INTERACTIVE UTAR WBLE PORTAL

BY

LEE CHUAN HOW

A REPORT

SUBMITTED TO

Universiti Tunku Abdul Rahman

in partial fulfillment of the requirements

for the degree of

BACHELOR OF INFORMATION SYSTEMS (HONS)

INFORMATION SYSTEMS ENGINEERING

Faculty of Information and Communication Technology
(Kampar Campus)

JAN 2019

UNIVERSITI TUNKU ABDUL RAHMAN

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<u>SELANGOR</u>   Supervisor's name

Date: <u>3 APRIL 2019</u>   **Date**: : <u>3 APRIL 2019</u>

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DECLARATION OF ORIGINALITY

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Date   :   3 April 2019

ACKNOWLEDGEMENTS

I would like to express my sincere thanks and appreciation to my supervisors, Mr. Soong Hoong Cheng who has given a lot of suggestion and recommendation regarding the project. A million thanks to you.

Finally, I must say thanks to my parents and my family for their love, support and continuous encouragement throughout the course.

Abstract

An Electronic Document Management System (EDMS) was developed called Interactive UTAR Wble Portal. This is an extension system from official web-based learning platform called Web-Based Learning Environment (WBLE). This system is adopted by mobile platform, Android, in order to provide the ease of document access. The motivation of this project is to overcome the problem of students who is unable to manage their study especially during peak semester. Therefore, mobile platform is the way to provide the accessibility. Furthermore, the features of this system were emphasized on the modification on PDF files and files reading history. This system provides the ability of PDF file modification to students, students are able to add some notes on the files but not editing original file content. To perform the function, custom PDF viewer is adopted to handle the file process. Next, to handle the user history, a famous cloud database was adopted to this system. The cloud database named Firebase, managed by Google. The type of database used in this project is Cloud Firestore, it supports fast querying than SQL due to the database structure is much different and SQL, also Cloud Firestore is a non-SQL database. Therefore, new data structure of storing user data is designed and developed in order to become compatible to the database.

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LIST OF ABBREVIATIONS

UTAR   Universiti Tunku Abdul Rahman

LMS   Learning Management System

EDMS   Electronic Document Management System

PDF   Portable Document Format

CPU   Central Processing Unit

GHz   Gigahertz

RAM   Random Access Memory

GB   Gigabyte

CHAPTER 1 INTRODUCTION

1.1 Problem Statement

There are five existing Learning Management System evaluated in this project. Those systems are Moodle, Canvas, Blackboard, Agylia and Khan Academy. Some problems were found during the evaluation and listed at below:

i) Lack of learnability

Some of the systems are not defined clearly what user can and/or should do. For example the login page, systems require user to key in the "site" rather than registered account in order to log in. Other than that, user needs to self-explore to learn to use the system, or requires a demo lesson from the official website.

ii) Closed

Some of the systems required user to login first in order to start to use, after that students need to key in course key that's secretly share from teacher only then allows students to join the course.

iii) Lack of management capability

One of the systems does not provide a function that allow user to categorize their downloaded file in courses. All files are stored according to the default folder.

1.2 Background

Nowadays each student from UTAR must be faced some tight schedules in their university life. In daytime, they need to attend a lot of classes from morning to 6p.m. and resulting in they only have some free time to finish their assignment at night. It leads to students have to spend extra time for preparing their midterm test.

In this era, a system called electronic document management system (EDMS) was developed to organize their store papers, or digital documents (techopedia, n.d.). Nowadays this system usually implemented by companies for their documents. However, this comes out an opportunity for the use case of EDMS to solve the above problem. EDMS does has a potential to provides ease of file access to students, therefore students can optimize the gaps between their classes to have a read on their

documents. This may benefit the students to decrease the effort of paper printing, money saving, chance of paper lost, and so on.

This project is aim to develop an extension of WBLE which is EDMS and it is developed especially for UTAR students in mobile application platform. This platform allows students access the study material easily and motivate them use it frequently.

1.3 Motivation

The motivation of this topic is to solve the problem of UTAR's students that is unable to manage their study. The outcome of this project is creating a mobile document management application in Android platform. Through this project, the desired outcome would be an EDMS are developed for students, students are able to study their subject at any time through the application. This application not only provide the ease of document access, and also substitute the paper printed for each week. According to similar systems, this system created especially for UTAR students which means students can easily download the study materials via application rather than access website to download the documents and open it with another 3rd party document viewer.

1.4 Objectives

- To increase the number of channels used by students to study their subject.
- To develop an Android application that enables students to study their subject and modify the study materials via the application that substitute the way that students take notes on the physical paper.
- To increase the durability of documents via the system used by students to back up their electronic study materials at the end of semester rather than storing the physical paper.

1.5 Proposed Approach
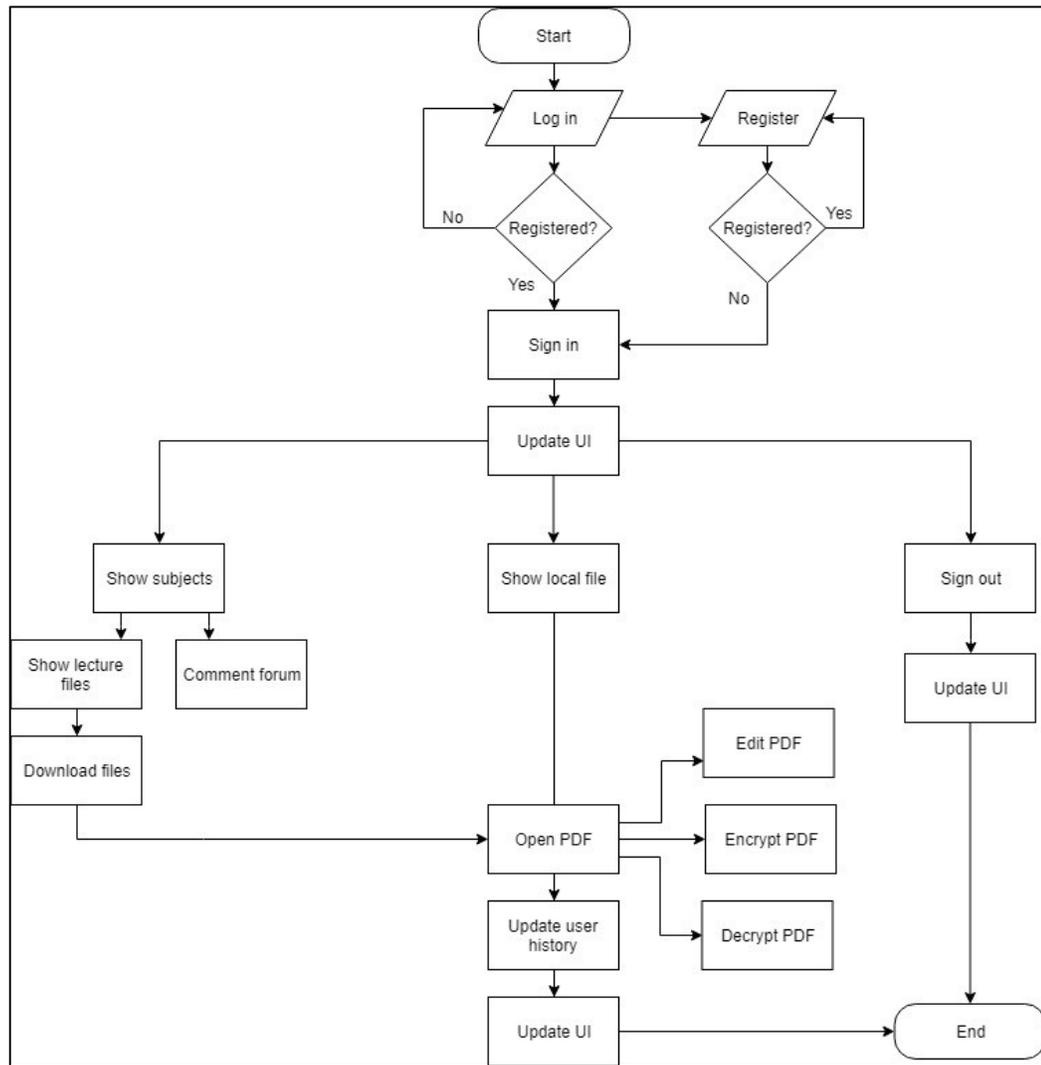
Figure 1.5-1 System flowchart

Figure 1-5-1 shows the flowchart of Interactive Utar Wble Portal. User need to log in with their UTAR email address first in order to prevent anonymous user from outside the UTAR. First time user may use their email to register. After the registration done, system will direct user to main page. User interface will update based on the user information such as username and profile picture. User may access the file through home page or file manager page. All subjects will be listed at home page, and user may click the subject for get the list of lecture slides at new pages. At the same time, user may post some message at the subject forum that created for each subject. User is able to download lecture slides from internet when the files is not existing at local storage.

