software Magazine. Available at:<<https://www.todayssoftmag.com/article/995/scrum-with-extreme-programming>>[Accessed 5 August 2018].
- Despa M.L., 2014. Comparative study on software development methodologies. *Database system journal* [online] 5(3), pp.42-43. Available at:<http://dbjournal.ro/archive/17/17_4.pdf> [Accessed 4 August 2018].
- Experience UX. (2019). *What is usability testing?* [online] Available at: <https://www.experienceux.co.uk/faqs/what-is-usability-testing/> [Accessed 3 Apr. 2019].

Fatima F., Javed M., Amjad F. and Khan U.G., 2014. An approach to enhance quality of the Rad Model using Agents. *The international Journal of Science and Technoledge* [online] 2(13), pp.203. Available at:< http://www.theijst.com/force_download.php?file_path=wp-content/uploads/2015/01/33.-ST1412-089.pdf&id=976> [Accessed 5 August 2018].

Gechter F., Ronzani B. and Rioli F., 2014. *Software development process: waterfall model.* [images] Available at: <https://www.researchgate.net/publication/282329585_Spherical_A_HumanArtificial_Intelligence_interaction_experience?_sg=CAp78POXaQ8CIZMqKzWNv21ZGXgX0hnOJGGR08y5krWOCUiE--rwHdgZueqNQnOneS2QsAYcWvWpH6O8BtkFC2UhhFk> [Accessed 3 August 2018].

Guru99.com. (2019). [online] Available at: <https://www.guru99.com/integration-testing.html> [Accessed 3 Apr. 2019].

International Testing Qualification Board,2017. *What is RAD model – advantages, disadvantages and when to use it?* Available at:< <http://istqbexamcertification.com/what-is-rad-model-advantages-disadvantages-and-when-to-use-it/>> [Accessed: 14th July 2018].

International Testing Qualification Board,2017. *What is Prototype model – advantages, disadvantages and when to use it?* Available at <http://istqbexamcertification.com/what-is-prototype-model-advantages-disadvantages-and-when-to-use-it/> [Accessed: 14th July 2018].

Munassar N.M.A. and Govardhan A., 2010. A comparison between five models of Software Engineering. *International Journal of Computer Science Issues* [online] 7(5), pp.98. Available at:< https://www.researchgate.net/publication/258959806_A_Comparison_Between_Five_Models_Of_Software_Engineering> [Accessed 4 August 2018].

Mundar, D., Matotek, D. and Jakuš, M. (2012) *Quantitative research methods participation in the information sciences papers in Croatia.* Available at: <<https://bib.irb.hr/datoteka/601796.dkb10.pdf>> [Accessed: 5 August 2018].

n.a., 2016. *Spiral Model.* [image] Available at:< <http://www.professionalqa.com/spiral-model>> [Accessed 4 August 2018].

Ogedebe P.M. and Jacob B.P., 2012. Software Prototyping: A Strategy to use when user lacks Data processing experience. *ARPJ Journal of Systems and Software* [online] 2(6), pp. 220. Available at:< http://scientific-journals.org/journalofsystemsandsoftware/archive/vol2no6/vol2no6_4.pdf > [Accessed 4 August 2018].

Parhizkar B., Bakka C., Pandor A.A., Ng A.G., Christian M., Jubair M.A.A. and Lashkari A.H., 2015. *Rapid Application Development Model*. [image] Available at: < https://www.researchgate.net/publication/236987507_MOBILE_AR_GPS-BASED_FOR_NAVIGATION_PURPOSE?sg=fHwjqqJ579zdoj1ZNL9yiuYYG75snUrETK4hrvUrgq0OIP54YLqo38i-OpdCTnwOsiqWR0bZg > [Accessed 5 August 2018].

Peterson K. and Wohlin C., 2009. A comparison of Issues and Advantages in Agile and Incremental Development between state of the Art and an Industrial Case. *Journal of Systems and Software* [online] pp.3. Available at: <http://www.wohlin.eu/jss09.pdf> [Accessed 5 August 2018].

Petersen, K., Wohlin, C. and Baca, D. (2009) *The Waterfall Model in Large-Scale Development*. Available at:< <http://www.diva-portal.org/smash/get/diva2:835760/FULLTEXT02.pdf> > [Accessed: 4 August 2018].

Rouse, M.,2015. *What is Prototyping Model? – Definition from WhatIs.com.* [online] SearchCIO. Available at <https://searchcio.techtarget.com/definition/Prototyping-Model> [Accessed: 13th July 2018].

Sabale R. G. and Dani A. R., 2012. Comparative Study of Prototype model for Software Engineering with System Development Life Cycle. *IOSR Journal of Engineering* [online] 2(7), pp. 22-23. Available at: < <https://pdfs.semanticscholar.org/3d3e/fd30d509e6ad392bb0de7bb0946069aaf783.pdf> > [Accessed 3 August 2018].

Sarjusingh W., Castellanos F. and Mohammed C., 2009. *Software Prototyping model*. [image] Available at: < <http://ijedict.dec.uwi.edu/viewarticle.php?id=866&layout=html> > [Accessed 3 August 2018].

Saxena A., and Upadhaya P., 2016. Waterfall vs. Prototype: Comparative Study of SDLC. *Imperial Journal of Interdisciplinary Research (IJIR)* [online] 2(6), pp.1013-1014. Available at:< <https://www.onlinejournal.in/IJIRV2I6/189.pdf> > [Accessed 3 August 2018].

Sharma, L. (2016) *WaterFall Model in Software Developement Life Cycle / SDLC*. Available at: < <http://toolsqa.com/software-testing/waterfall-model/> > [Accessed: 16 August 2018].

Sharma S., Sarkar D. and Gupta D., 2012. Agile Process and methodologies: A Conceptual Study. *International Journal on Computer Science and Engineering*. [online] 4(5), pp.894-897. Available at:< <https://pdfs.semanticscholar.org/5af8/fc8a2be4a16da4ffbe11d5699f71a37f6969.pdf> > [Accessed 5 August 2018].

Software Testing Fundamentals. (2019). *Unit Testing - Software Testing Fundamentals*. [online] Available at: <http://softwaretestingfundamentals.com/unit-testing/> [Accessed 3 Apr. 2019].

