CHAPTER III
ANALYSIS AND DESIGN

3.0 INTRODUCTION

System development methodology is the standard process followed in organization to conduct all steps necessary to analyse, design, implement and maintain the information system. Here this study will use the Software Development Life Cycle (SDLC) for planning and management of the system development process.

SDLC is a process followed for a software project, within a software organization. It consists of a detailed plan describing how to develop, maintain, replace and alter or enhance specific software. The life cycle defines a methodology for improving the quality of software and the overall development process.

The following figure is a graphical representation of the various stages of a typical SDLC.

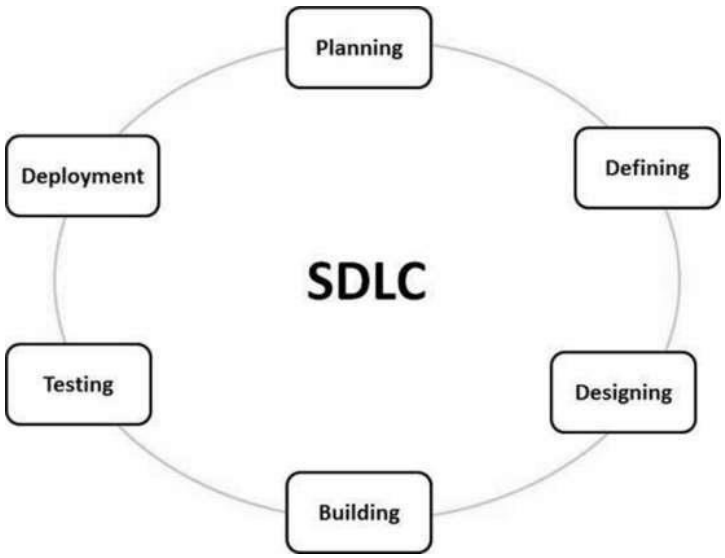


Figure3.1: Software Development Life Cycle (SDLC).

3.1 IDENTIFICATION PHASE

The objective of this phase is to come out with a new idea or improvements to the existing application. The developer analyses and categorizes the ideas. The ideas can come from the customer or from the developers. In this project, the application is categorized into three domains which are:

i. The assessment form page should be easy to assess, and not too complicated.
ii. Assess summarization result, where the system can conclude automatically year by year.

3.2 DESIGN

In design phase, is develop into an initial design of the system, the feasibility of developing the system platforms is determined. In this phase, developer needs to design a model of the database and the system graphical user interface.

List of Requirement will show the list of requirements that are the document or a table containing all the requirements to a certain system. It is written to allow people to understand what a system should do. There are three kinds of system requirements as following;

- M-mandatory requirement (what the system must do)
- D-desirable requirement (what the system preferably should do)
- O-option requirement (what the system may do)

NO	Requirement ID	Requirement Description	Priority
1	REQ_1	**Register**	
	REQ_1.1	Admin register all member	M

2	REQ_2	**Login**	
	REQ_2.1 REQ_2.2 REQ_2.3 REQ_2.4	Admin login to admin page manager login to manager page lecturer login to member page officer login to officer page	M
3	REQ_3	**Manage User**	
	REQ_3.1	Admin can CRUD user information.	M
4	REQ_4	**Manage assess forms**	
	REQ_4.1 REQ_4.2 REQ_4.3	Admin can CRUD assess forms (P04, POR) Manager can fill up the form, and give credit mark to member. Lecturer/officer can fill up their own form.	M
5	REQ_5	**User information**	
	REQ_5.1 REQ_5.2	Admin can CRUD all user information. Manager can view and update all user information.	M

	REQ_5.3	Lecturer/officer can view all user information.	
6	REQ_6	**Assess form files**	
	REQ_6.1	Users can view their own form files that are already save in each semester.	M
7	REQ_7	**Manage Mark**	
	REQ_7.1	Admin can summarize user's mark in each year in percentage and pie chart.	O
	REQ_7.2	Manager can summarize user's mark in each year in percentage and pie chart.	
	REQ_7.3	Lecturer can summarize their own mark in each year in percentage and pie chart.	
8	REQ_8	**Language**	
	REQ_8.1	Admin can select Thai / English language.	M
	REQ_8.2	Manager can select Thai / English language.	

	REQ_8.3	Lecturer/officer can select Thai / English language.	
9	REQ_9	**File sharing**	
	REQ_9.1 REQ_9.2 REQ_9.3 REQ_9.4	Admin can download / print out file. Manager can download / print out file. Lecturer can download / print out file. officer can download / print out file.	D
10	REQ_10	**Date / Times**	
	REQ_10.1	Admin can set and view date / times of the assess forms.	D

Table 3.2 : Lists of Requirement

Initial design created using Use-Case Diagram of UML (Unified Modelling Language) by using Star UML software as a tool. Star UML software is functioned to design models of the software development life cycle, data flow diagram and entity relationship diagram. The use case diagram for the system below:

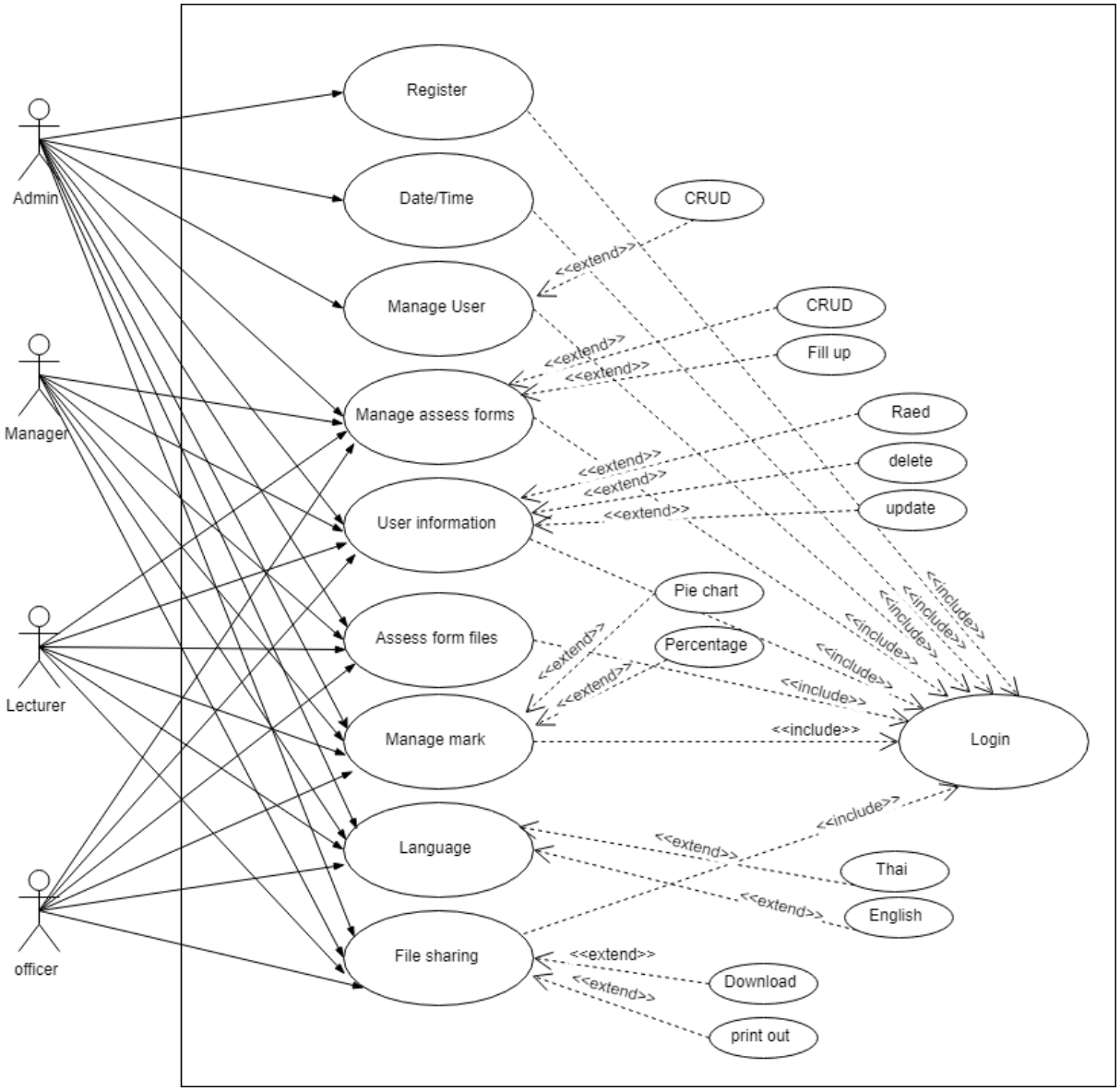


Figure 3.2: Use case diagram Personnel assessment Faculty of science and technology of Fatoni university.

Use Case Description

This section is to show the use case specification. Use case specification is synonymous to use case description and use case definition and use case interchangeably. Use case specification defines the information that pertains to a particular use case which is important in understanding the purpose behind the use case.