After that, user may open the downloaded files through pressing the layout with the file name. User are able to do three major things with the opening PDF files such as edit, encrypt and decrypt. Once user closes the PDF, system will update the PDF file usage as user history to local and cloud database. User can sign out their account when clicked the sign out button.

1.6 Achieved highlighted task

Highlighted task had been achieved in this development is able to make a modification on PDF file such as add notes on selected page from a PDF file. Due to the original method of editing an PDF file began with read the metadata, raw text and format from a PDF file and compile and display the document format, then system will follow the user modification to update the current view and PDF format data simultaneously. According to user is not necessary to edit the lecture slide entirely, therefore an alternative way for user to modify the PDF files is restrict to add texts and overlay it on the page.

CHAPTER 2 LITERATURE REVIEW

2.1 E-learning System

E-learning is form by two words that is electronic (E) and learning. E-learning means learning conducted via electronic media, usually though online. Normally people think that e-learning is slide-based online lesson that contains simple navigation element such as buttons for next or previous pages (Heroes, n.d.). (Harandi, 2015), studied about the impact of e-learning that influences the motivation of students, the result of the study proved there was a e-learning does impact obviously to the motivation of students. Students are more willing to use e-learning in their study. It would be a reason to use e-learning as a teaching materials for university students

2.2 Learning Management System (LMS)

LMS is a mostly cloud-based software that manage, deliver and measure an organization's learning programs (Docebo, 2017). (C & Patil, 2012), studied about the impact of LMS on students of University College and how LMS act as an important role in the university that effects the academic performance of the students. They conducted a survey questionnaire for students from academic year 2008-09, 2009-10 and 2010-11. The result of questionnaire shown that the 91% of students from 2010 either agreed or strongly agreed having improved after they tried and used LMS properly

2.3 Electronic Document Management System (EDMS)

The meaning of Document Management System is a software that allows user to store and manage their documents in electronic devices (axero, n.d.). EDMS allows centralizing the large volume of data storage and efficient document retrieval (Technopedia, n.d.). (Kelemen & Mekovec, 2007), a case study about the process and result of implementation of DMS in Varazdin County. After the two years of implementation, the results shows DMS has stimulated the performance of internal communication such as case and act creation, control and retrieval processes..

2.4 Portable Document Format (PDF)

PDF is a file format act as exchange documents. It is dependent of software, hardware, or operating system (Adobe, n.d.). Moreover, PDF file is most commonly used file types, it is great for documents with text, forms, images that contain words. Certain program make the documents able to search and edit the characters (ILM, 2015).

The goal of PDF was to allow anyone to download and display it at majority of electronic machine (Adobe, n.d.). The role of PDF act in this project is able to convert some useful learning material into digital format and able to manage in EDMS.

2.5 Collaboration Tools

Padlet is one of the example of collaboration tools that suitable for students to manage their learning skills. Padlet is a software that enable user to create and shares content with others. The one feature of Padlet is collaborative, it allows user to invite others to work together on shared project or assignment. Another important feature of Padlet is portable, which is mobile application available. Students able to manage their learning content in this platform with clearer view due to Padlet has capability to contain multiple types of file such as audio, video, hyperlink, documents and so on (Padlet, 2017).

2.6 Types of Media

There are several types of media that potentially use in this project is text, image, video and audio.

Text plays an important role on everywhere, it can simply change the reader's mind by using different by of typograph. "Typography matters because it helps keep the reader's attention on your content. Good typography allows them to focus on the message instead of focusing on the mechanics of reading." (AdPushUp, 2013). Furthermore, (Zee, n.d.) studied the use of different fonts, he found that using a legible font may contribute to the extent in which websites are able to convince and seduce visitors to take action.

2.7 Image

There are 90% of the information that human brain gets is visual (Lloyd, 2014). (Bullas, 2014) said that, In an online store, up to 63% of customer said that the quality of image that shows the product is more significant than product-specific information, 54% of customers said that image is more significant than a long description, and 53% said that the image is more significant than ratings and reviews (53%).

2.8 Video

Video has the potential for education and training particularly in the context of e-learning (McIntosh, 2013). He studied about video in training and education. In conclusion, he pointed out some advantages and disadvantages of video in training and

education such as one of the advantages is the most useful method to distribution the knowledge by using video recordings. In the other hand, some of disadvantages are unlike content only consist of text, the pace speed is difficult to control and also difficult to take note during playing the video and unable to use search engine to find the content.

2.9 Audio

Audio, one of the important element used in education. In computers, audio is the sound system that able to transfer between other computers. An audio file is a captured sound that able to play in electronic device and able to rewind (TechTarget, n.d.). In education, people are not only use audio only, they get used to present visual with audio (Audio Visual). (Rasul, et al., 2011), studied about result of using audio visual aids in their teaching method in university. They conducted survey questionnaire to students and teachers. The result of survey shows majority of students and teachers agreed that use of Audio Visual aids has significant improved in teaching method.

2.10 Cloud Firestore

A brand news structure of database than SQL database. This is a cloud database from Firebase. It supports array and object storing. And also, it does generate unique id for each data in the database. The structure of Cloud Firestore is collection and document. Data was managed in documents and documents was managed in collections. Last, document may contain nested data or store subcollections (Firebase Google, n.d.).

2.11 Features comparison between several systems

Systems / Features	Moodle	Agylia	Blackboard	Canvas	Khan Academy
Customizable	✓		✓	✓	
Free	✓				✓
Video/ Audio player		✓		✓	✓
Without enrolment key	✓	✓	✓		✓
Forum among course	✓		✓	✓	✓

Table 2.11-1 Comparison between systems

i) Customizable

Allows user (teacher) to customize their site's layout.

ii) Free

The system is free for teachers to setup their own courses.

iii) Video/Audio player

The system is able to play video or audio file instantly.

iv) Without enrolment key

Students may register some courses without enrolment key or without course registration.

v) Forum among course

The system contains discussion forum function among single course.
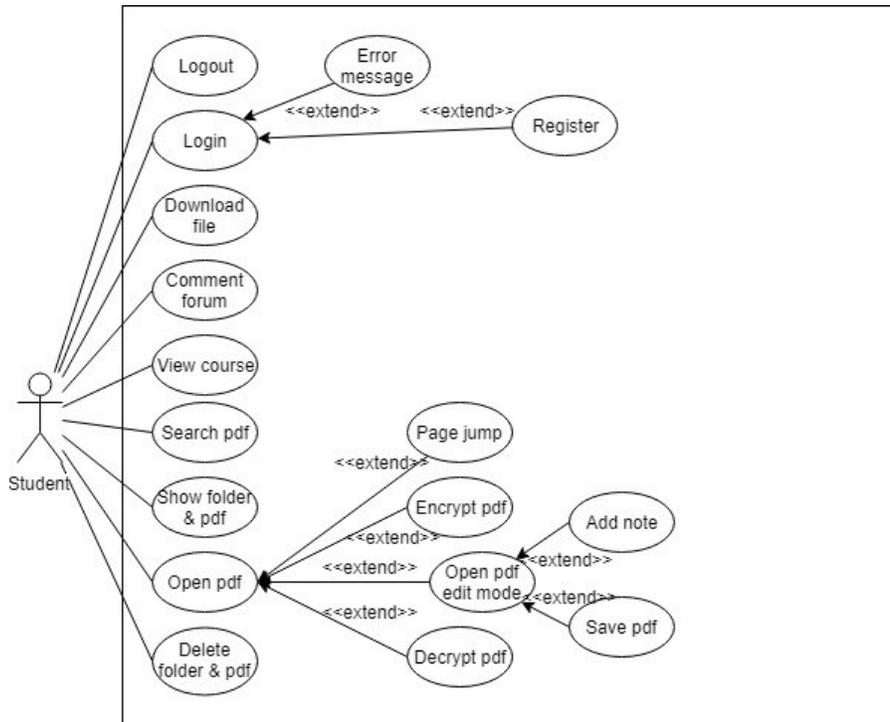
CHAPTER 3 SYSTEM DESIGN