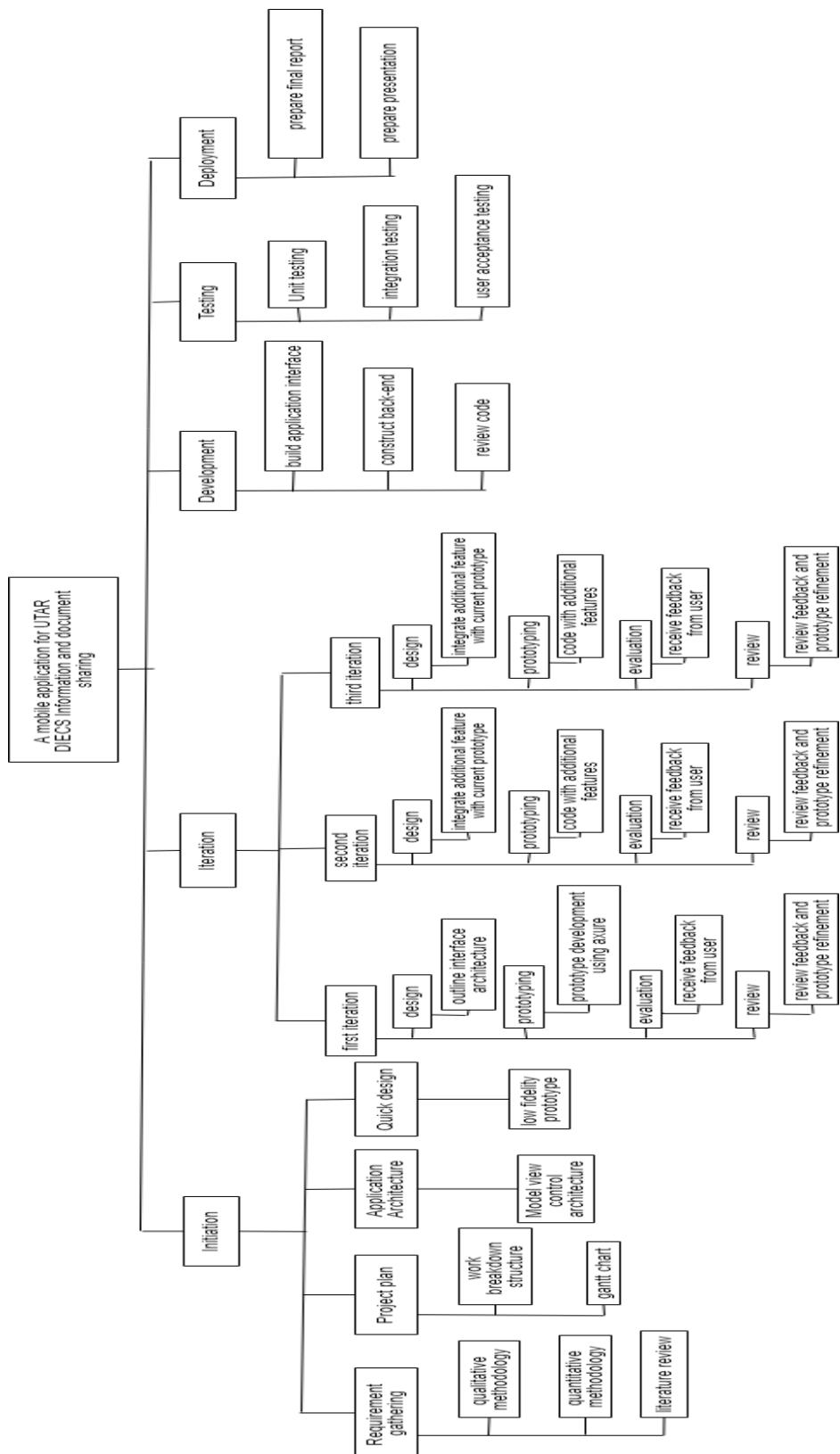
Techopedia.com. (2019). *What is User Acceptance Testing (UAT)? - Definition from Techopedia*. [online] Available at: <https://www.techopedia.com/definition/3887/user-acceptance-testing-uat> [Accessed 3 Apr. 2019].

Thakur, A. (2015) ‘A Comparison Between Evolutionary and Prototype Model’, *Spl. Issue*, 2(2). Available at: < http://www.ijcsit-apm.com/Uploads/Media/Journal/20150622151402_CS116.pdf > [Accessed: 3 August 2018].

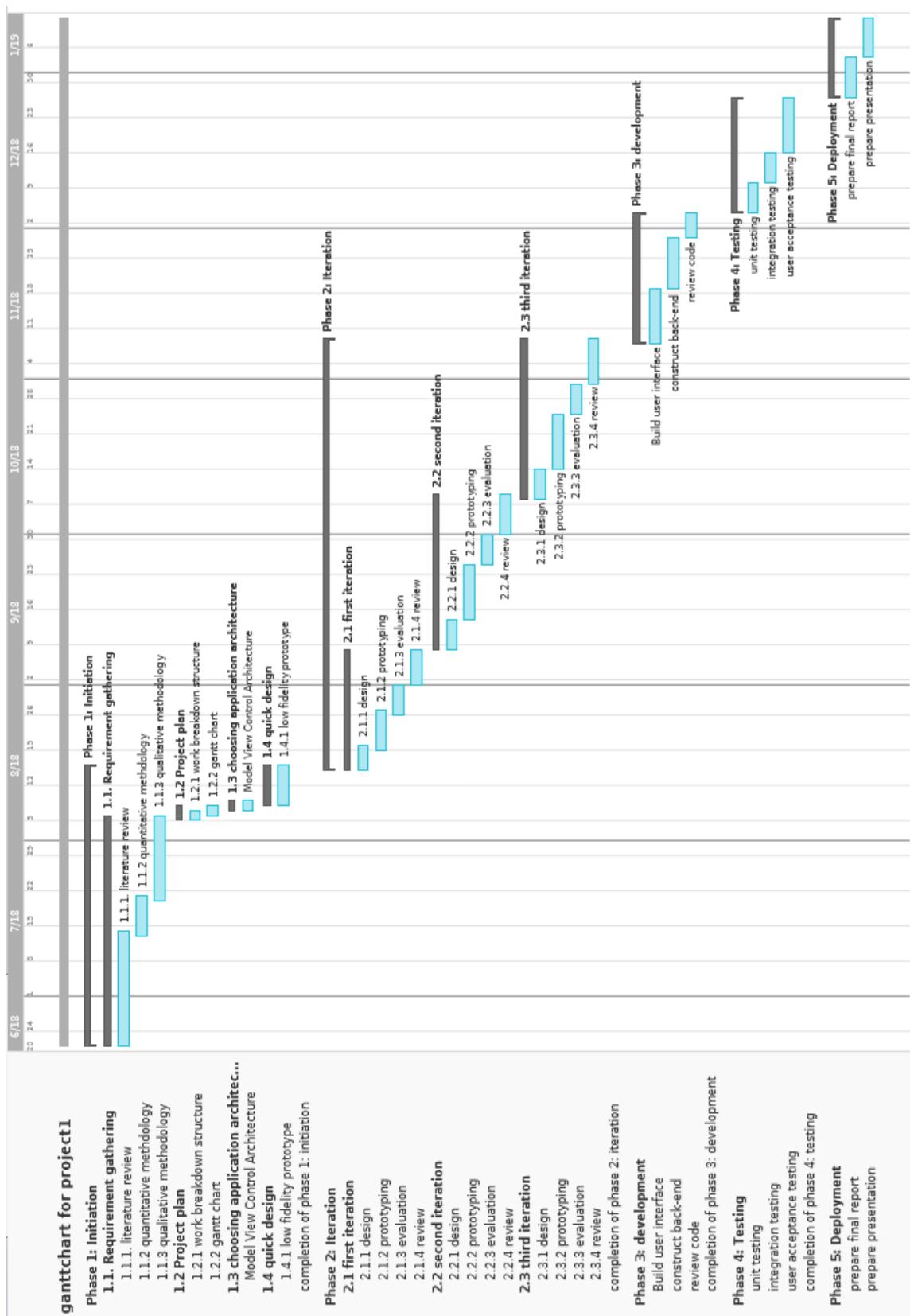
Thakur D., n.d. Rapid Application Development (RAD) Model and its Advantages and Disadvantages of RAD Model. [online] Ecomputernotes.com. Available at:< <http://ecomputernotes.com/software-engineering/rapid-application-development> >[Accessed 5 August 2018].