1. Use Case Login (REQ_1)

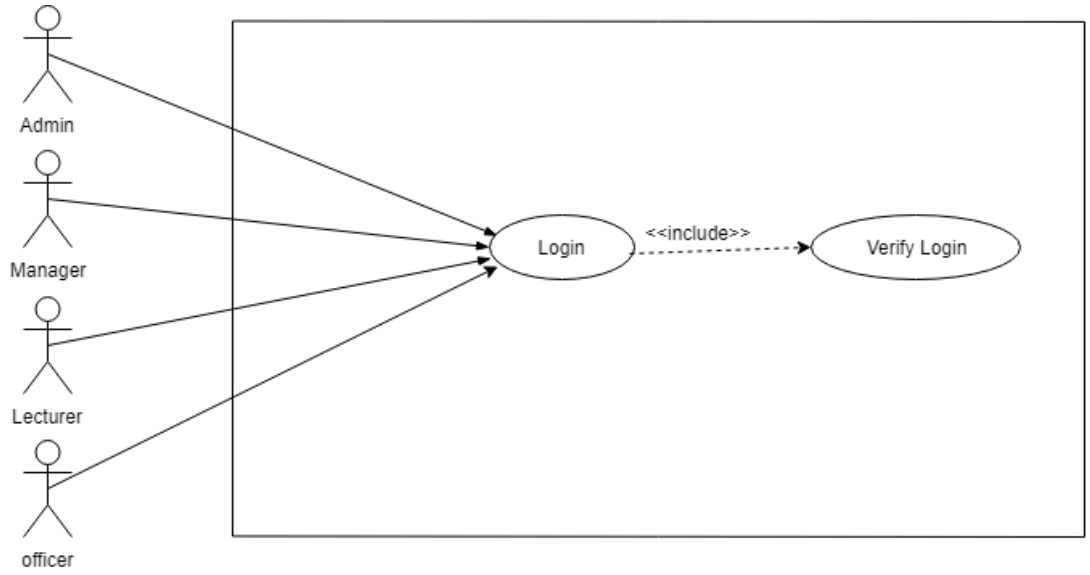


Figure 1 Use Case: Login

Use-Case Name: Login	**ID:** REQ_1	**Important Level:** High
Primary Actor: Users (Admin, Manager, Lecturer, Officer)		
Stakeholders and Interests: Admin – wants to login into the system. Manager – wants to login into the system. Lecturer – wants to login into the system. Officer – wants to login into the system.		
Brief Description: This use case will be used to allow users (Admin, Manager, Lecturer, Officer) to login to use the system.		
Trigger: The users want to login into the system. **Type:** External		

<table>
<tr><td colspan="2">Relationships:

Association: Admin, Manager, Lecturer, Officer

Include: Validate the account (username and password)

Extend: None

Generalization: None</td></tr>
<tr><td colspan="2">Preconditions: The user must have a username and password to perform task.</td></tr>
<tr><td colspan="2">Post-condition: The user can login to the system.</td></tr>
<tr><td colspan="2">Normal Flow of Events:</td></tr>
<tr><td>Actor</td><td>System</td></tr>
<tr><td>1.This use case begin when the user press on login link at the main page

3.The user enters the correct username and password.

4. Users submit the username and passwords.</td><td>2.The login page appears with login form

5.System verify the username and password

6.The use case end when the system displays the control panel</td></tr>
<tr><td colspan="2">Sub flows:</td></tr>
<tr><td colspan="2">Alternative/Exception Flows:</td></tr>
</table>

A-1: Registration (if user has no username and password) 1. administrator registration all user to be the user of the system E-1: Invalid username 1. User has to enter a valid username E-1: Invalid username 1. User has to enter a valid password
Limitation: The Password must contain at least 8 characters.

2. Use Case Registration (REQ_2)

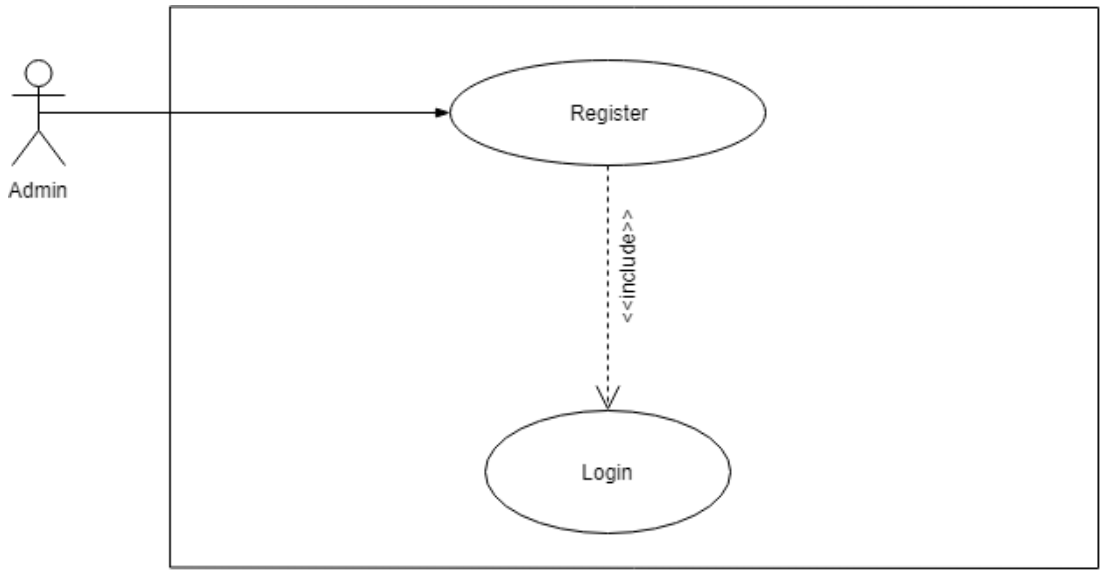


Figure 2 Use Case: Register

Use-Case Name: Registration	**ID:** REQ_2	**Important Level:** High
Primary Actor: Administrator		
Stakeholders and Interests:		

Admin – wants to register member to be a user of system.
Brief Description: This use case will be used to allow admin to register member to be a user of system.
Trigger: The admin wants to register member to be a user of system. **Type:** External
Relationships: **Association:** Administrator **Include:** Login **Extend:** None **Generalization:** None
Preconditions: Admin must fill user entire information to be a user. The user must be who's relevant with FST staff.
Post-condition:
Normal Flow of Events:

Actor	**System**

<table>
<tr><td>1. This use case being when the admin press on register link at the main page

3. Admin fill the information according to the form given

4. Admin press register button

5. Admin give the username and password to the user for login to system.</td><td>2.The register page appears with the register form</td></tr>
<tr><td colspan="2">Sub flows:</td></tr>
<tr><td colspan="2">Alternative/Exception Flows:

A-1: If admin does not register user to the system.

1.The user can’t be login to the system.</td></tr>
<tr><td colspan="2">Limitation: The Password must contain at least 8 characters.</td></tr>
</table>

3. Use Case Manage Users (REQ_3)

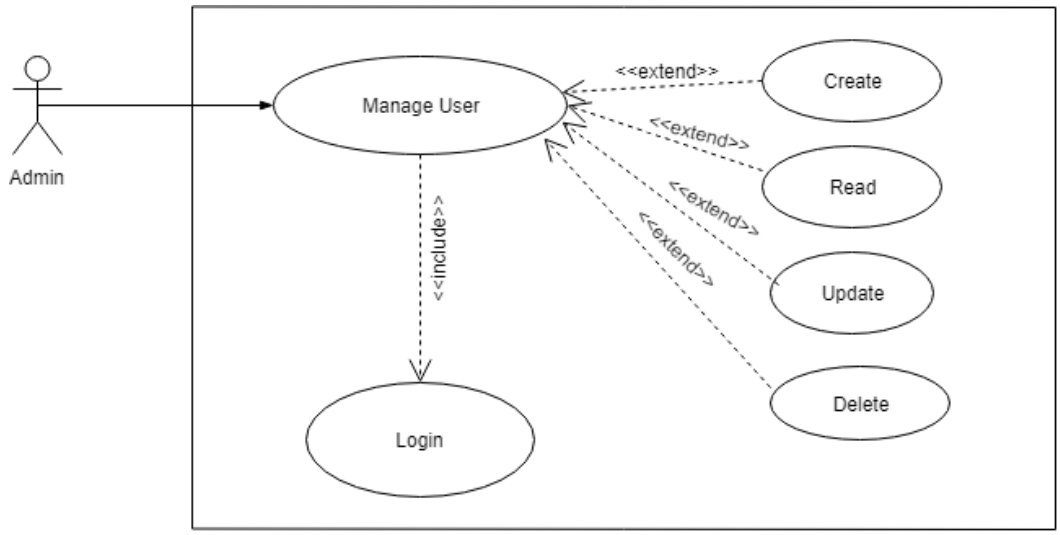


Figure 3 Use Case: Manage Users

Use-Case Name: Manage Users	**ID:** REQ_3	**Important Level:** High
Primary Actor: Administrator		
Stakeholders and Interests: Admin – wants to manage user's information.		
Brief Description: This use case will be used to allow the administrator to manage users whose enter in the system. The Admin can add, update, and delete user's information.		
Trigger: The admin wants to manage user's information. **Type:** External		
Relationships: **Association:** Administrator **Include:** login		

<table>
<tr><td colspan="2">Extend: CRUD user’s information.

Generalization: None</td></tr>
<tr><td colspan="2">Preconditions: The administrator must login in order to perform task.</td></tr>
<tr><td colspan="2">Post-condition: The Administrator can create/review/update/delete user’s information.</td></tr>
<tr><td colspan="2">Normal Flow of Events:</td></tr>
<tr><td>Actor</td><td>System</td></tr>
<tr><td>1. This use case being when administrator click on any user’s information on control panel to edit user’s information.

3. Administrator edit user’s information

4. Administrator click save button</td><td>2. The system display the user information according to the Admin clicked.

5.The use case end when the system successfully task</td></tr>
<tr><td colspan="2">Sub flows:</td></tr>
<tr><td colspan="2">Alternative/Exception Flows:

A-1: Add/Update/ delete user’s information.