3.1 Use Case Diagram

Figure 3.1-1 Use Case Diagram

Figure 3-1-1 shows the use case of Interactive Utar Wble Portal. The functionality of this system will be explained at the following part (3.2 Activity Diagram).
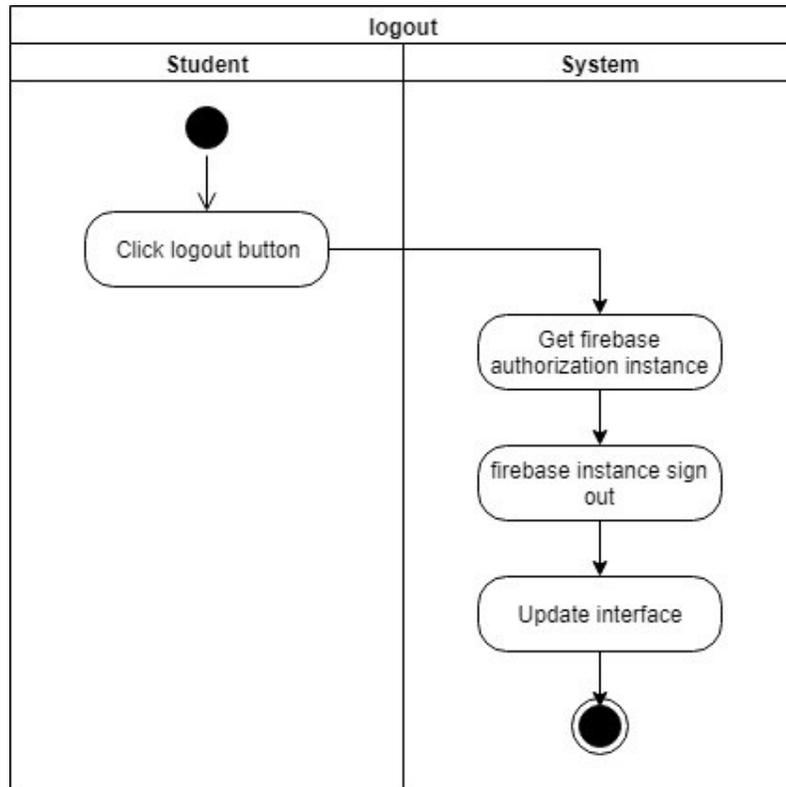
3.2 Activity Diagram

Logout

Figure 3.2-1 Logout

Figure 3-2-1 shows the logout function of the application. In order to perform logout function, system need to get the current user authorization first, after that, sign-out method is called from that user authorization variable. Once the sign-out method executes successful, user interface will be updated by removing the sign-outed user information such as user email and profile picture.
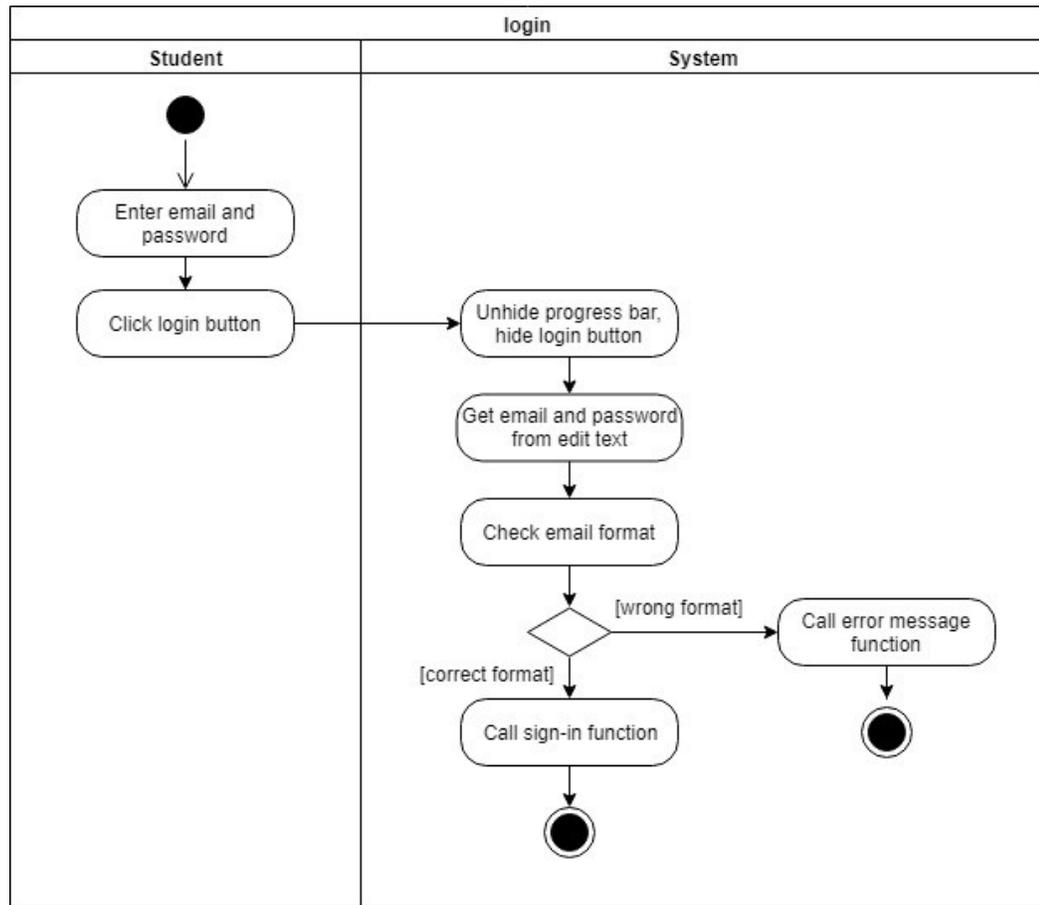
Login

Figure 3.2-2 Login

Figure 3-2-2 shows the login function of the system. Whenever the user clicks the button after filled up the required information, system will show the progress bar and hide the login button in order to inform the user the process is beginning. Next, system will get the texts from input text box for further processing, for instance, make sure both texts are not empty. If one of the text boxes is empty, a notification will be prompted to user, else login method will be going to execute. The sign in verification is handled by cloud database called Firebase.
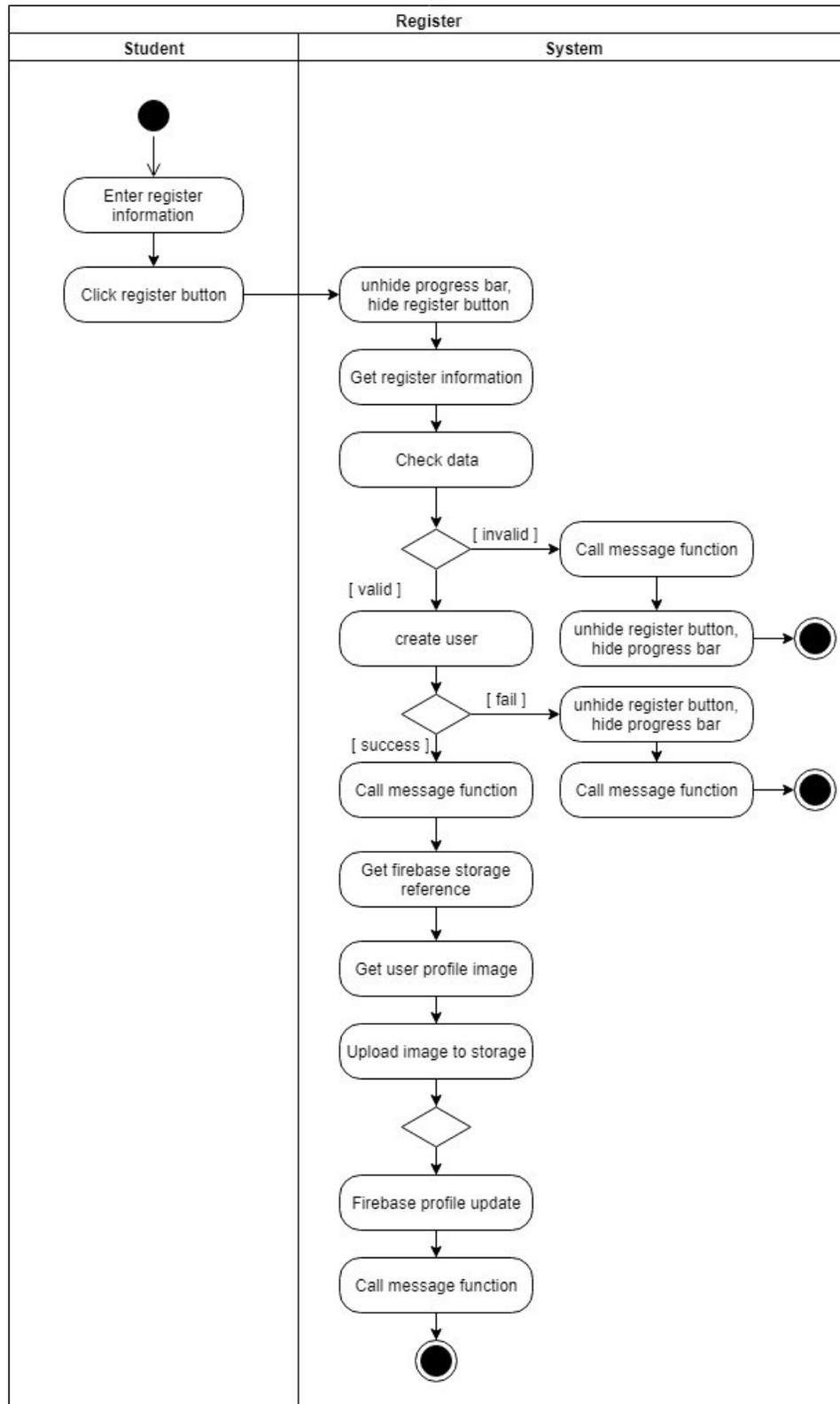
Register

Figure 3.2-3 Register

Figure 3-2-3 shows the register function of the application. When the user clicked the button after filled up the required information, system will update the UI in order to inform user the process is start. System will get the data from text boxes and validate those data. Whenever the data is not valid such as empty field found or password not tally with second password, system will prompt message to user. Else, the registration will be started. In this phase, the verification is handled by Firebase. When the email format is correct, Firebase will store the user info, else, an error message will be returned to system and prompt to user. Last, after the Firebase stored the user info, user profile picture will be uploaded to Firebase and save at cloud storage. A success message is returned to user once the whole process is executed successfully.