APPENDICES

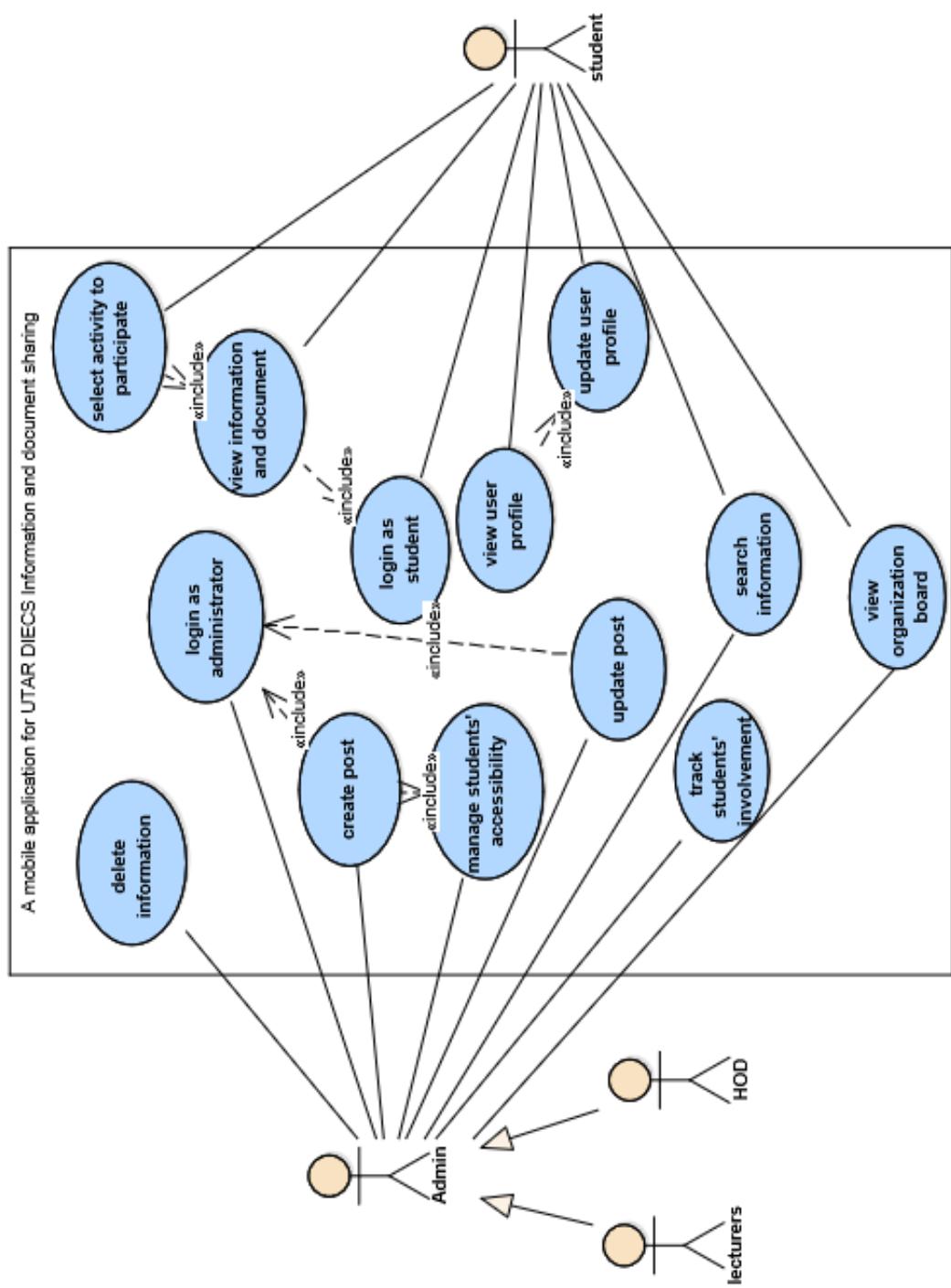
APPENDIX A Work Breakdown Structure



APPENDIX B Gantt Chart



APPENDIX C Use Case diagram



APPENDIX D Questionnaires for student

Name *

Your answer

Gender *

- male
- female

course *

Your answer

1. How do you usually get the information and event details held in UTAR? (you may choose more than 1) *

- UTAR websites
- UTAR email
- UTAR portal
- Other: _____

2. What kind of information do you usually access in UTAR DIECS? (e.g. talk, competition) *

Your answer

3. How often do you take part in the events? *

- took part in every event
- took part in the event which you found interested
- seldom
- not at all

4. Who do you ask if you have any inquiries about the information/event? *

- Lecturer-in-charge
- Faculty General Office (FGO)
- Friends
- Don't ask anyone, keep questions to yourself

5. How do you approach the person in-charge if you have problems or questions? *

- Email him/her
- Book a consultation time
- Try your luck to meet her/him up at the walkway or office
- Other: _____

6. Do you clearly know that which lecturer(s) is in-charge of which task? *

- yes
- no

7. Do you find any problem in accessing UTAR DIECS information and documents? *

- Yes
- No

8. What is the problem(s) have you encountered in accessing the information?

Your answer

9. How do you find the level of complexity in accessing information posted? *

- Very hard. Information is scattering everywhere
- Fair.
- Very easy. I have no issue on retrieving information

10. What is the impact to your study based on the level of complexity you have chosen in the above question? *

11. As a student in UTAR DIECS, do you know the organizational board? (i.e. HOD, HOP) *

- Yes, I know every one of them
- I know only some of them
- Nah, I barely know them

12. Do you think it is important to know the organizational structure in UTAR DIECS? *

- Yes, definitely
- Neutral
- No

13. If you were to choose a centralized platform to access the information, which one do you prefer the most? *

- Web application
- Mobile application

14. What feature(s) do you think shall be included in the application? (you may choose more than 1) *

- Download and view documents and information
- Search information and documents
- Calendar to track events
- Other: _____

15. Do you think that having a forum or private chat room is good to enhance communication between lecturers, HOD and students? *

- Yes, sure
- No, I don't think so

APPENDIX E Questionnaire for academic staff

- 1) How do you normally post information and documents?
 - a. Through UTAR email
 - b. Through WBLE
 - c. Through UTAR portal
 - d. Other, please specify_____

- 2) Do you usually upload documents and information per source or multiple source?

- 3) What kind of information/ emergency case, something urgent, class cancellation?

- 4) Do you find any problems in posting information based on the answer in q2? If yes, please specify.

- 5) How often do you face these problems?

- 6) If there are some changes in the post, do you need to make the changes in every single source you have posted?

- 7) How do you ensure that students are notified about the changes that have been made?

- 8) When a student has some problem regarding the information you have posted, how do you normally communicate with that student?
 - a. Via email
 - b. Face-to-face
 - c. Other, please specify_____

- 9) Do you have any problems with the method you chose on question above? if yes, please specify.

- 10) If a mobile application is to be developed to address all the problems and limitations you have listed above, what kind of application do you wish it will be?

11) What features you think should be included in the application? (you may choose more than 1)

- a. Create and manage information and documents (CRUD)
- b. Manage students' accessibility and visibility to the posts
- c. Check students' participation for event posted
- d. Other, please specify _____

12) Do you think having a forum or a private chat room is good to enhance communication and interaction between lecturers and students?