The system shall add/update/ delete user’s information from system</td></tr>
<tr><td colspan="2">Limitation: No limitation.</td></tr>
</table>

4. Use Case Manage Assess form (REQ_4)

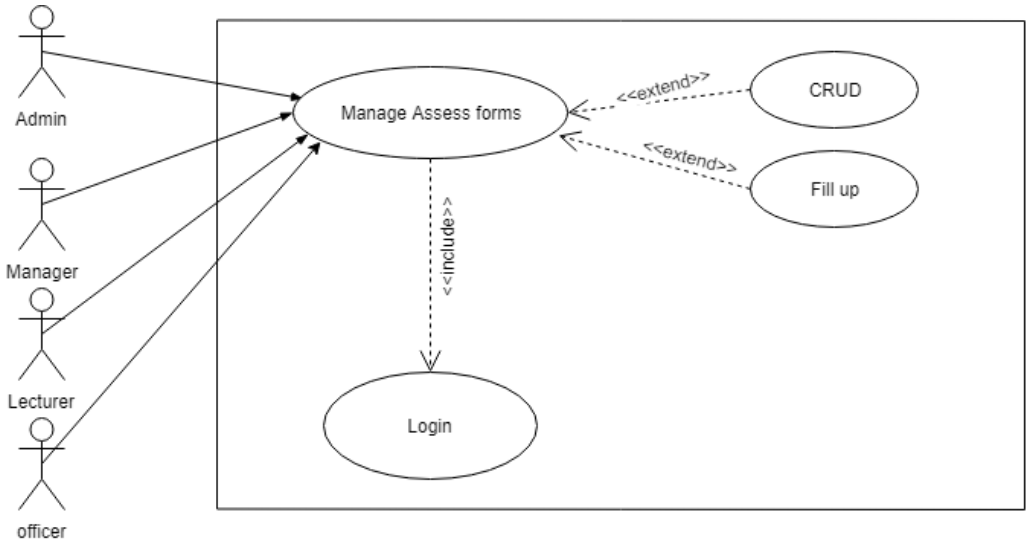


Figure 4 Use Case: Manage Assess form

Use-Case Name: Manage Announcement	**ID:** REQ_4	**Important Level:** High
Primary Actor: Administrator, Manager, Lecturer, officer		
Stakeholders and Interests: Admin – wants to manage the Assess form. Manager – wants to manage the Assess form. Lecturer – wants to manage the Assess form. Officer – wants to manage the Assess form.		
Brief Description: This use case will allow user (admin, manager, lecturer, officer) to manage assess form such as fill up the assess form in the system.		
Trigger: The admin wants to manage the assess form.		

<table>
<tr><td colspan="2">The manager wants to manage the assess form.

The lecturer wants to manage the assess form.

The officer wants to manage the assess form.

Type: External</td></tr>
<tr><td colspan="2">Relationships:

Association: Administrator, Manager, Lecturer, officer

Include: login

Extend: Fill up the assess form in the system.

Generalization: None</td></tr>
<tr><td colspan="2">Preconditions: The user (administrator, manager, lecturer, officer) must login in order to perform task.</td></tr>
<tr><td colspan="2">Post-condition: The user (administrator, manager, lecturer, officer) can fill up the assess form in the system</td></tr>
<tr><td colspan="2">Normal Flow of Events:</td></tr>
<tr><td>Actor</td><td>System</td></tr>
<tr><td>1.This use case begin when user (admin, manager, lecturer, officer) select on button TOR form/P04 form on control panel.

3.The Administrator click on the blank to fill up the assess form.</td><td>2. Display assess form.</td></tr>
</table>

	4. The system save the information which user's fill it to data base. 5.The use case end when the system successfully task
Sub flows:	
Alternative/Exception Flows: A-1: Fill up assess form The user shall fill up assess form to the system.	
Limitation: No limitation.	

5. Use Case User Information (REQ_5)

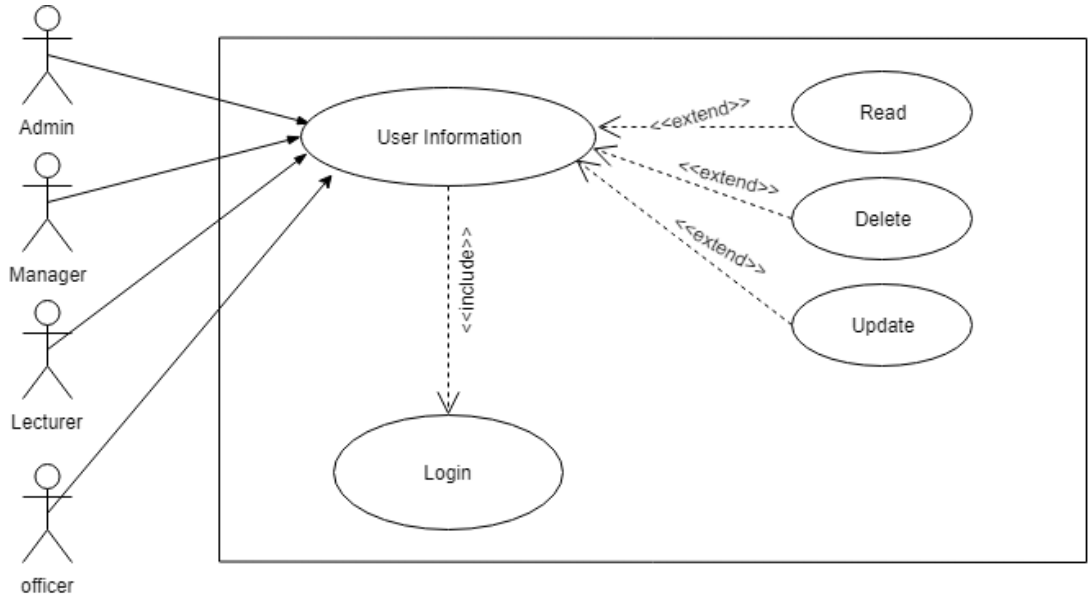


Figure 5 Use Case: Users Information

Use-Case Name: user information	**ID:** REQ_5	**Important Level:** High
Primary Actor: Administrator, Manager, Lecturer, Officer		
Stakeholders and Interests: Admin – wants to manage their own information. Manager – wants to manage their own information. Lecturer – wants to manage their own information. Officer – wants to manage their own information.		
Brief Description: This use case will be used to allow users (Admin, Lecturer, Manager, Officer) to manage their own information in the system.		
Trigger: The users (Admin, manager, lecturer, officer) wants to manage their own information in the system. **Type:** External		
Relationships: **Association:** Administrator, Lecturer, Manager, Officer **Include:** login **Extend:** Read, update, and Delete their own information. **Generalization:** None		
Preconditions: The users (Admin, manager, lecturer, officer) must login in order to perform task.		

Post-condition: The users (Admin, manager, lecturer, officer) can read/update/delete their own information in the system.	
Normal Flow of Events:	
Actor	**System**
1.This use case begin when users select on Profile on the panel.	2. The system shall display the user's request page **3.** The system end when the task successfully completed.
Sub flows:	
Alternative/Exception Flows: None	
Limitation: No limitation.	

6. Use Case assess form files (REQ_6)

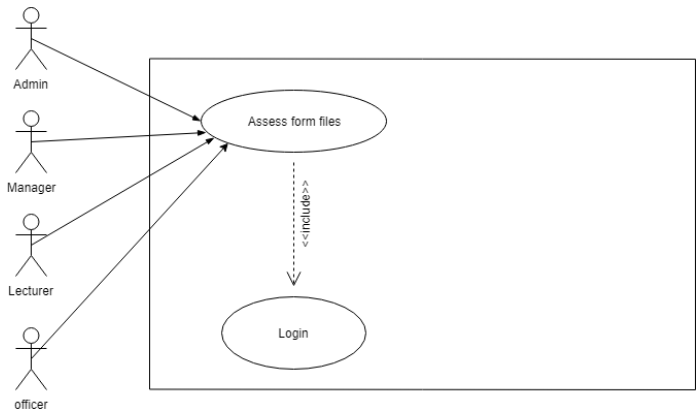


Figure 6 Use Case: Assess form files

Use-Case Name: assess form files	**ID:** REQ_6	**Important Level:** High
Primary Actor: Administrator, Lecturer, Manager, Officer		
Stakeholders and Interests: Admin – wants to view assess form file. Lecturer – wants to view assess form file. Manager – wants to view assess form file. Officer – wants to view assess form file.		
Brief Description: This use case will be used to allow the users (Administrator, Lecturer, Manager, Officer) to view assess form file from the system.		
Trigger: The users (Administrator, Lecturer, Manager, Officer) wants to view assess form files from the system. **Type:** External		
Relationships: **Association:** Administrator, Lecturer, Manager, Officer **Include:** login **Extend:** None **Generalization:** None		
Preconditions: None		
Post-condition: The users (Administrator, Lecturer, Manager, Officer) can view assess form files from the system.		

Normal Flow of Events:	
Actor	**System**
1.This use case begin when user presses the assess form file name on the control panel	2.The system displays assess form file 3.The use case end
Sub flows:	
Alternative/Exception Flows: None	
Limitation: No limitation.	