Error Message

Figure 3.2-4 Error Message
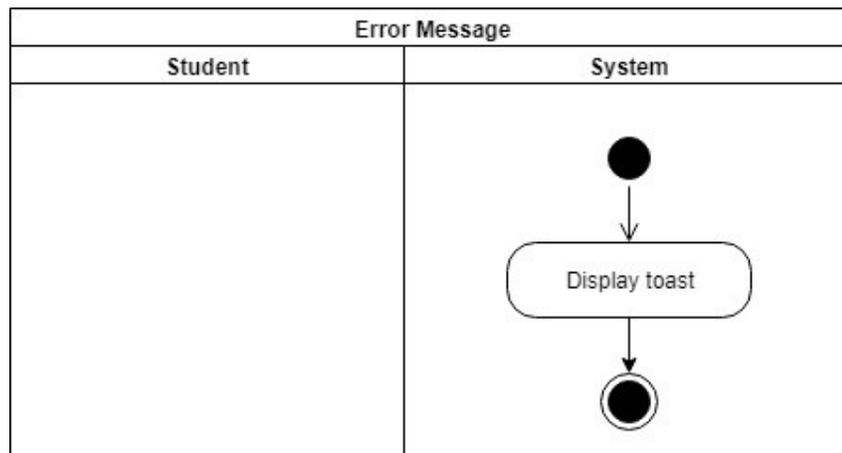
Figure 3-2-4 shows the method of displaying error message. At the beginning of the method, a string variable that contains exception message was pass into this method. After that, a toast will be prompted to user about the occurred error. The purpose of this method is to simplify the way of prompting message, else developer needs to memorize the value and parameter required for toast function.
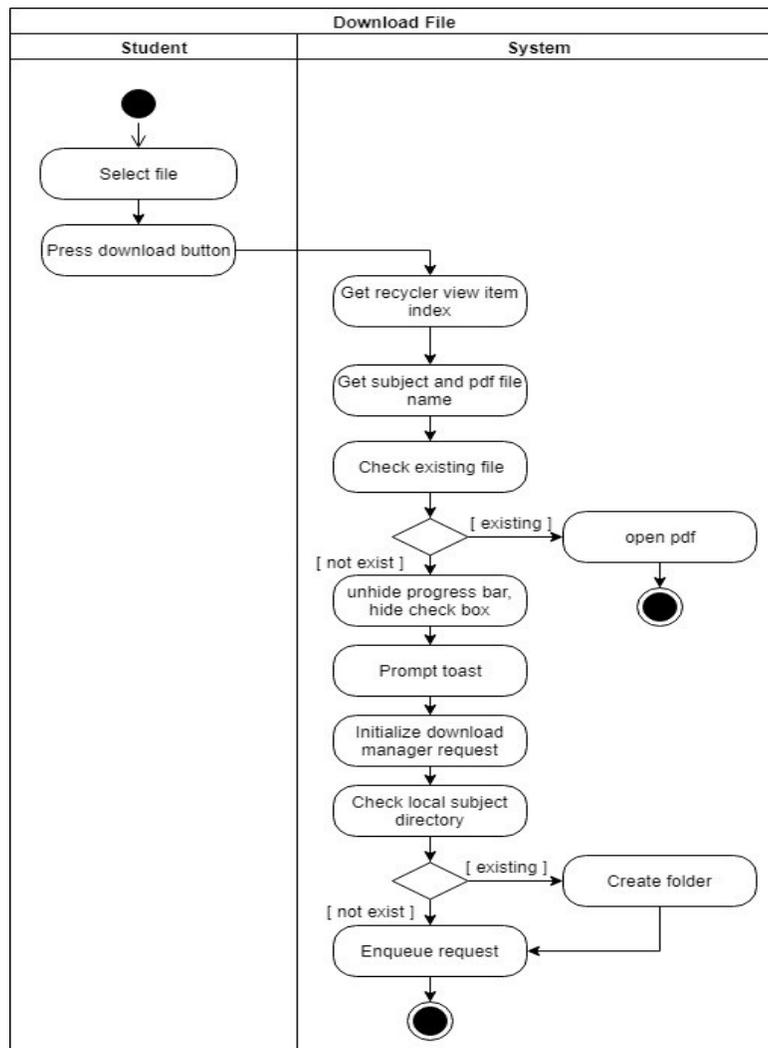
Download file

Figure 3.2-5 Download File

Figure 3-2-5 shows the download file function. This function is attached to each lecture file layout that showed in the list (recycler view). When this function is triggered, system will get the index of what item was been clicked in the list. After that, the index was used to query the file name from array list. File name is required in order to determine the file isn't existing in local storage. System will open the file if the file is found at local storage, else part of UI elements will be updated for informing user about process is started. A download manager request is initialized by system and determine the existence of subject folder that will store the download file. Lastly, system will create the subject folder if that is not found in local storage, and download request will be enqueued after that.
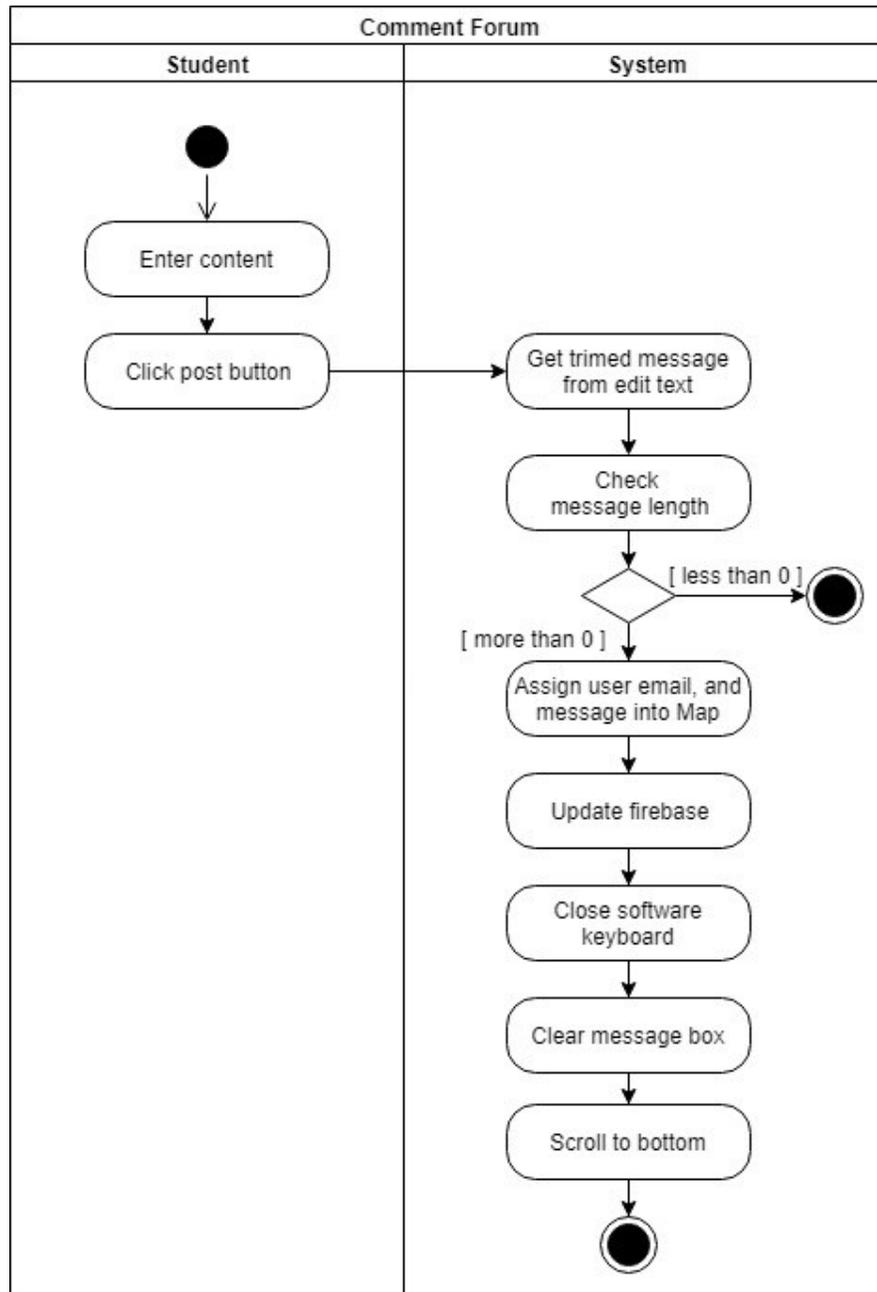
Comment Forum

Figure 3.2-6 Comment Forum

Figure 3-2-6 shows the comment function of the application. System retrieve the message from text box and execute a verification. If the text is not empty, a map (key-value pair) will be created with user info and message. After that, the map will be uploaded to Firebase and the UI will be initialized.