APPENDIX F Interview question with HOD

1. What do you think about students' acknowledgement for the UTAR DIECS organizational board?
2. How do you think the problem can be resolved for the above problem?
[question extend from q1]
3. Do you think students do not know which lecturer in-charge of a task is a problem exist in current UTAR DIECS?
4. If yes, what do you think about this problem? Is this a serious problem?
5. As a Head of department of UTAR DIECS, have you encountered students with some problems in their study?
6. How do you usually communicate with this kind of students?
7. When students have to find you, where do they usually approach you?
8. How do you normally post information in UTAR DIECS?
9. Do you have any limitations in posting information?
10. Do you usually upload 1 information/ document per source (i.e. UTAR portal, email, etc.) or 1 information and document for multiple places?
11. From the answer for q4, do you find any problem in sharing the information and document in UTAR DIECS? if yes, please specify the problem.
12. From the answer for q5, how often do you encounter the problem mentioned?

13. If a mobile application is to be developed to address the problems you encountered, do you think it is efficient to resolve your problems?

14. What kind of application do you wish it will be?

15. What features do you wish to have in the mobile application?

16. Do you think that having a forum in the app is good to let students and lecturer to interact with each other?

APPENDIX G Interview question with FYP coordinator

1. How do you inform students regarding the FYP?
2. Do you find any limitations in posting information?
3. Do you usually post 1 information per source or 1 information multiple sources?
4. If your answer in q3 is 1 information multiple sources, do you think that this is very troublesome to post a single information in multiple sources?
5. How frequent do you have this kind of problem?
6. When students have problems regarding their project, how do they usually approach you?
7. Do you find any problem in the way students consult you?
8. If a mobile application is to be developed to address the problems you have encountered, what kind of application you wish it will be?
9. What features do you think should be included in the application?
10. Do you think that having a forum or a private chat room is good to enhance communication and interaction between lecturer and students?

APPENDIX H Interview question with IT coordinator

1. How do you usually post information and documents regarding Industrial Training? For example, vacancy available, procedures before, during and after IT program.
2. For 1 post, do you post only in a single source or multiple source?
3. If you are posting in multiple source, do you find any difficulties in posting it?
4. How often do you encounter this problem?
5. If there is a change in the post, do you need to update the content in every single source you have posted?
6. If yes, do you find that it is very troublesome to do so? Or you enjoy doing it?
7. If no, how you make sure that the students acknowledgement about the changes?
8. How do you usually consult students with problems or questions?
9. Do you think that this method is efficient to solve the students' problems or questions?
10. If a mobile application is to be developed to resolve the problems you have encountered, what kind of application you wish it be?
11. What kind of features do you think should be included in the application?

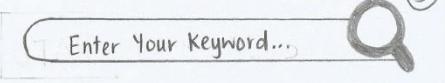
12. Do you think having a forum or a private chat room is good to enhance communication and interaction between lecturers and student?

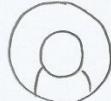
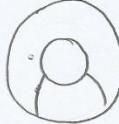
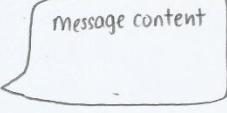
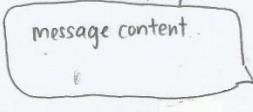
APPENDIX I Interview question with FGO

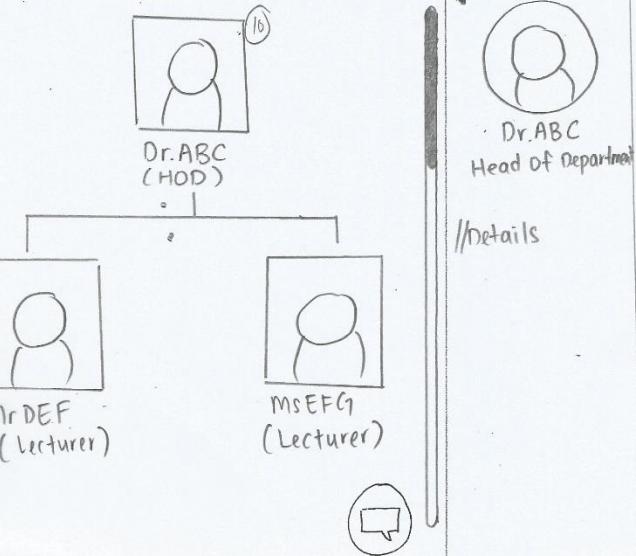
1. Where does lecturers post non-course-related information such as talks, job vacancy and workshop to inform students and How?
Facebook website, notice board
2. What is the standard operation procedure for a lecturer to post an information?
3. How do you ensure the lecturer posts appropriate information?
4. Who is going to control the information posted?
5. If the information is targeted to a specific group of students, how do the lecturer inform them? For example, the job vacancy for final year student.

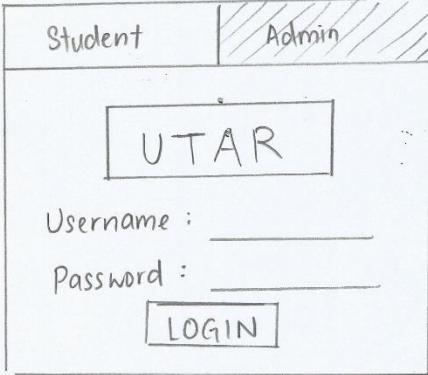
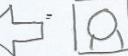
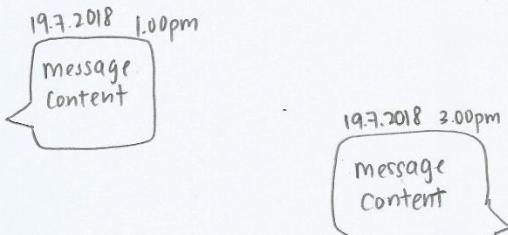
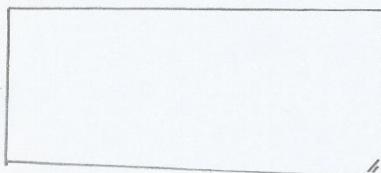
APPENDIX J Low fidelity paper-based prototype