7. Use Case Manage mark (REQ_7)

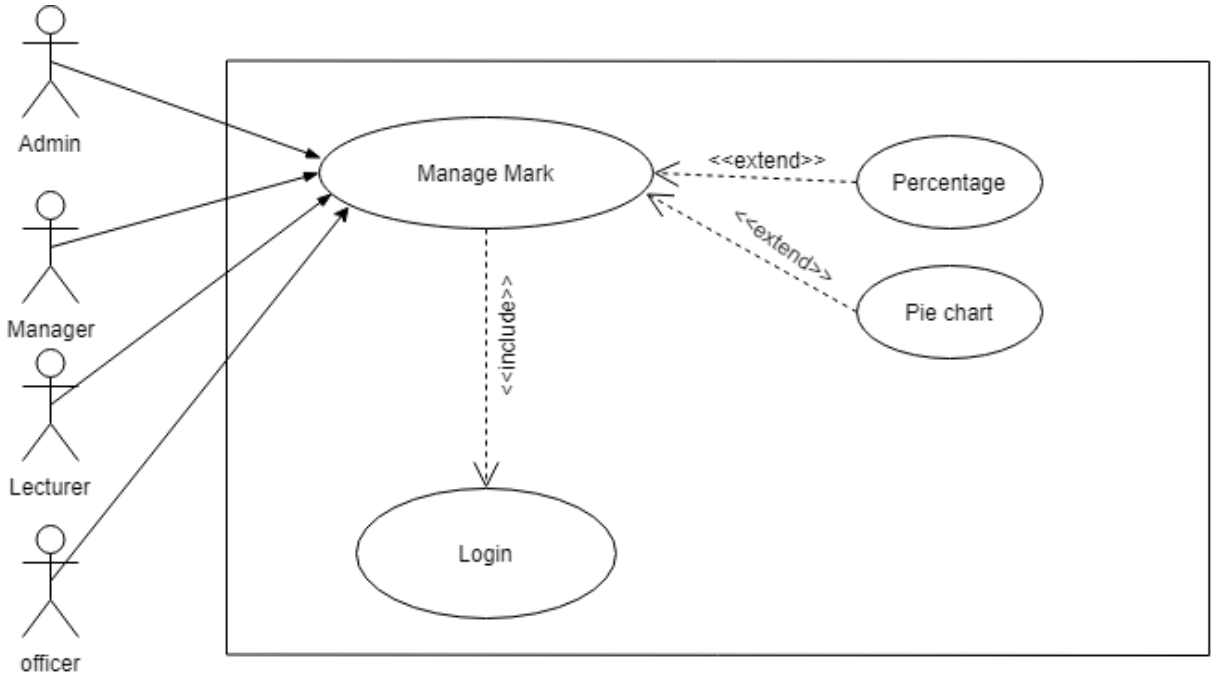


Figure 7 Use Case: Manage mark

Use-Case Name: Manage mark	**ID:** REQ_7	**Important Level:** High
Primary Actor: Administrator, Manager, Lecturer, Officer		
Stakeholders and Interests: Admin – wants to manage mark of assessment form. Manager – wants to manage mark of assessment form. Lecturer – wants to manage mark of assessment form. Officer – wants to manage mark of assessment form.		
Brief Description: This use case will allow user (administrator, manager, lecturer, officer) to manage mark of the assessment form in the system.		
Trigger: The users (Administrator, Manager, Lecturer, officer) want to manage mark of the assessment form. **Type:** External		
Relationships: **Association:** Administrator, Manager, Lecturer, officer **Include:** login **Extend:** pie chart, percentage. **Generalization:** None		
Preconditions: The user must login in order to perform task.		

Post-condition: The user can summarise result of assessment form in the system.	
Normal Flow of Events:	
Actor	**System**
1.This use case start when user clicks on manage mark on the control panel.	2. The system displays the result in pie chart and percentage. 5.The use case end when the system successfully task
Sub flows:	
Alternative/Exception Flows: A-1: summarise The system shall summarise the assessment result in a pie chart and percentage.	
Limitation: No limitation.	

8. Use Case Language (REQ_8)

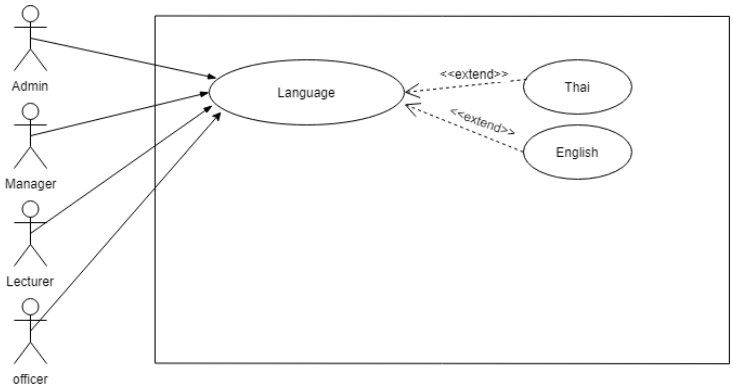


Figure 8 Use Case Language

Use-Case Name: Language	**ID:** REQ_8	**Important Level:** High
Primary Actor: Administrator, Manager, Lecturer, Officer		
Stakeholders and Interests: Administrator – wants to View system in Thai or English language. Manager – wants to View system in Thai or English language. Lecturer – wants to View system in Thai or English language. Officer – wants to View system in Thai or English language.		
Brief Description: This use case will be used to allow users (admin, manager, lecturer, officer) to view system in Thai or English language.		
Trigger: The users (admin, manager, lecturer, officer) wants to view system in Thai or English language. **Type:** External		
Relationships: **Association:** Administrator, Manager, Lecturer, Officer **Include:** None **Extend:** Thai, English **Generalization:** None		
Preconditions:		
Post-condition: The user can view the system in Thai or English language		

Normal Flow of Events:	
Actor	**System**
1. This use case begin when the users click on Thai or English on the control panel.	2. Use case end when system display task completely
Sub flows:	
Alternative/Exception Flows: A-1: Select Language The system shall display the language in Thai or English.	
Limitation: No limitation.	

9. Use Case File sharing (REQ_9)

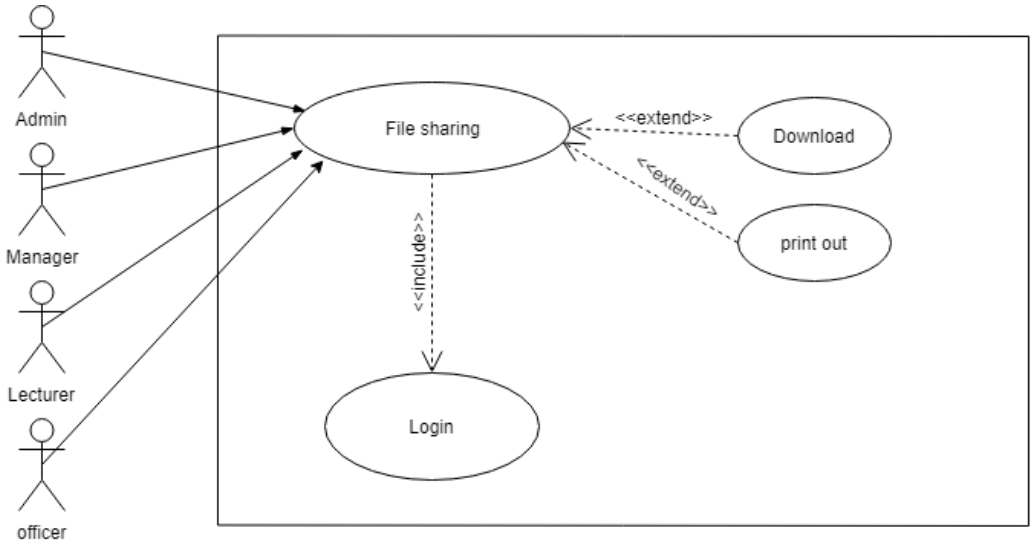


Figure 9 Use Case: File sharing

Use-Case Name: File sharing	**ID:** REQ_9	**Important Level:** High
Primary Actor: Administrator, Manager, Lecturer, Officer		
Stakeholders and Interests: Administrator - want to download or print out he file. Manager - want to download or print out he file. Lecturer - want to download or print out he file. officer- want to download or print out he file.		
Brief Description: This use case will allow user to download and print out the file.		
Trigger: The user wants to download and print out the file form. **Type:** External		
Relationships: **Association:** Administrator, manager, Lecturer, Officer **Include:** login **Extend:** Download, Print out. **Generalization:** None		
Preconditions: The user must login in order to perform task.		
Post-condition: The user can download and print out the file form.		
Normal Flow of Events:		
Actor	**System**	

1. This use case begin when user select download and print out.	5. The use case end when completely task.
Sub flows:	
Alternative/Exception Flows: A-1: download The system shall download the file form to any folder file that user select. A-2: print out The system shall print out the file form.	
Limitation: No limitation.	