View Course
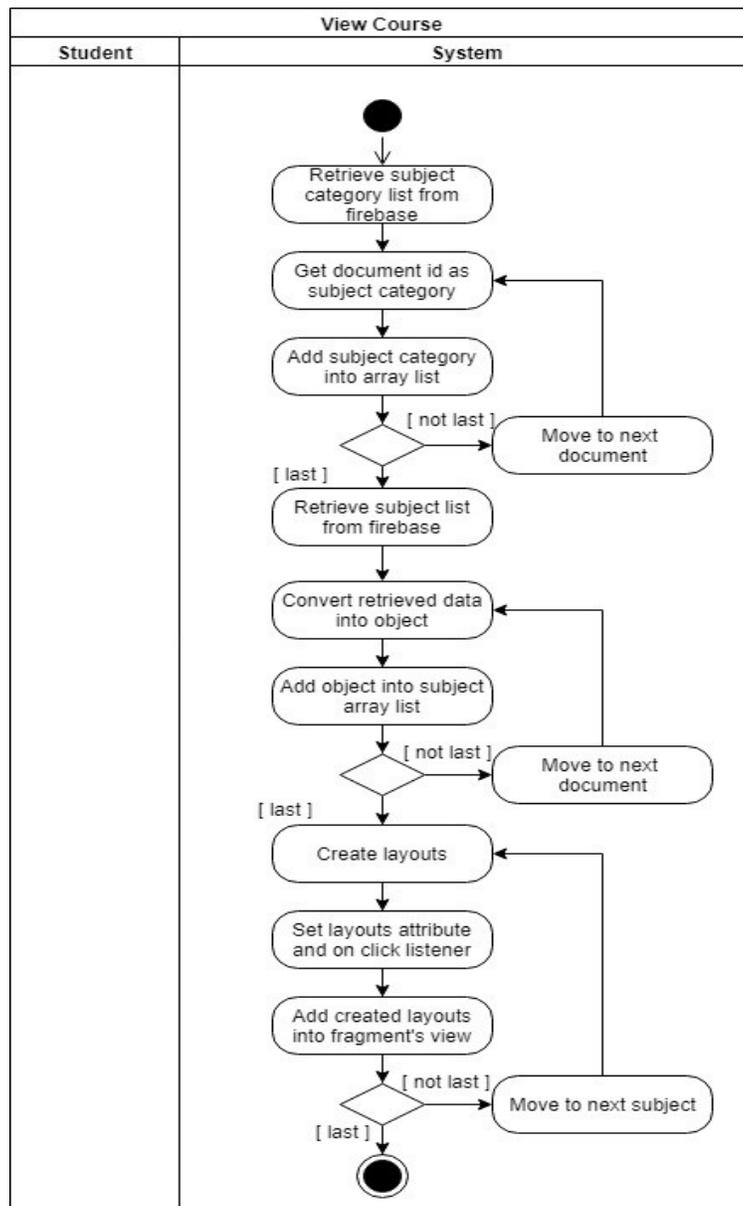
Figure 3.2-7 View Course

Figure 3-2-7 shows the view course function. This function will be triggered when home page viewed. At the beginning, system will retrieve the category list from Firebase, after that, system also query the subject list in order to categorize those retrieved subject. When the category and subject list is retrieved finished, system will start to setup the layout according to retrieved data. During the setup, the subject layout will be attached with an event listener. The listener function is direct user to a page that contains list of lecture slide of the selected subject.

16
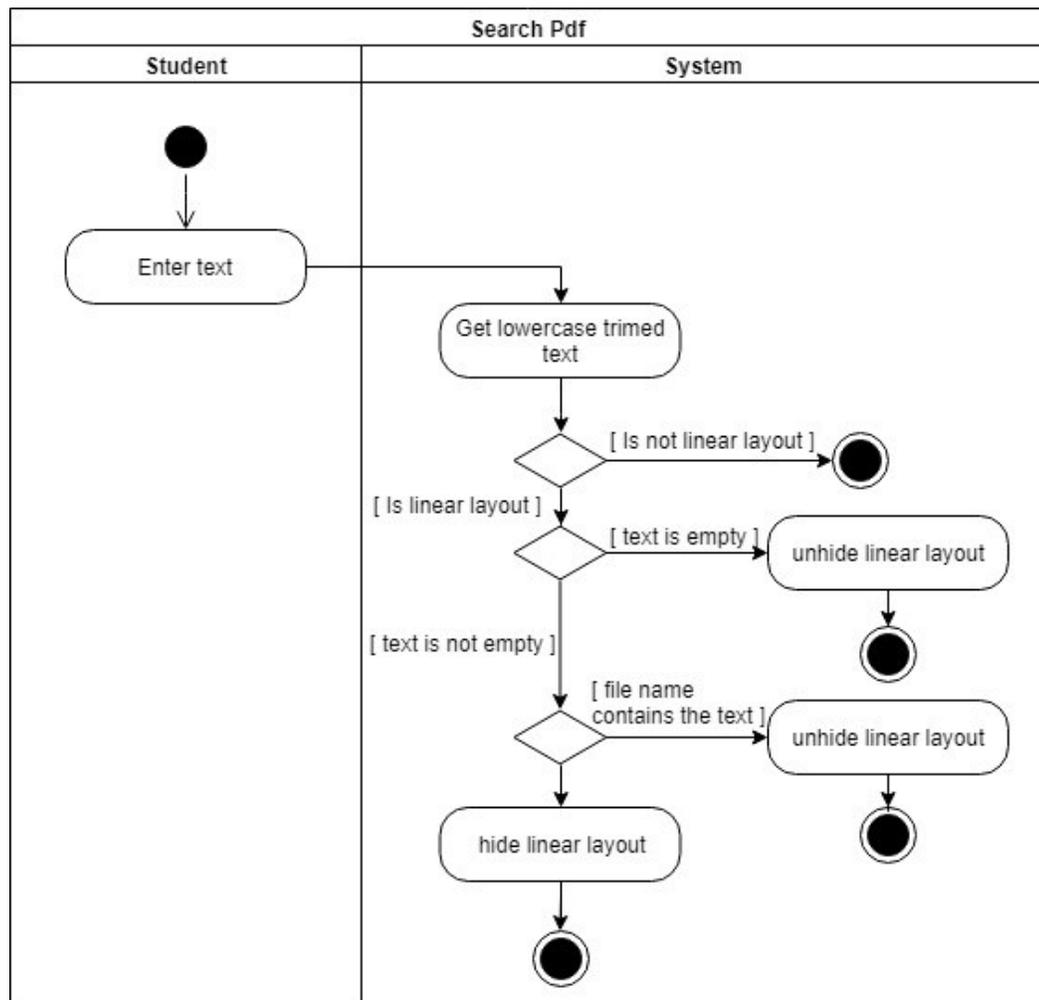
Search Pdf

Figure 3.2-8 Search Pdf

Figure 3-2-8 shows the filter function for pdf file. User may enter some texts at text box that either located at the top of file layout or located at file manager layout. At the beginning, system will get the trim text in lower case. After that, system will determine the file name in the linear layout, if the file name contains the entered texts, then system will set the visibility of the layout to visible, else system will set it to invisible.