UTAR UTAR DIECS		①	UTAR UTAR DIECS		②
<input type="button" value="HOME"/>	<input type="button" value="NOTIFICATION"/>	<input checked="" type="checkbox" value="Message"/>	<input type="button" value="HOME"/>	<input checked="" type="checkbox" value="NOTIFICATION"/>	<input checked="" type="checkbox" value="MESSAGE"/>
<p style="text-align: right;">Sort :</p> <div style="border: 1px solid black; padding: 10px;">  Dr. ABC (HOD) <input type="text" value="TITLE"/> <input type="text" value="DESCRIPTION"/> Apple (19.7.2018 12.00pm) <input type="text" value="Enter your comment here..."/> </div>			<div style="border: 1px solid black; padding: 10px;">  Dr ABC has an update. <input type="text"/> (updated 30 mins ago) </div>		
<div style="border: 1px solid black; padding: 10px;">  Mr. DEF (lecturer) <input type="text"/> <input type="checkbox"/> <input type="checkbox"/> <input type="text"/> // comment section  </div>			<div style="border: 1px solid black; padding: 10px;">  mr. DEF created a post <input type="text"/> (created 50 mins ago) </div>		
<input type="button" value="UTAR"/>		③	<input type="button" value="UTAR"/>		④
<input type="button" value="HOME"/>	<input type="button" value="NOTIFICATION"/>	<input checked="" type="checkbox" value="MESSAGE"/>	<input type="button" value="HOME"/>	<input type="button" value="NOTIFICATION"/>	<input checked="" type="checkbox" value="MESSAGE"/>
<div style="border: 1px solid black; padding: 10px;">  Dr. ABC Head of Department <input type="text" value="TITLE"/> <input type="text" value="description"/> <input type="checkbox"/> Going <input type="checkbox"/> Not Going Apple (19.7.2018 12.00pm) It'll so much fun! <input type="text" value="Enter your comment here..."/> </div>			<div style="border: 1px solid black; padding: 10px;">  Dr. ABC message content 7.00pm 1 new message </div>		
			<div style="border: 1px solid black; padding: 10px;">  Mr. DEF message content 6.30pm 2 new messages </div>		

 <p><input type="button" value="HOME"/> <input type="button" value="NOTIFICATION"/> <input type="button" value="Message"/></p> <p>No Result found.</p> <p>Found post(s) with "talk" keyword.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Dr. ABC (HOD) <input type="text" value="TITLE"/> <input type="checkbox"/> Dr. ABC (HOD) <input type="text" value="TITLE"/> <input type="checkbox"/> Mr. DEF (lecturer) <input type="text" value="TITLE"/>  	<p>X </p> <p>Signed in as <u>ABC</u> Course : SE ID : </p> <p>Login/Logout </p> <p> User Profile </p> <p> Subjects</p> <p> Organization chart </p> <p> Setting </p>
--	--

 UTAR UTAR DIECS  (9)	 UTAR UTAR DIECS  (10)						
HOME NOTIFICATION MESSAGE							
<p>Login as :</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 5px;">Student</td> <td style="padding: 5px;">Admin</td> </tr> <tr> <td colspan="2" style="text-align: center; padding: 10px;">UTAR</td> </tr> <tr> <td colspan="2" style="padding: 10px;"> Username : _____ Password : _____ <input style="width: 100%;" type="button" value="LOGIN"/> </td> </tr> </table>		Student	Admin	UTAR		Username : _____ Password : _____ <input style="width: 100%;" type="button" value="LOGIN"/>	
Student	Admin						
UTAR							
Username : _____ Password : _____ <input style="width: 100%;" type="button" value="LOGIN"/>							
 <u>Name</u> Student ID : xxxxxxxx Course : xxxx xxxx xx Gender : F Date Of Birth : xx - xx - xxxx H/P NO : xx - xxxxxxxx							
 (11)							
 UTAR UTAR DIECS  (11)	 UTAR UTAR DIECS  (12)						
HOME NOTIFICATION MESSAGE							
 <u>Name</u> Student ID : xxxxxxxx Course : xxxx xxxx xx } fixed Gender : F } Date Of Birth : xx - xx - xxxx } H/P NO : _____ Email : _____							
 (13)							
19.7.2018 3.00pm  message content							
19.7.2018 4.00pm  message content							
<input type="text" value="Enter new message ..."/>							

 UTAR UTAR DIECS 	 UTAR UTAR DIECS 
HOME NOTIFICATION <input checked="" type="checkbox"/> MESSAGE // Opacity 50%	HOME NOTIFICATION <input checked="" type="checkbox"/> MESSAGE Receive Notification 
<p>Select contact Person :</p> <ul style="list-style-type: none">  Dr. ABC   Mr. DEF  Ms. EFG  Mr. XYZ 	
	
 UTAR UTAR DIECS 	 UTAR UTAR DIECS 
HOME NOTIFICATION <input checked="" type="checkbox"/> MESSAGE	HOME NOTIFICATION <input checked="" type="checkbox"/> MESSAGE created on 17.7.2018 7.00AM Talk Title  created on 15.7.2018 5.00PM Workshop read more  Category 
	
	

 UTAR UTAR DIECS 	 UTAR UTAR DIECS 
HOME NOTIFICATION MESSAGE Login as : <input type="radio"/> Student <input checked="" type="radio"/> Admin  <p>UTAR</p> <p>Username : _____</p> <p>Password : _____</p> <p><input type="button" value="LOGIN"/></p>	HOME NOTIFICATION MESSAGE  Apple  <p>19.7.2018 1.00pm</p> <p>message content</p> <p>19.7.2018 3.00pm</p> <p>message content</p> <p>Enter your message here</p>
 UTAR UTAR DIECS 	 UTAR UTAR DIECS 
HOME NOTIFICATION MESSAGE TITLE <hr/> DESCRIPTION 	HOME NOTIFICATION MESSAGE  <p>Are You Sure to DELETE?</p> <p><input type="button" value="Yes"/> <input type="button" value="No"/></p>

The image displays four hand-drawn wireframe prototypes arranged in a 2x2 grid, representing a mobile application's interface.

Top Left Prototype: This prototype shows a 'HOME' screen with a navigation bar at the top. Below it is a 'NOTIFICATION' card for 'Dr. ABC (HOD)' containing a title, a 'read more' link, a timestamp ('Apple (17.7.2018 12.00pm)'), and a comment input field. A 'Sort:' dropdown is located above the notification card.

Top Right Prototype: This prototype shows a 'NOTIFICATION' screen for a user. It lists two notifications: one from 'Apple' and one from 'Orange'. Each notification includes a 'TITLE' field, a 'comment' field with a timestamp ('commented 50 mins ago'), and a 'category' field. There are also empty input fields for entering a new comment.

Bottom Left Prototype: This prototype shows a 'MESSAGE' screen for 'Dr. ABC Head of Department'. It includes a 'TITLE' field, a 'Description' field, and a timestamp ('Apple (17.7.2018 12.00pm)'). A 'category' dropdown is positioned above the message input area. A note at the bottom says 'It'll be so much fun!' and there is a comment input field.

Bottom Right Prototype: This prototype shows a 'MESSAGE' screen for 'Apple' and 'Orange'. It lists messages from both users with their respective timestamps ('7.00pm' and '6.30pm') and a note indicating '1 new message'. The interface includes a magnifying glass icon and a vertical toolbar on the right side with icons for trash, edit, and a circular arrow.