10. Use Case Date/Time (REQ_10)

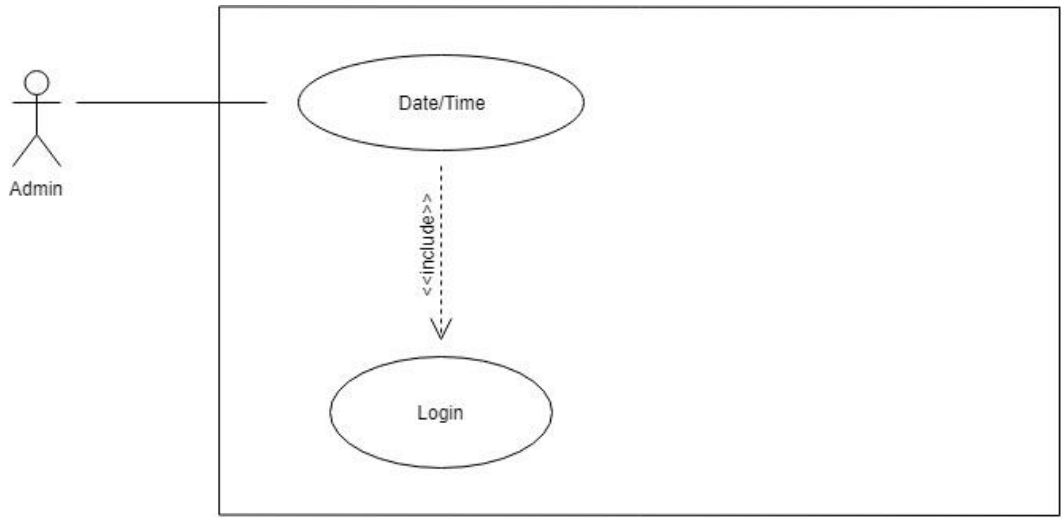


Figure 10 Use Case: Date/Time

Use-Case Name: Date/Time	**ID:** REQ_10	**Important Level:** High
Primary Actor: Admin		
Stakeholders and Interests: Administrator – wants to create the assessment form dateline.		
Brief Description: This use case will allow administrator to create the dateline of assessment form.		
Trigger: The administrator wants to create the dateline of assessment form. **Type:** External		
Relationships: **Association:** Administrator **Include:** login **Extend:** None **Generalization:** None		
Preconditions: The administrator must login in order to perform task.		
Post-condition: Administrator create the assessment form dateline.		
Normal Flow of Events:		
Actor	**System**	

1.This use case begin when Administrator clicks dateline on control panel. 3.The administrator select date/time	2.The system display the date/time 4. The use case end when the system successfully submits the request information.
Sub flows:	
Alternative/Exception Flows: A: if the dateline done A-1: the assess form will be gone.	
Limitation: No limitation.	

Sequence diagram is creating to shows the flow of the system. A sequence diagram is an interaction diagram that shows how objects operate with one another and in what order. It is a construct of a message sequence chart. A sequence diagram shows object interactions arranged in time sequence. The sequence diagram for the system is as below:

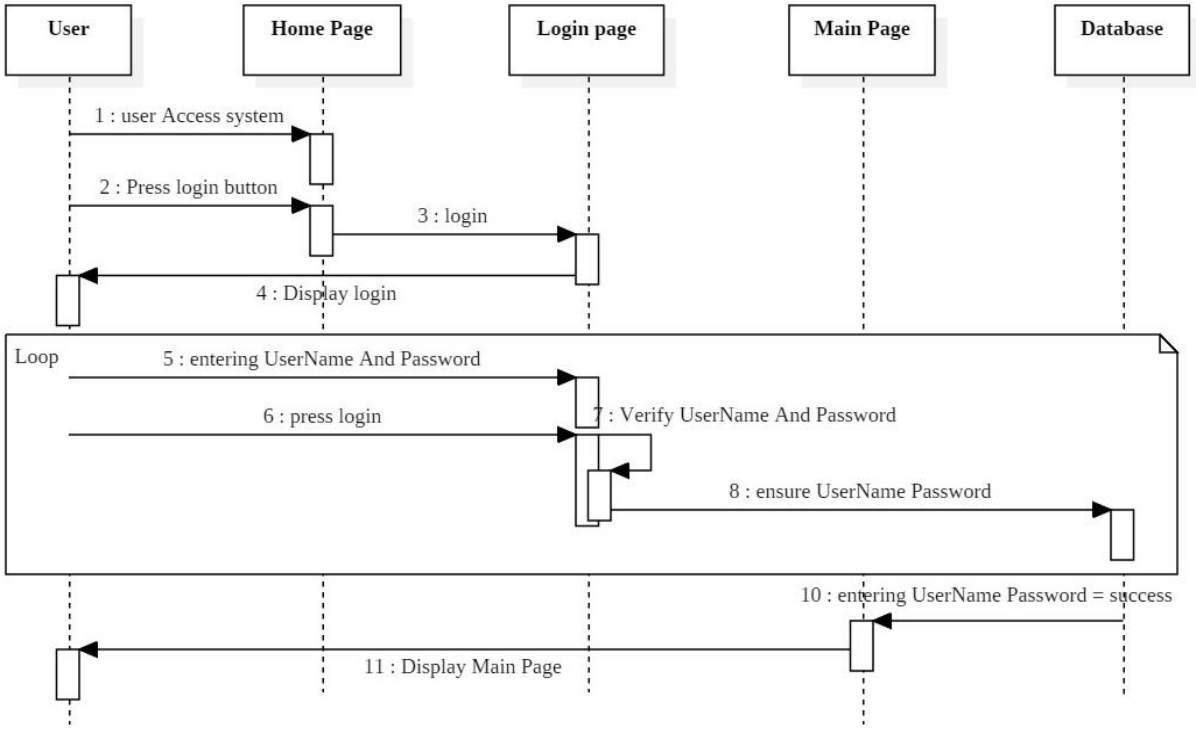


Figure 3.3: Sequence Diagram Login process

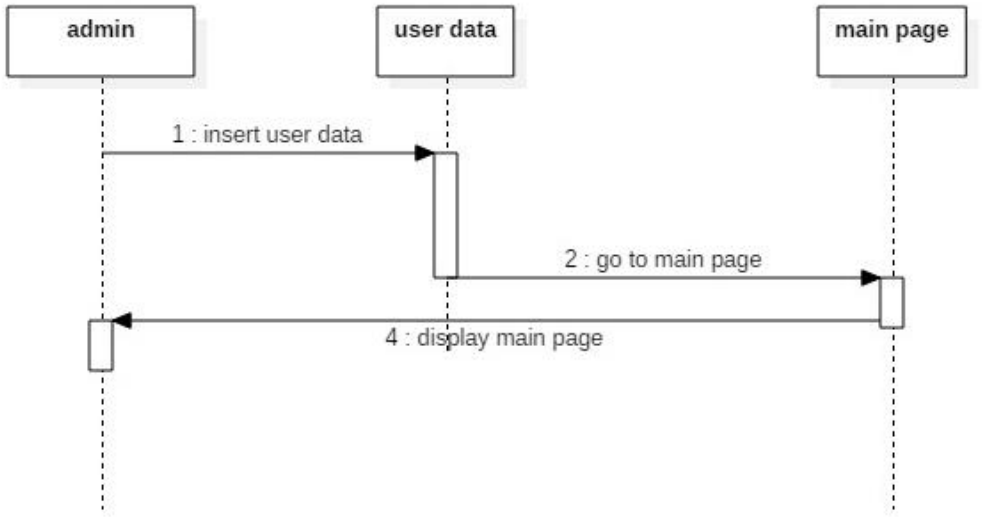


Figure 3.4: Sequence Diagram admin Input Data

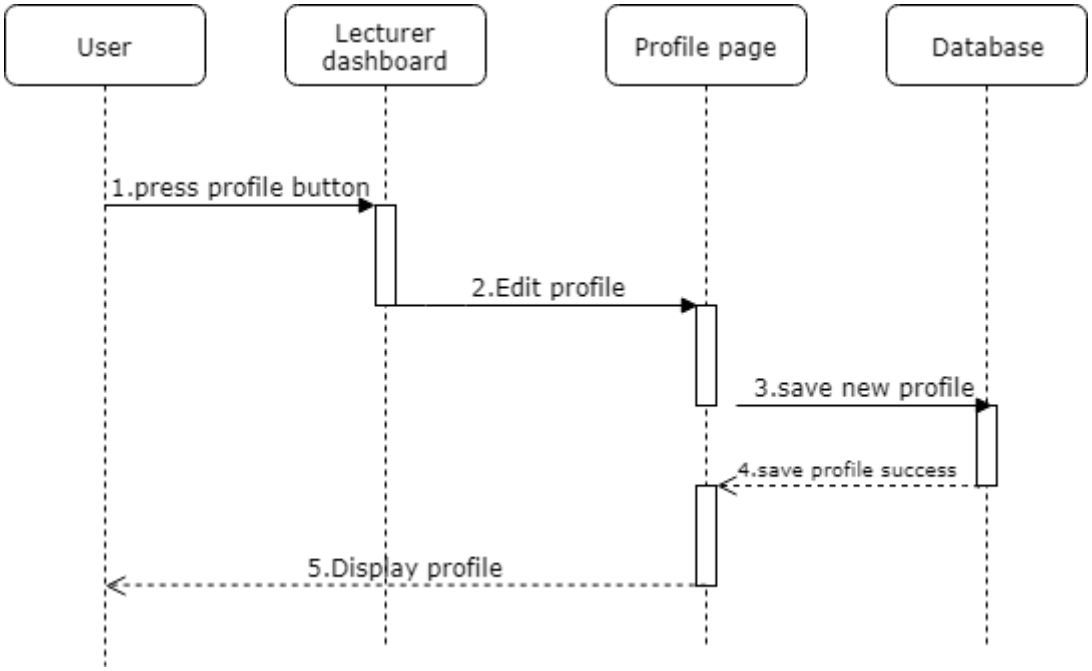


Figure 3.4: Sequence Diagram user edit profile

In sequence diagram above, the user will have to login first before the application can display the main page and they can assess the assess form. For the first time login, user need to request to the admin for register to them. Then, the user can login with user ID and password. User can choose to use any available function from the main page of the application.

3.3 DELOPMENT

In this phase, the application is coded. Coding for different module of the same prototype can be proceed in parallel. Throughout the system development, there is a tool that has been used to assist the process involved in the development of the project. The tool required is Visual Studio Code, where it is a source-code editor developed by Microsoft for Windows, Linux and macOS. This software is used to design the interface of the system and program the module of the system.