Show Folder & Pdf
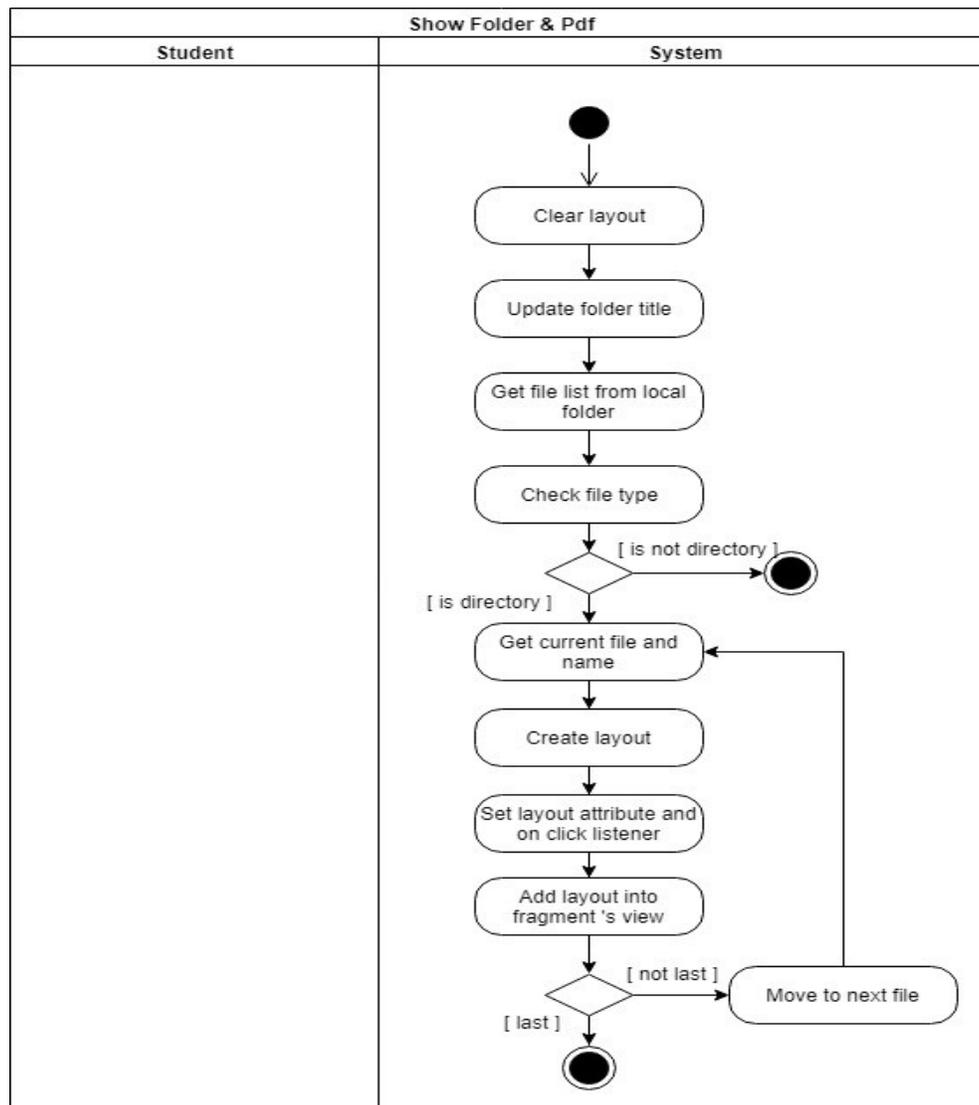
Figure 3.2-9 Show Folder & Pdf

Figure 3-2-9 shows the function of displaying local file. This function will be triggered when file manager page viewed. At the beginning, system will initialize the page. After that, system will retrieve the file list in local storage. The file in the list would be determine by system, if the file is a directory, the file name will be stored temporary for layout setup later. The layout will be attached with an event listener. The function of the listener is updating the page and displaying child files that inside the selected directory. And also, those layout in the updated page have each own function that is direct user to PDF viewer page. Lastly, the created layout will be added to the page after the setup.

Open Pdf
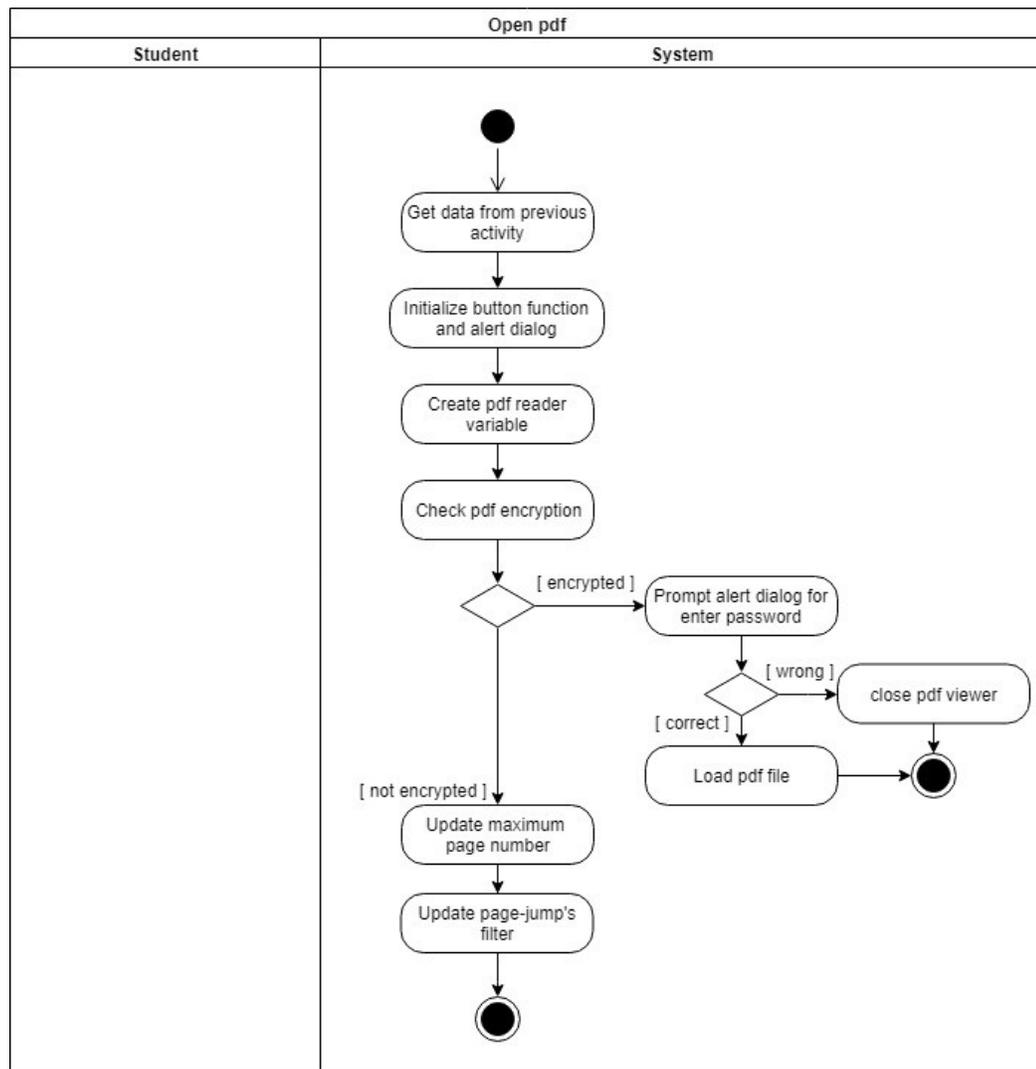
Figure 3.2-10 Open Pdf

Figure 3-2-10 shows the function of displaying the content of PDF file. When the PDF viewer page is started, this function will be called to load the PDF file content. Firstly, system will get data from previous page. Next, initialization has been done for the buttons' function inside the page. After that, a reader was created, it is used for determine the encryption of PDF file. If the system catches an error, it means the file was encrypted. An alert dialog was prompt to user to ask the password for opening the file. If no error was caught, system will straight to open the PDF file and update the UI with the number of maximum pages of the file.

Page Jump
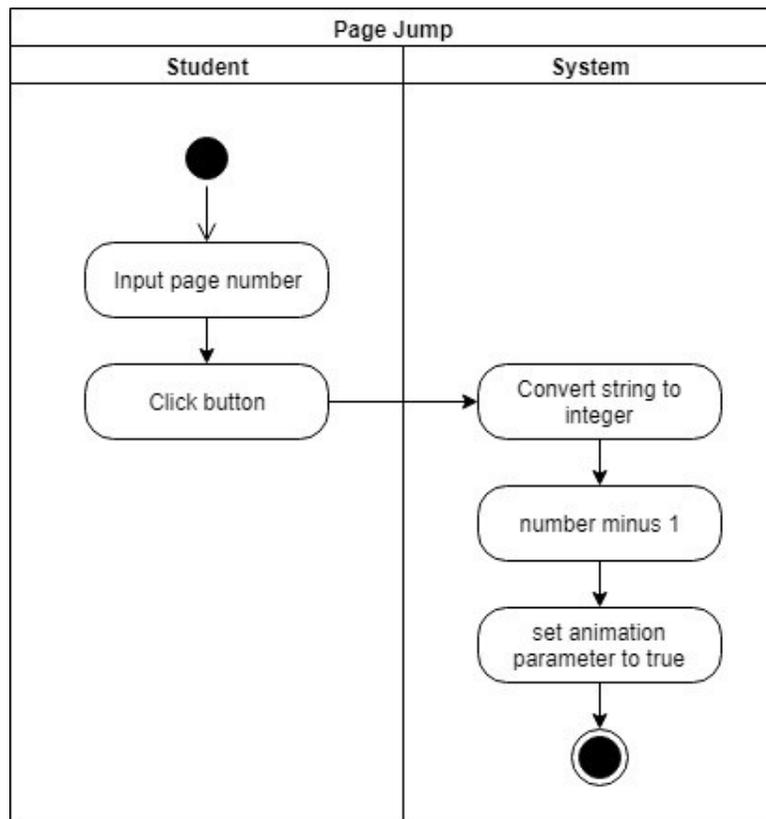
Figure 3.2-11 Page Jump

Figure 3-2-11 shows the page jump function in PDF viewer page. This function will be triggered by clicking the jump button. Whenever the user triggers this function, the PDF viewer will convert the number in string format to integer format. After that, the integer number will deduct by 1 due to convert into index. Lastly, set the animation parameter to true in order to activate the animation of direct the current page to desired page with smooth scroll animation. The validation is not required in this section due to the filter in the text box already restrict user to input number only.