APPENDIX K Usability test result

	Strongly Disagree 1	2	3	4	Strongly Agree 5
1. I think that I would like to use this website/system for viewing information and related matter.			✓		
2. I found the website/system unnecessarily complex.		✓			
3. I thought the website/system was easy to use				✓	
4. I think that I would need the support of a technical person to be able to use this website/system.		✓			
5. I found this website/system was easily moved through without a lot of backtracking or data re-entry.				✓	
6. I thought there was too much inconsistency in this website/system.		✓			
7. I would imagine that most people would learn to use this website/system very quickly.			✓		
8. I found the system/website very awkward to use.	✓				
9. I felt very confident using the system/website.			✓		
10. I needed to learn a lot of things before I could get going with this website/system.			✓		
What did you like best about the site?	The participation could be predicted				

What did you like least about the site?	Cannot change password/personal details
If you were to describe this site to a colleague in a sentence or two, what would you say?	A -
Do you have any other final comments or questions?	/

	Strongly Disagree 1	2	3	4	Strongly Agree 5
1. I think that I would like to use this website/system for viewing information and related matter.	✓				✓
2. I found the website/system unnecessarily complex.	✓				
3. I thought the website/system was easy to use				✓	
4. I think that I would need the support of a technical person to be able to use this website/system.	✓				
5. I found this website/system was easily moved through without a lot of backtracking or data re-entry.				✓	
6. I thought there was too much inconsistency in this website/system.	✓				
7. I would imagine that most people would learn to use this website/system very quickly.					✓
8. I found the system/website very awkward to use.	✓				
9. I felt very confident using the system/website.					✓
10. I needed to learn a lot of things before I could get going with this website/system.	✓				
What did you like best about the site?	<u>Simple and clean design</u>				

What did you like least about the site?	<u>No filtering feature in the home page.</u>
If you were to describe this site to a colleague in a sentence or two, what would you say?	<u>Must try!</u>
Do you have any other final comments or questions?	<u>—</u>

	Strongly Disagree 1	2	3	4	Strongly Agree 5
1. I think that I would like to use this website/system for viewing information and related matter.				✓	
2. I found the website/system unnecessarily complex.		✓			
3. I thought the website/system was easy to use			✓		
4. I think that I would need the support of a technical person to be able to use this website/system.					✓
5. I found this website/system was easily moved through without a lot of backtracking or data re-entry.			✓		
6. I thought there was too much inconsistency in this website/system.			✓		
7. I would imagine that most people would learn to use this website/system very quickly.	✓				
8. I found the system/website very awkward to use.			✓		
9. I felt very confident using the system/website.			✓		
10. I needed to learn a lot of things before I could get going with this website/system.				✓	
What did you like best about the site?	Colorful UI				

What did you like least about the site?	Navigation
If you were to describe this site to a colleague in a sentence or two, what would you say?	Interesting app
Do you have any other final comments or questions?	✓

	Strongly Disagree 1	2	3	4	Strongly Agree 5
1. I think that I would like to use this website/system for viewing information and related matter.				✓	
2. I found the website/system unnecessarily complex.		✓			
3. I thought the website/system was easy to use				✓	
4. I think that I would need the support of a technical person to be able to use this website/system.		✓			
5. I found this website/system was easily moved through without a lot of backtracking or data re-entry.				✓	
6. I thought there was too much inconsistency in this website/system.		✓			
7. I would imagine that most people would learn to use this website/system very quickly.				✓	
8. I found the system/website very awkward to use.		✓			
9. I felt very confident using the system/website.				✓	
10. I needed to learn a lot of things before I could get going with this website/system.		✓			
What did you like best about the site?	<i>List of info on home page</i>				

What did you like least about the site?	<i>Lack of categories in home page</i>
If you were to describe this site to a colleague in a sentence or two, what would you say?	<i>Information sharing system</i>
Do you have any other final comments or questions?	

	Strongly Disagree 1	2	3	4	Strongly Agree 5
1. I think that I would like to use this website/system for viewing information and related matter.				✓	
2. I found the website/system unnecessarily complex.			✓		
3. I thought the website/system was easy to use					✓
4. I think that I would need the support of a technical person to be able to use this website/system.	✓				
5. I found this website/system was easily moved through without a lot of backtracking or data re-entry.			✓		
6. I thought there was too much inconsistency in this website/system.		✓			
7. I would imagine that most people would learn to use this website/system very quickly.				✓	
8. I found the system/website very awkward to use.	✓				
9. I felt very confident using the system/website.				✓	
10. I needed to learn a lot of things before I could get going with this website/system.			✓		
What did you like best about the site?	Easy to use and user friendly				

What did you like least about the site?	<i>less figure / illustration</i>
If you were to describe this site to a colleague in a sentence or two, what would you say?	<i>user friendly and informative app.</i>
Do you have any other final comments or questions?	<i>n/a</i>

	Strongly Disagree 1	2	3	4	Strongly Agree 5
1. I think that I would like to use this website/system for viewing information and related matter.				/	
2. I found the website/system unnecessarily complex.		/			
3. I thought the website/system was easy to use				/	
4. I think that I would need the support of a technical person to be able to use this website/system.		/			
5. I found this website/system was easily moved through without a lot of backtracking or data re-entry.				/	
6. I thought there was too much inconsistency in this website/system.		/			
7. I would imagine that most people would learn to use this website/system very quickly.				/	
8. I found the system/website very awkward to use.	/				
9. I felt very confident using the system/website.				/	
10. I needed to learn a lot of things before I could get going with this website/system.	/				
What did you like best about the site?	Simplified information				

What did you like least about the site?	long logout after pressing back button
If you were to describe this site to a colleague in a sentence or two, what would you say?	nicer and simple mobile application
Do you have any other final comments or questions?	data not updated after inputs, user login session doesn't persist, good to have application,

	Strongly Disagree 1	2	3	4	Strongly Agree 5
1. I think that I would like to use this website/system for viewing information and related matter.				✓	
2. I found the website/system unnecessarily complex.	✓				
3. I thought the website/system was easy to use				✓	
4. I think that I would need the support of a technical person to be able to use this website/system.	✓				
5. I found this website/system was easily moved through without a lot of backtracking or data re-entry.					✓
6. I thought there was too much inconsistency in this website/system.		✓			
7. I would imagine that most people would learn to use this website/system very quickly.				✓	
8. I found the system/website very awkward to use.	✓				
9. I felt very confident using the system/website.					✓
10. I needed to learn a lot of things before I could get going with this website/system.	✓				
What did you like best about the site?					

What did you like least about the site?	
If you were to describe this site to a colleague in a sentence or two, what would you say?	
Do you have any other final comments or questions?	

	Strongly Disagree 1	2	3	4	Strongly Agree 5
1. I think that I would like to use this website/system for viewing information and related matter.					✓
2. I found the website/system unnecessarily complex.	✓				
3. I thought the website/system was easy to use					✓
4. I think that I would need the support of a technical person to be able to use this website/system.		✓			
5. I found this website/system was easily moved through without a lot of backtracking or data re-entry.				✓	
6. I thought there was too much inconsistency in this website/system.	✓				
7. I would imagine that most people would learn to use this website/system very quickly.				✓	
8. I found the system/website very awkward to use.	✓				
9. I felt very confident using the system/website.					✓
10. I needed to learn a lot of things before I could get going with this website/system.	✓				
What did you like best about the site?	Able to see what event will be held				

What did you like least about the site?	cannot scroll down to edit my user information
If you were to describe this site to a colleague in a sentence or two, what would you say?	can easily keep track event that is going to be held
Do you have any other final comments or questions?	No

	Strongly Disagree 1	2	3	4	Strongly Agree 5
1. I think that I would like to use this website/system for viewing information and related matter.					✓
2. I found the website/system unnecessarily complex.	✓				
3. I thought the website/system was easy to use					✓
4. I think that I would need the support of a technical person to be able to use this website/system.	✓				
5. I found this website/system was easily moved through without a lot of backtracking or data re-entry.					✓
6. I thought there was too much inconsistency in this website/system.	✓				
7. I would imagine that most people would learn to use this website/system very quickly.					✓
8. I found the system/website very awkward to use.	✓				
9. I felt very confident using the system/website.					✓
10. I needed to learn a lot of things before I could get going with this website/system.	✓				
What did you like best about the site?	convenient				

What did you like least about the site?	—
If you were to describe this site to a colleague in a sentence or two, what would you say?	save time
Do you have any other final comments or questions?	No.