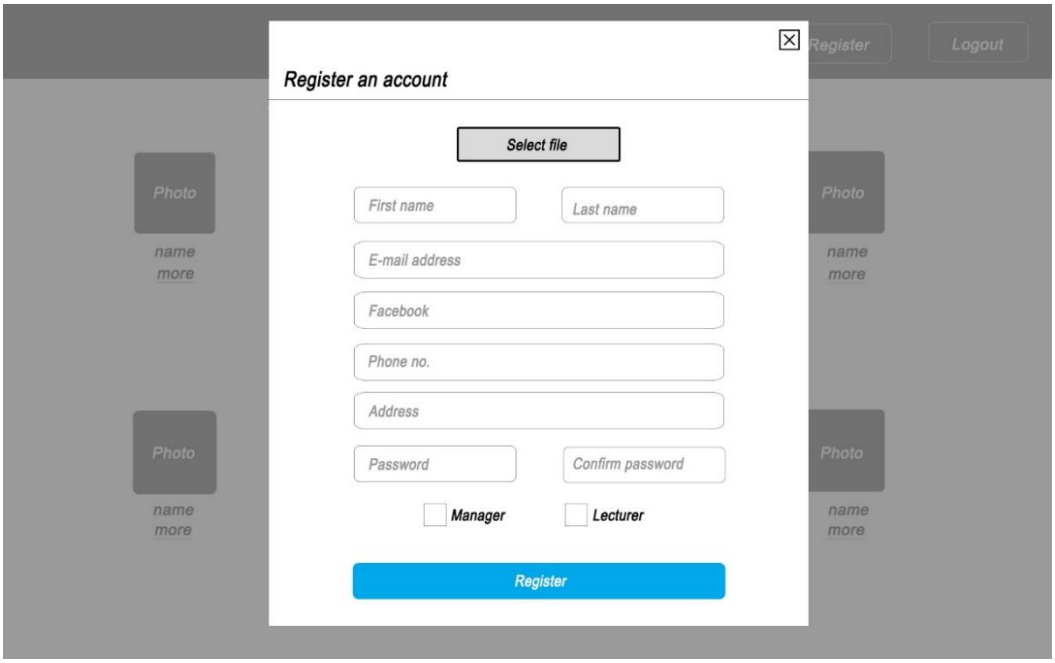
Besides, to develop this system, there is hardware and software requirements that need to be specify as listed below:

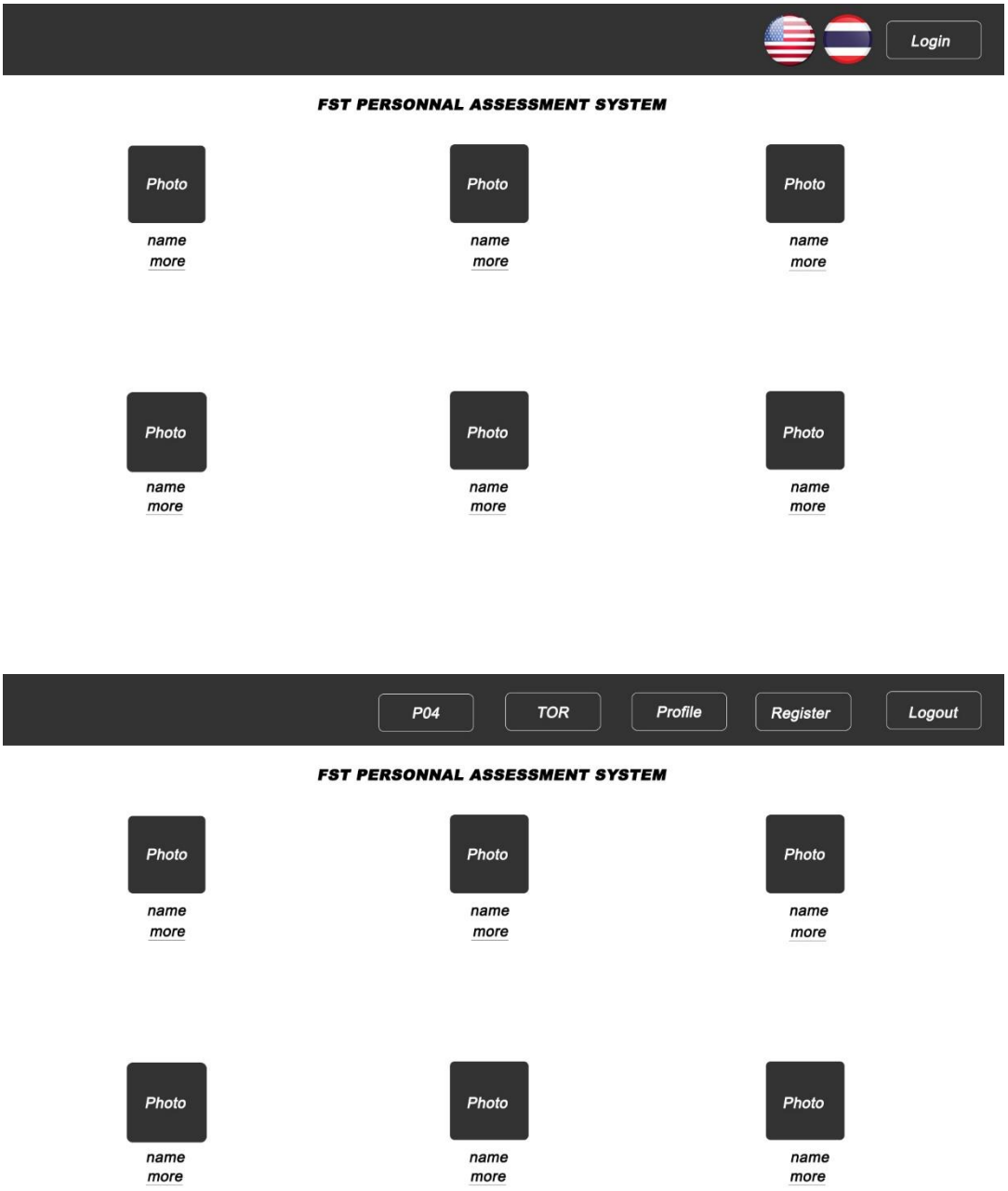
i. Hardware requirement
    a. Operating system windows 10 64-bit.
    b. Processor core i5.
    c. RAM 4GB.
    d. Storage space at least 40GB.

ii. Software requirement
    a. Visual studio code: to develop system with version Android Lollipop and above.
    b. Java JDK 6.
    c. XAMPP 1.7.3 for PHP and MySQL function.
    d. SQLite: for application database.

3.4 PROTOTYPING

In this phase, the functional requirements of each prototype are analysed. Developer creates and tests the prototype. After feedback is received from the potential user, the required changes are implemented through the development. The work done in this prototyping phase is documented and then forwarded to the testing phase. The tool required in this process is same as in development process. The prototype of each page of the Android application shows below:


Register
Logout
Register an account
Select file
First name
Last name
E-mail address
Facebook
Phone no.
Address
Password
Confirm password
Manager
Lecturer
Register
Photo
name
more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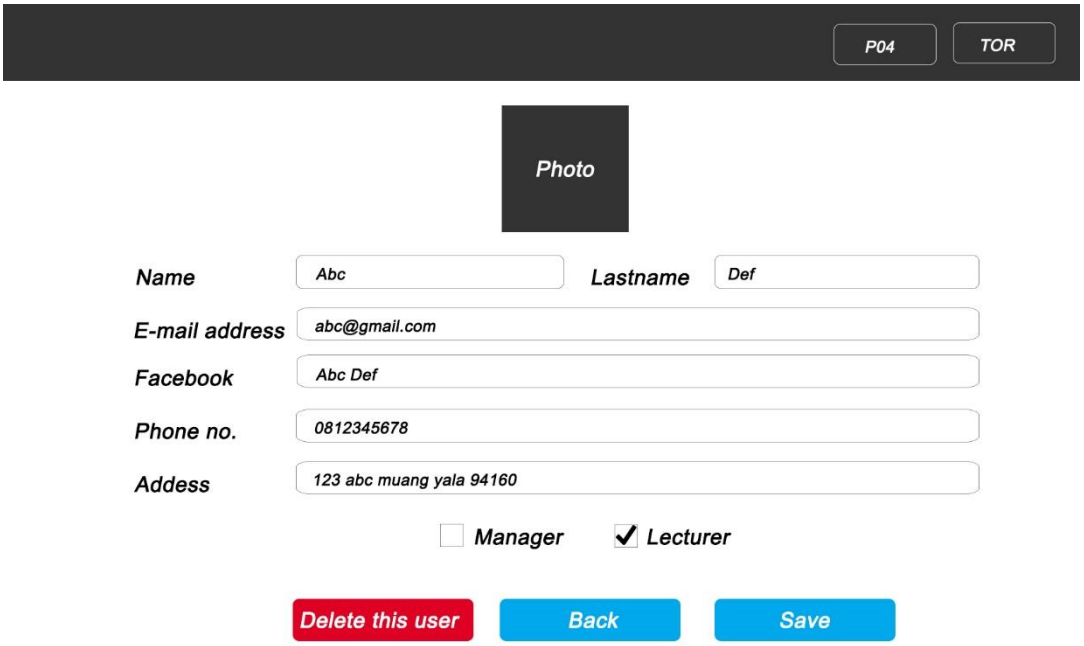
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Facebook
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Addess
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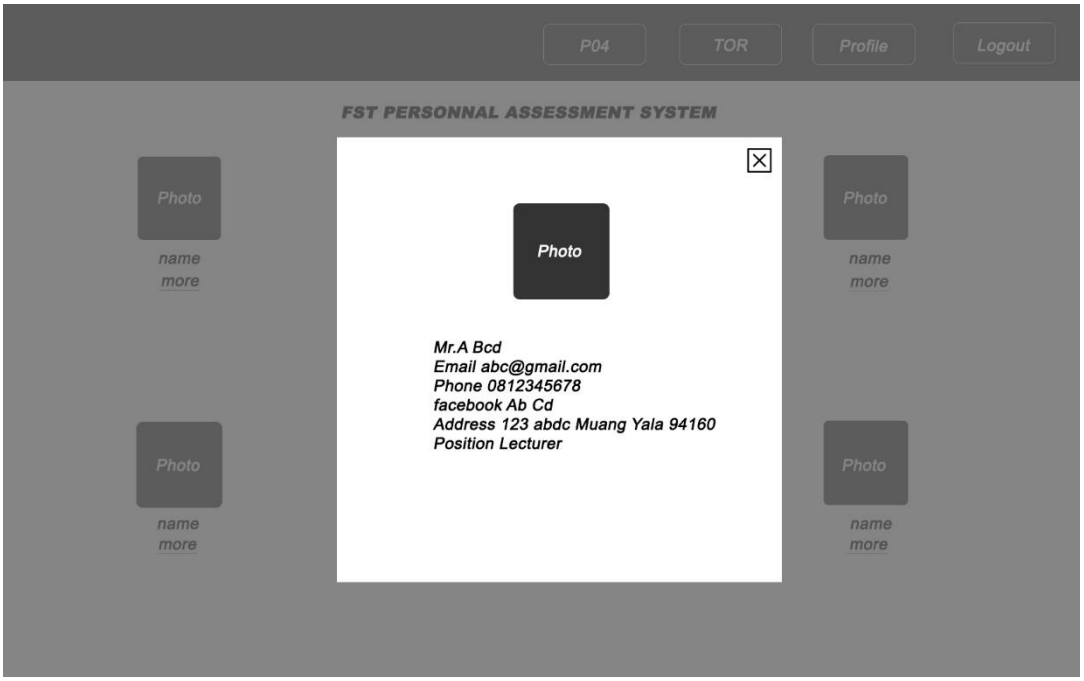
Manager
Lecturer
Delete this user
Back
Save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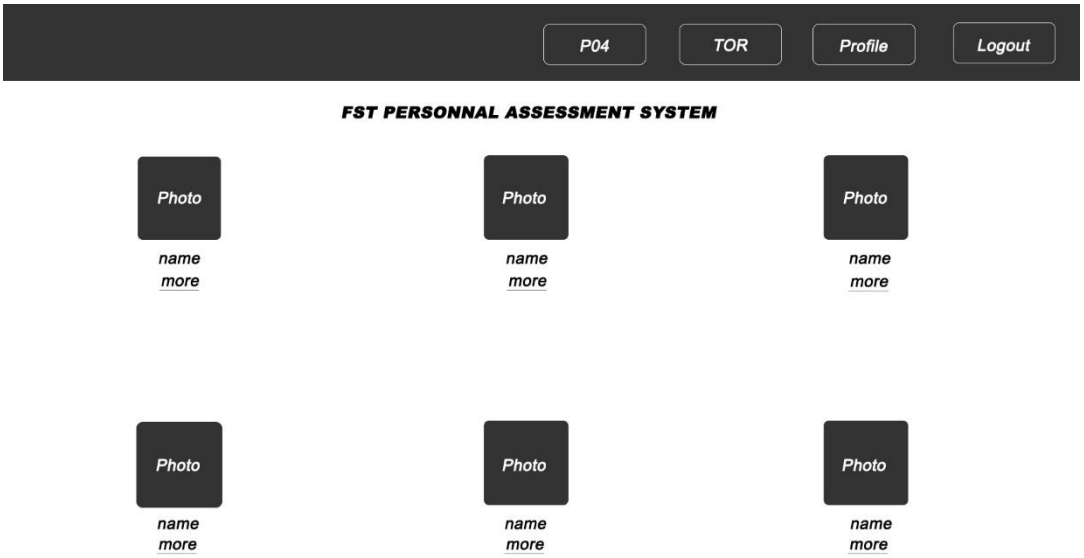
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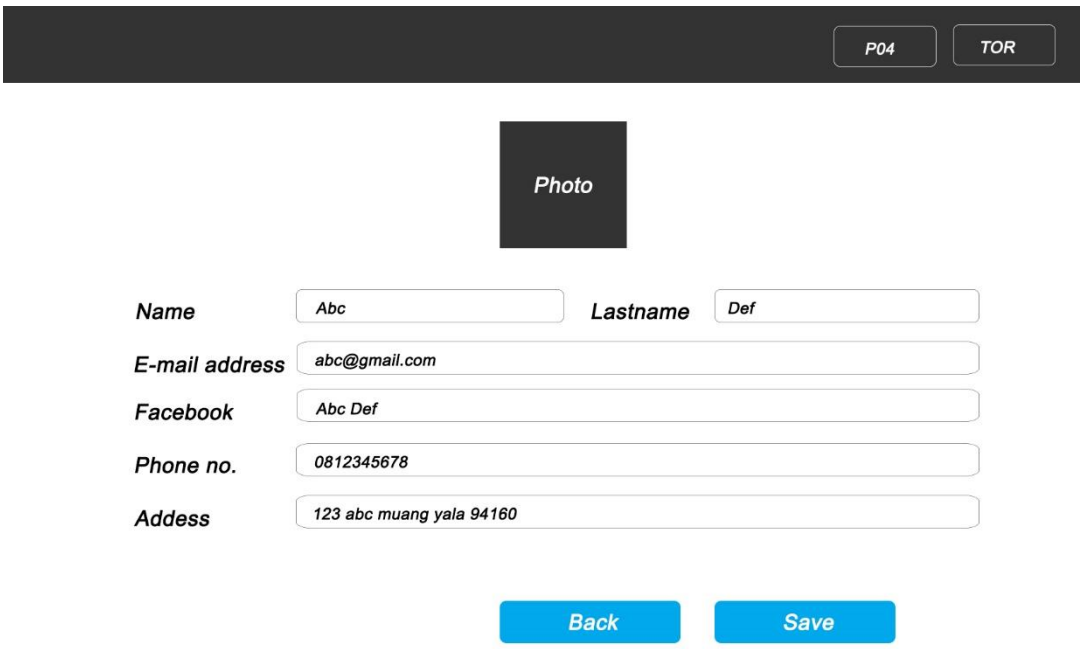
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abc@gmail.com
Facebook
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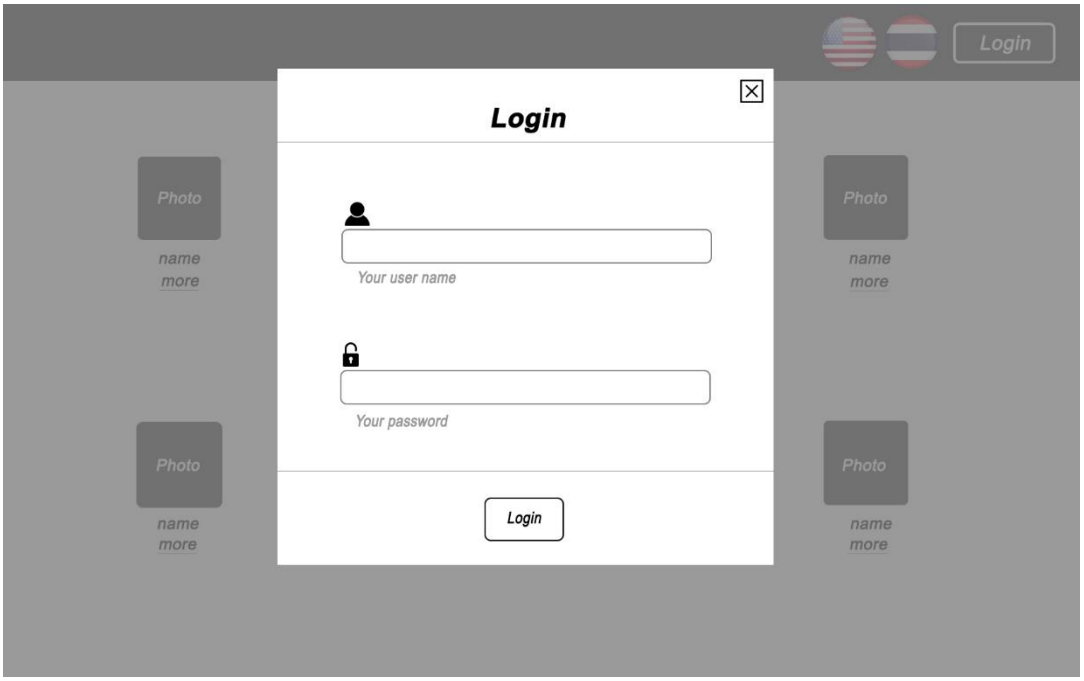
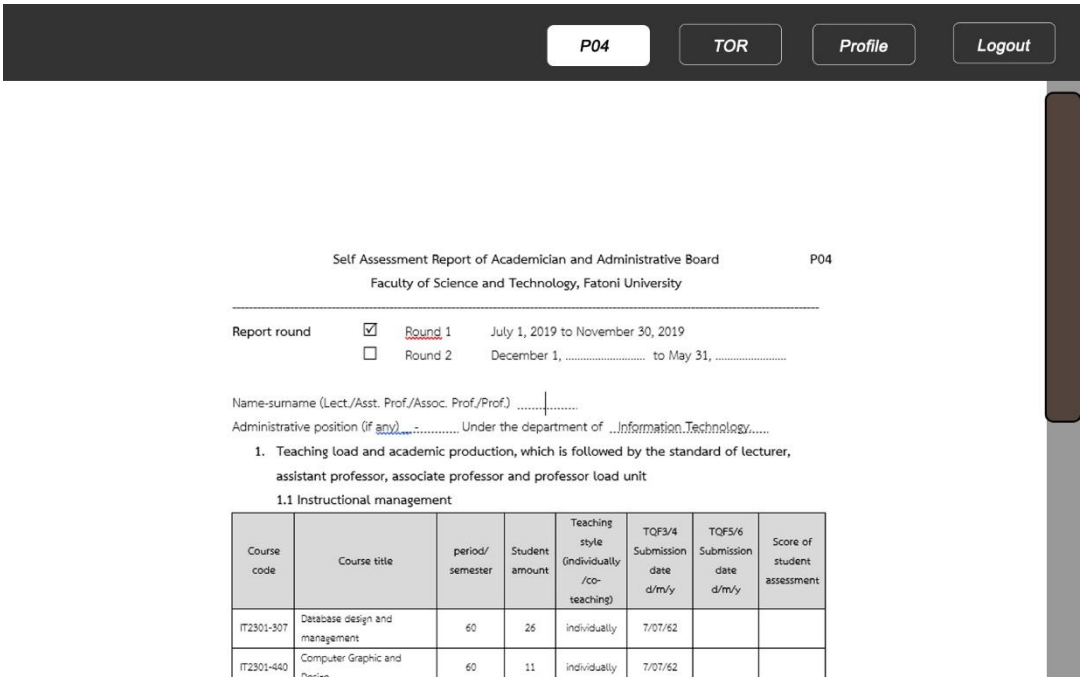
123 abc muang yala 94160
Back
Save