Encrypt PDF
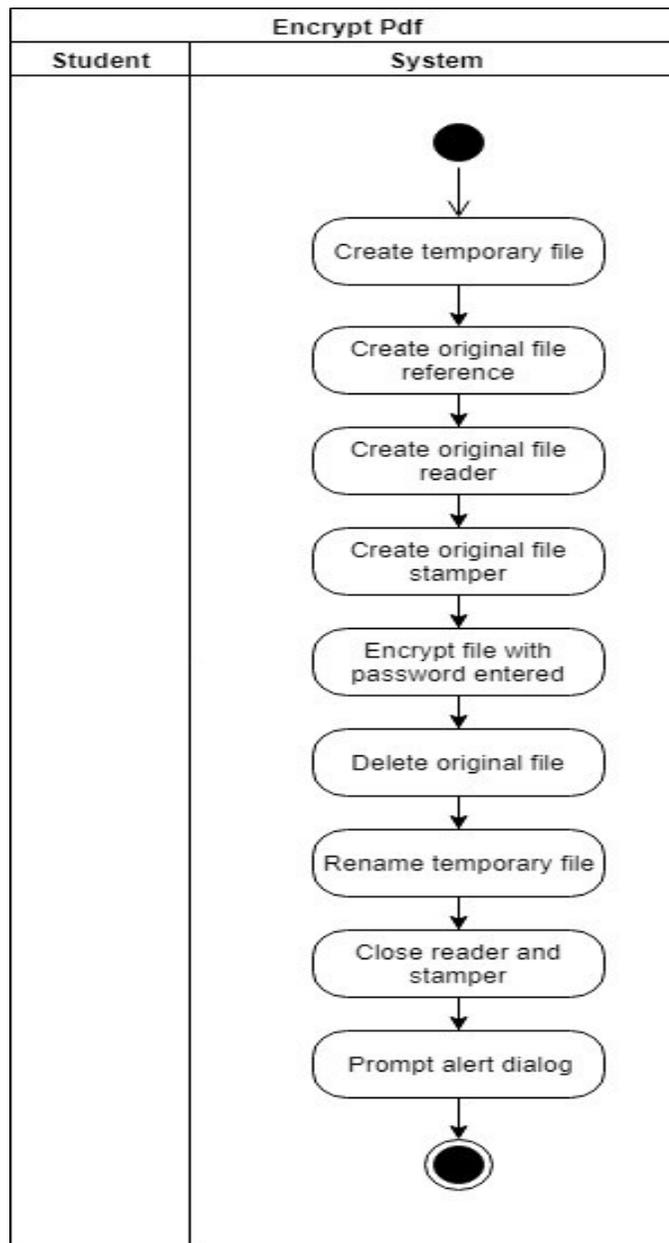
Figure 3.2-12 Encrypt PDF

Figure 3-2-12 shows the encryption function of PDF viewer. When the function begin, system will create a temporary file as destination file for exporting. After that, system also need to create some necessary object such as PDF reader, stamper, and original file reference. The purpose of reader is extracting the file content, moreover, the stamper is created to clone the original file and encrypt during cloning. Once the clone finish, original file will be deleted and the temporary file will be renamed to original file name.

Decrypt PDF
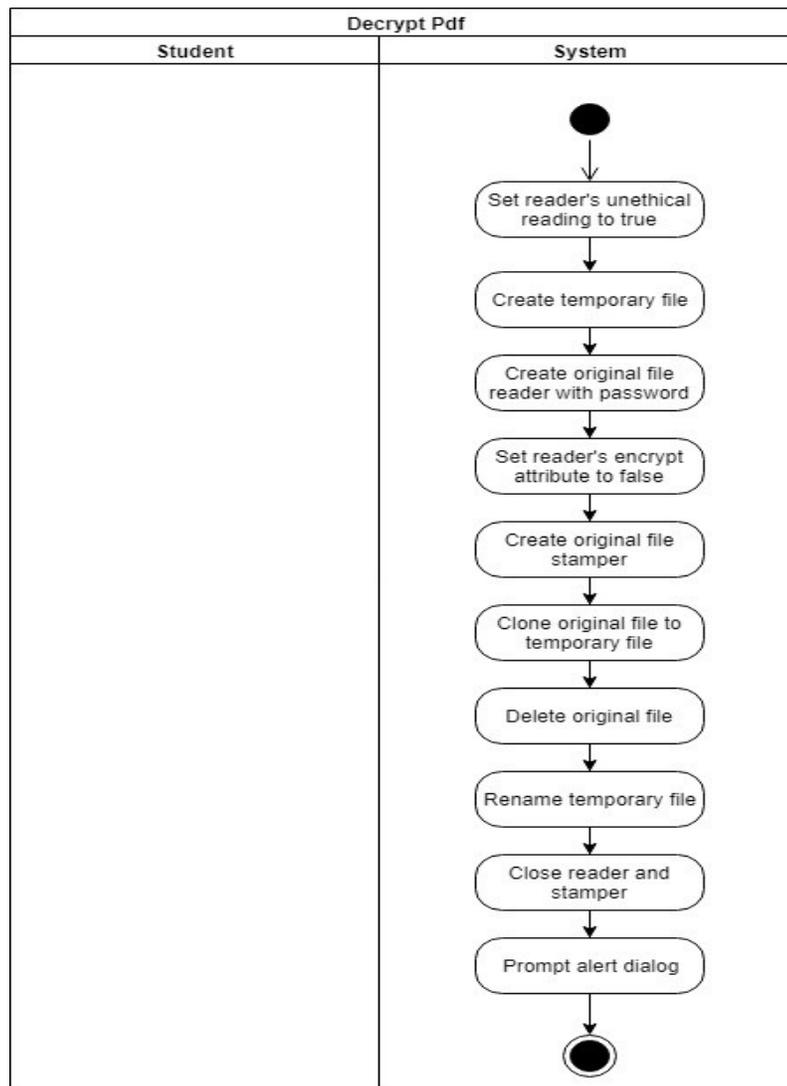
Figure 3.2-13 Decrypt PDF

Figure 3-2-13 shows the decryption function of PDF viewer. First of all, an attribute of a PDF reader class named unethicalreading need to be set to true first in order to perform encrypted file cloning. This function setup was similar to encrypt function. Temporary file, original file reference, reader and stamper need to create first. The only difference is one line of code need to be added for access super class of PDF reader, and set another attribute called encrypted to false. Hence, the cloning for encrypted file was available after those setups. Lastly, delete original file which is encrypted and rename the temporary file name that is decrypted of original file to original file name.

Open PDF Edit Mode
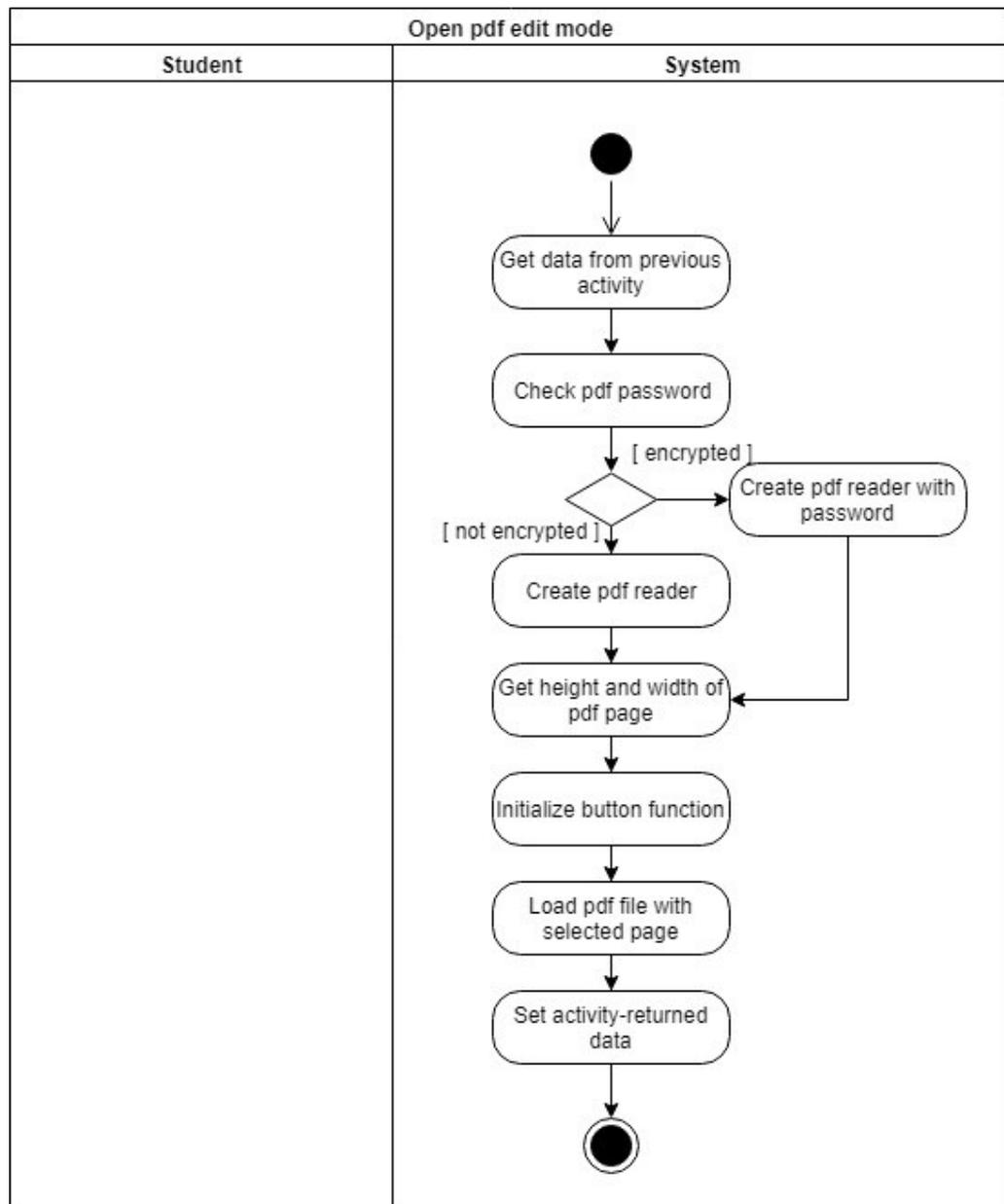
Figure 3.2-14 Open PDF Edit Mode