	Strongly Disagree 1	2	3	4	Strongly Agree 5
1. I think that I would like to use this website/system for viewing information and related matter.					<input checked="" type="checkbox"/>
2. I found the website/system unnecessarily complex.	<input checked="" type="checkbox"/>				
3. I thought the website/system was easy to use					<input checked="" type="checkbox"/>
4. I think that I would need the support of a technical person to be able to use this website/system.	<input checked="" type="checkbox"/>				
5. I found this website/system was easily moved through without a lot of backtracking or data re-entry.					<input checked="" type="checkbox"/>
6. I thought there was too much inconsistency in this website/system.	<input checked="" type="checkbox"/>				
7. I would imagine that most people would learn to use this website/system very quickly.					<input checked="" type="checkbox"/>
8. I found the system/website very awkward to use.			<input checked="" type="checkbox"/>		
9. I felt very confident using the system/website.				<input checked="" type="checkbox"/>	
10. I needed to learn a lot of things before I could get going with this website/system.	<input checked="" type="checkbox"/>				
What did you like best about the site?	Easy to use				

What did you like least about the site?	The colour scheme
If you were to describe this site to a colleague in a sentence or two, what would you say?	It is a good to have application and is easy to use
Do you have any other final comments or questions?	No

APPENDIX L User Acceptance Test result for admin

Testing date	3. 4. 19		
Testing start time	4:00 pm		
Testing end time	4:10 pm		
Name of tester	Ms. Chean Swee Ling		
Test module	Test scenario	Pass/ fail	Comments
Login	1. admin login to their own account 2. Enter the credentials as below: • Staff ID: s1300041 • Password: all123	Pass	
Post management	<u>Create post</u> 1. admin wants to create a post 2. presses on plus button on home page 3. enter title. 4. Select category 5. Enter description 6. Select date 7. Select group of students 8. Choose image 9. Choose document 10. Press on create button <u>Edit post</u> 1. Admin wants to edit a post 2. Presses on history button on side drawer 3. Admin selects on any post to view the details 4. Admin presses on pencil button 5. Admin chooses edit button 6. Admin update information by updating the any fields. 7. Admin presses update button. <u>Delete post</u> 1. Admin wants to edit a post 2. Presses on history button on side drawer 3. Admin selects on any post to view the details 4. Admin presses on pencil button 5. Admin chooses delete button 6. A message prompt for confirm deletion 7. Admin selects ok 8. Post is deleted	Need to refresh after delete action. Pass	
Search module	1. Admin wants to search information	Pass	

	2. Enter the keyword 'Multi' 3. Click on the search result and view the information		
Student participation report	1. Admin wants to view student participation report for the event created 2. Presses on history button on side drawer 3. Admin selects on any post and presses view report button 4. The report for particular event is displayed	Pass	
View organization chart	1. Admin wants view organization chart 2. Admin presses on the organization chart button located on the side navigation drawer. 3. Admin selects any lecturers to view lecturer profile.	Pass	It will be good if it is shown by using hierarchy chart.

Testing date	3/4/19		
Testing start time	3pm.		
Testing end time	3.25 pm.		
Name of tester	Sor Kean Vee		
Test module	Test scenario	Pass/ fail	Comments
Login	<p>1. admin login to their own account</p> <p>2. Enter the credentials as below:</p> <ul style="list-style-type: none"> • Staff ID: s1300041 • Password: all123 	pass	
Post management	<u>Create post</u> 1. admin wants to create a post 2. presses on plus button on home page 3. enter title. 4. Select category 5. Enter description 6. Select date 7. Select group of students 8. Choose image 9. Choose document 10. Press on create button	P	
	<u>Edit post</u> 1. Admin wants to edit a post 2. Presses on history button on side drawer 3. Admin selects on any post to view the details 4. Admin presses on pencil button 5. Admin chooses edit button 6. Admin update information by updating the any fields. 7. Admin presses update button.		P
	<u>Delete post</u> 1. Admin wants to edit a post 2. Presses on history button on side drawer 3. Admin selects on any post to view the details 4. Admin presses on pencil button 5. Admin chooses delete button 6. A message prompt for confirm deletion 7. Admin selects ok 8. Post is deleted		P
Search module	1. Admin wants to search information	P	

	2. Enter the keyword 'Multi' 3. Click on the search result and view the information		
Student participation report	<p>1. Admin wants to view student participation report for the event created</p> <p>2. Presses on history button on side drawer</p> <p>3. Admin selects on any post and presses view report button</p> <p>4. The report for particular event is displayed</p>	P	
View organization chart	<p>1. Admin wants view organization chart</p> <p>2. Admin presses on the organization chart button located on the side navigation drawer.</p> <p>3. Admin selects any lecturers to view lecturer profile.</p>	P	

Testing date	4/4/19		
Testing start time	11:45 am		
Testing end time	12 pm		
Name of tester	Simon Lan Boung Yeri		
Test module	Test scenario	Pass/ fail	Comments
Login	1. admin login to their own account 2. Enter the credentials as below: • Staff ID: s1300041 • Password: all123	P	
Post management	<u>Create post</u> 1. admin wants to create a post 2. presses on plus button on home page 3. enter title. 4. Select category 5. Enter description 6. Select date 7. Select group of students 8. Choose image 9. Choose document 10. Press on create button	P	navigation control needs to be improved.
	<u>Edit post</u> 1. Admin wants to edit a post 2. Presses on history button on side drawer 3. Admin selects on any post to view the details 4. Admin presses on pencil button 5. Admin chooses edit button 6. Admin update information by updating the any fields. 7. Admin presses update button.		
	<u>Delete post</u> 1. Admin wants to edit a post 2. Presses on history button on side drawer 3. Admin selects on any post to view the details 4. Admin presses on pencil button 5. Admin chooses delete button 6. A message prompt for confirm deletion 7. Admin selects ok 8. Post is deleted		
Search module	1. Admin wants to search information	P	

	2. Enter the keyword 'Multi' 3. Click on the search result and view the information		
Student participation report	1. Admin wants to view student participation report for the event created 2. Presses on history button on side drawer 3. Admin selects on any post and presses view report button 4. The report for particular event is displayed	P	Combine the view with the post description
View organization chart	1. Admin wants view organization chart 2. Admin presses on the organization chart button located on the side navigation drawer. 3. Admin selects any lecturers to view lecturer profile.	P	change to list view

Testing date	4/4/2019		
Testing start time	11.10		
Testing end time	11.35		
Name of tester	Mariam Nainan		
Test module	Test scenario	Pass/ fail	Comments
Login	1. admin login to their own account 2. Enter the credentials as below: • Staff ID: s1300041 • Password: ali123	Pass	
Post management	<u>Create post</u>	Pass	home page to show categories first, then details (Date of event not shown)
	1. admin wants to create a post 2. presses on plus button on home page 3. enter title. 4. Select category 5. Enter description 6. Select date 7. Select group of students 8. Choose image 9. Choose document 10. Press on create button		
	<u>Edit post</u>		
1. Admin wants to edit a post 2. Presses on history button on side drawer 3. Admin selects on any post to view the details 4. Admin presses on pencil button 5. Admin chooses edit button 6. Admin update information by updating the any fields. 7. Admin presses update button.			
<u>Delete post</u>		Pass	
Search module	1. Admin wants to search information		