Self Assessment Report of Academician and Administrative Board P04
Faculty of Science and Technology, Fatoni University

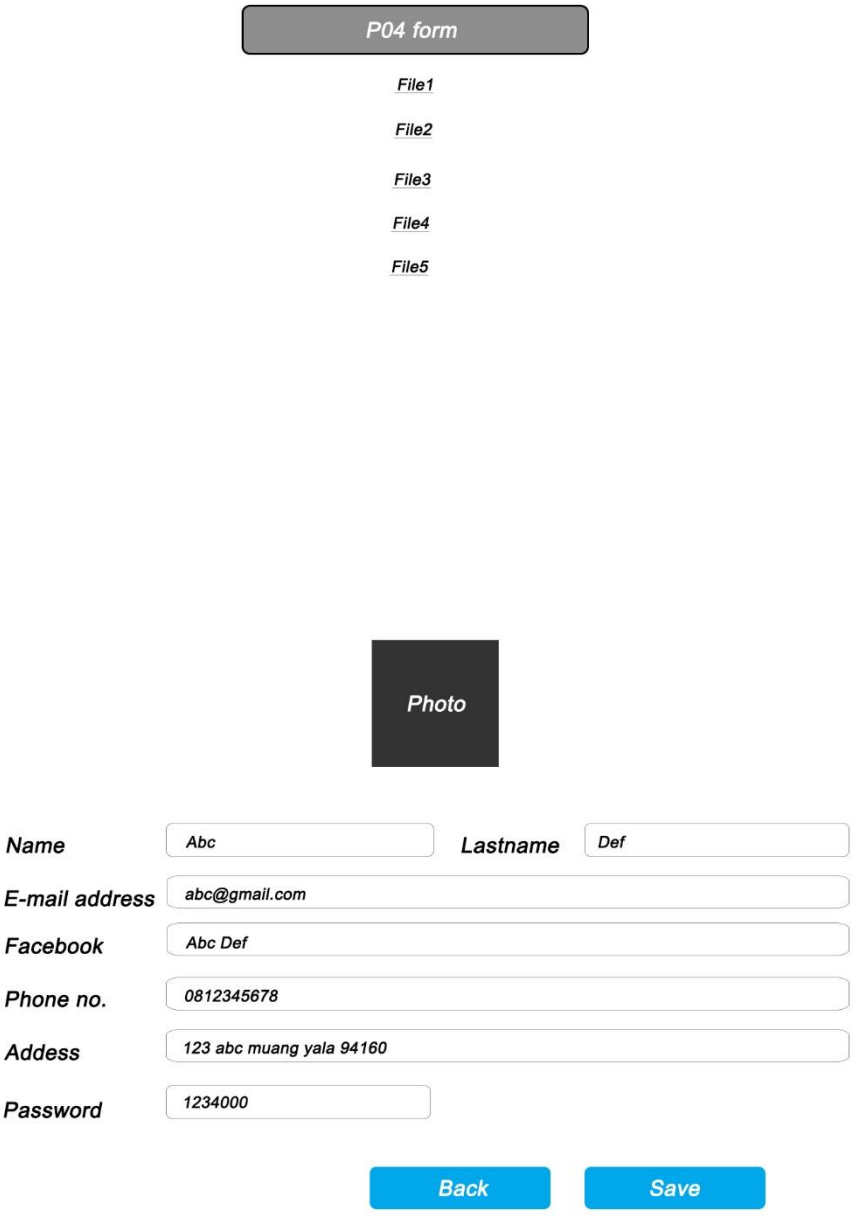
Report round ☑ Round 1 July 1, 2019 to November 30, 2019
☐ Round 2 December 1, ... to May 31, ...

Name-surname (Lect./Asst. Prof./Assoc. Prof./Prof.) .....
Administrative position (if any) ..... Under the department of ..Information Technology.....

1. **Teaching load and academic production, which is followed by the standard of lecturer, assistant professor, associate professor and professor load unit**

1.1 Instructional management

Course code	Course title	period/ semester	Student amount	Teaching style (individually /co-teaching)	TQF3/4 Submission date d/m/y	TQF5/6 Submission date d/m/y	Score of student assessment
IT2301-307	Database design and management	60	26	individually	7/07/62		
IT2301-440	Computer Graphic and	60	11	individually	7/07/62		


P04 form
File1
File2
File3
File4
File5
Photo
Name
Abc
Lastname
Def
E-mail address
abc@gmail.com
Facebook
Abc Def
Phone no.
0812345678
Addess
123 abc muang yala 94160
Password
1234000
Back
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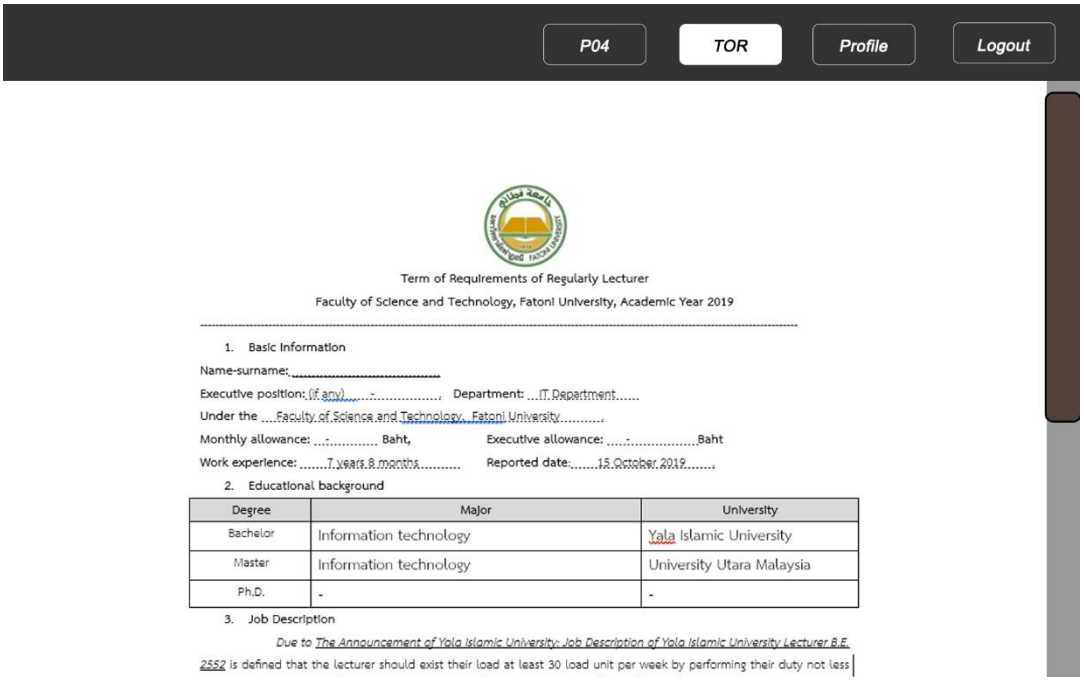

TOR form

File1

File2

File3

File4

File5

3.5 TESTING

Testing is one of the important phases of any development lifecycle model. The application is testing based on use-case diagram by using black-box testing method.

Black-box testing method is a fundamental aspect of testing system without peering into its internal structures of software. This method is used to determine whether the

software is functioning properly. Black-box testing method is a design method to test a data based on software specifications. The test data generated and executed on the software and then the output of the software is checked whether the expected result is successful

In this project, random users have been asking to test the application either each of the page is function or not. The application is tested during the competition of an innovation that has been conduction.

3.6 DEVELOPMENT

Deployment is the final phase of the development process. After the testing is completed and the final feedback is obtained, the application is ready for the deployment. The application is uploaded to the appropriate application store for user consumption.

3.7 MAINTENANCE

The maintenance is the final phase and it is a continuous process. Feedback is collected from users. If required, changes are made in the form of from bug fixes or any improvements.

4.0 CONCLUSION

Based on the description and discussion of the previous chapter, it can be concluded that this research resulted in personnel assessment Android application development that can display information and assess the personnel by using smartphones. information and assess displayed a more complete, consists of the assess form, commendation and summarize the assess result. The Android application can help users for easy to assess and give some comment. Besides, user will get a reminder from the application to assess when the time of assess coming. Hence, Mobile Application Development Life Cycle (MADLC) model can be

applied into the development process of personnel assessment application. This model efficiently helps developer to build an Android application.