	2. Enter the keyword 'Multi' 3. Click on the search result and view the information	Pass	
Student participation report	1. Admin wants to view student participation report for the event created 2. Presses on history button on side drawer 3. Admin selects on any post and presses view report button 4. The report for particular event is displayed	Pass	
View organization chart	1. Admin wants view organization chart 2. Admin presses on the organization chart button located on the side navigation drawer. 3. Admin selects any lecturers to view lecturer profile.	Pass	

APPENDIX M User Acceptance Test result for student

Testing date	3/4/2017		
Testing start time	1.30 am.		
Testing end time	1.50 am.		
Name of tester	Ooi Yee Wei		
Test module	Test scenario	Pass/ fail	Comments
Login	1. Student login to their own account 2. Enter the credentials as below: • Student ID: 1802345 • Password: lemon	Pass	
Participate in an event	1. Student wants to take part in an event 2. Click on 'JOIN' or 'NOT JOINING' to take part	Pass	Good
Search module	1. Student wants to search information 2. Enter the keyword 'Multi' 3. Click on the search result and view the information	Pass	
Profile management	View Profile 1. User clicks on user profile to view their own profile Edit Profile 2. User clicks on the edit button on user profile 3. Update the email and phone number as per below • Phone: 012-4567389 • Email: lemon@university.com	Pass	When click back button, the app will input automatically
View organization chart	1. Student wants view organization chart 2. Student clicks on the organization chart button. 3. Student clicks on any lecturers to view lecturer profile.	Pass	

Testing date	<u>3/4/2019</u>		
Testing start time	<u>2.17 a.m.</u>		
Testing end time	<u>2.37 a.m.</u>		
Name of tester	<u>Seah Sheng Hong</u>		
Test module	Test scenario	Pass/ fail	Comments
Login	<ol style="list-style-type: none"> Student login to their own account Enter the credentials as below: <ul style="list-style-type: none"> Student ID: 1802345 Password: lemon 	<u>Pass</u>	
Participate in an event	<ol style="list-style-type: none"> Student wants to take part in an event Click on 'JOIN' or 'NOT JOINING' to take part 	<u>Pass</u>	
Search module	<ol style="list-style-type: none"> Student wants to search information Enter the keyword 'Multi' Click on the search result and view the information 	<u>Pass</u>	
Profile management	<u>View Profile</u> <ol style="list-style-type: none"> User clicks on user profile to view their own profile 		
	<u>Edit Profile</u> <ol style="list-style-type: none"> User clicks on the edit button on user profile Update the email and phone number as per below <ul style="list-style-type: none"> Phone: 012-4567389 Email: lemon@university.co m 	<u>Pass</u>	
View organization chart	<ol style="list-style-type: none"> Student wants view organization chart Student clicks on the organization chart button. Student clicks on any lecturers to view lecturer profile. 	<u>Pass</u>	

Testing date	01/04/19		
Testing start time	3:00 p.m.		
Testing end time	3:15 p.m.		
Name of tester	Heng Lai Sean		
Test module	Test scenario	Pass/ fail	Comments
Login	1. Student login to their own account 2. Enter the credentials as below: • Student ID: 1802345 • Password: lemon	pass	Good.
Participate in an event	1. Student wants to take part in an event 2. Click on 'JOIN' or 'NOT JOINING' to take part	pass	
Search module	1. Student wants to search information 2. Enter the keyword 'Multi' 3. Click on the search result and view the information	pass	
Profile management	View Profile 1. User clicks on user profile to view their own profile	pass	
	Edit Profile 1. User clicks on the edit button on user profile 2. Update the email and phone number as per below • Phone: 012-4567389 • Email: lemon@university.com	pass	
View organization chart	1. Student wants view organization chart 2. Student clicks on the organization chart button. 3. Student clicks on any lecturers to view lecturer profile.	pass	

Testing date	1/4/2014		
Testing start time	11:20 PM		
Testing end time	11:34 PM		
Name of tester	Mak Ji Teng		
Test module	Test scenario	Pass/ fail	Comments
Login	1. Student login to their own account 2. Enter the credentials as below: • Student ID: 1802345 • Password: lemon	Pass	login without error
Participate in an event	1. Student wants to take part in an event 2. Click on 'JOIN' or 'NOT JOINING' to take part	Pass	Successful join event
Search module	1. Student wants to search information 2. Enter the keyword 'Multi' 3. Click on the search result and view the information	Pass	Successful retrieve event with 'Multi' keyword
Profile management	<u>View Profile</u> 1. User clicks on user profile to view their own profile	Pass	Suggest add a scrollbar to scroll and view the rest information as well as add email format validation.
	<u>Edit Profile</u> 1. User clicks on the edit button on user profile 2. Update the email and phone number as per below • Phone: 012-4567389 • Email: lemon@university.com		
View organization chart	1. Student wants view organization chart 2. Student clicks on the organization chart button. 3. Student clicks on any lecturers to view lecturer profile.	Pass	Able to view lecturer profile

Testing date	2/4/2019		
Testing start time	6.00 p.m.		
Testing end time	6.12 pm		
Name of tester	Chow Pui Yan		
Test module	Test scenario	Pass/ fail	Comments
Login	1. Student login to their own account 2. Enter the credentials as below: • Student ID: 1802345 • Password: lemon	Pass	
Participate in an event	1. Student wants to take part in an event 2. Click on 'JOIN' or 'NOT JOINING' to take part	Pass	
Search module	1. Student wants to search information 2. Enter the keyword 'Multi' 3. Click on the search result and view the information	Pass	
Profile management	<u>View Profile</u> 1. User clicks on user profile to view their own profile <u>Edit Profile</u> 1. User clicks on the edit button on user profile 2. Update the email and phone number as per below • Phone: 012-4567389 • Email: lemon@university.co m	Pass	the keypad is - change keypad to number when enter the phone number. - the edit icon is confusing as when finish edit need click on the edit icon.
View organization chart	1. Student wants view organization chart 2. Student clicks on the organization chart button. 3. Student clicks on any lecturers to view lecturer profile.	Pass	

Testing date	2/4/2010		
Testing start time	6:20pm		
Testing end time	6:45pm		
Name of tester	Yang Wei, Lin		
Test module	Test scenario	Pass/ fail	Comments
Login	1. Student login to their own account 2. Enter the credentials as below: • Student ID: 1802345 • Password: lemon	P	
Participate in an event	1. Student wants to take part in an event 2. Click on 'JOIN' or 'NOT JOINING' to take part	P	
Search module	1. Student wants to search information 2. Enter the keyword 'Multi' 3. Click on the search result and view the information	P	
Profile management	<u>View Profile</u> 1. User clicks on user profile to view their own profile	P	no validation card error message on show and edit
	<u>Edit Profile</u> 1. User clicks on the edit button on user profile 2. Update the email and phone number as per below • Phone: 012-4567389 • Email: lemon@university.co m		
View organization chart	1. Student wants view organization chart 2. Student clicks on the organization chart button. 3. Student clicks on any lecturers to view lecturer profile.	P	