Figure 3-2-14 shows the edit function of PDF viewer. This function will be triggered when user enter the edit mode page. First of all, system will get the passing data from PDF viewer page. After that, determine the encryption of the file, if the file is encrypted, create a PDF reader with retrieved data. Next, get the height and width of the page for cropping purpose and initialize buttons' function in the page. Lastly, PDF viewer load the same file but only shows the page that selected from previous page.

Add Note
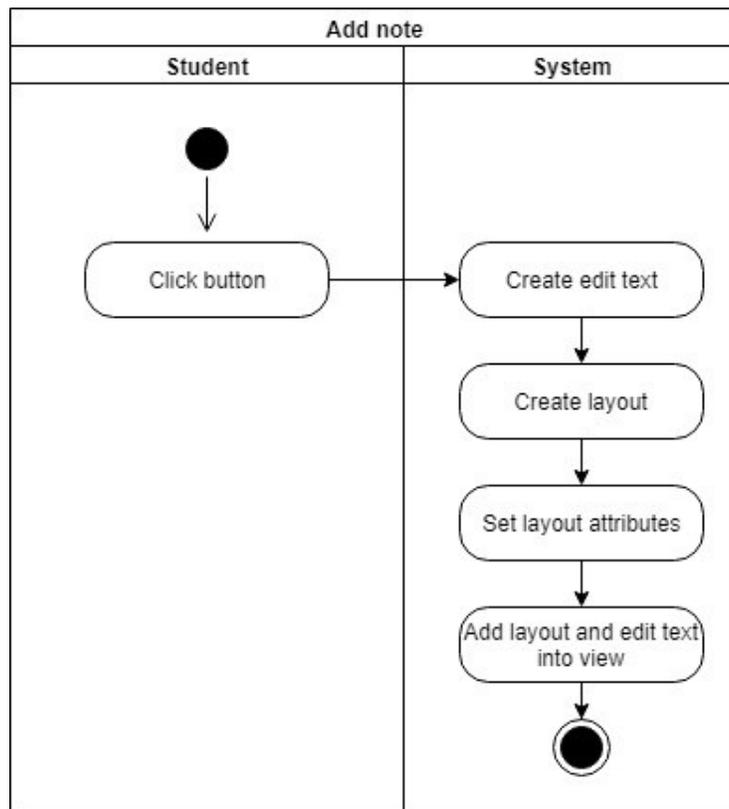
Figure 3.2-15 Add Note

Figure 3-2-15 shows add note function in PDF Edit Mode page. This function allows user to add some text on the page. When function is triggered, a text field is created and added to the page. User may drag the text field to desired place and enter some texts at the text field.

Save PDF
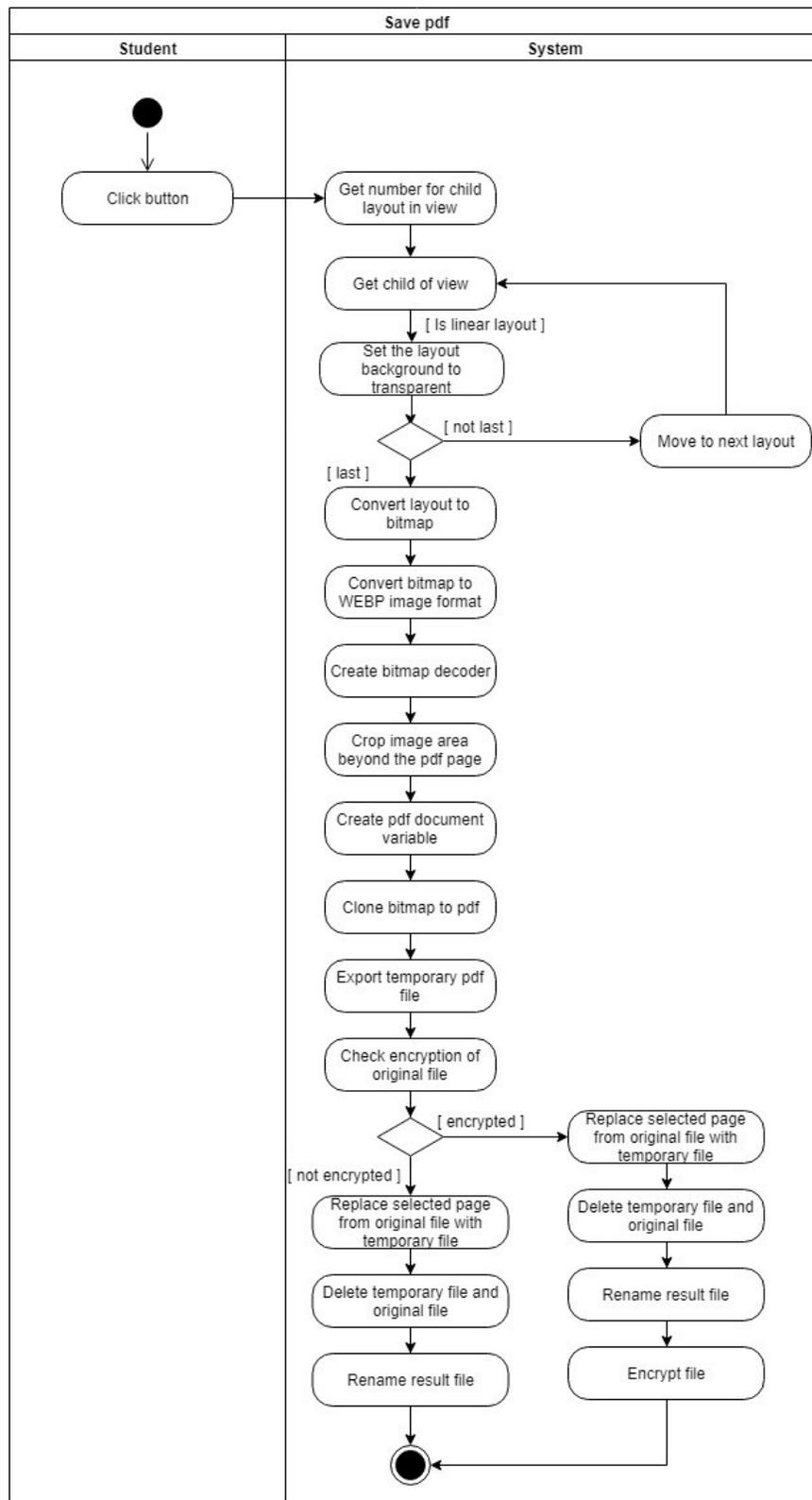
Figure 3.2-16 Save PDF

Figure 3-2-16 shows the Save PDF function in PDF Edit Mode page. When the user wants to commit the notes on the PDF page, it will trigger this function by clicking the save button. First of all, system need to get the total number of edit text in the page in order to perform looping. Next, loop will be started for each edit text. System will set the edit text's parent layout to transparent, and background color of edit text to transparent. The loop will end when all edit texts' background was set to transparent. After that, system will capture result through convert the PDF viewer layout to bitmap. Next, system will convert the bitmap to image file. Bitmap decoder was created to handle the cropping process of bitmap. The bitmap will be cropped according to the width and height that retrieved at the initialization process of this page. Then, create a PDFDocument variable that used to handle the exporting of image. Cloning process of image will be started afterward. After that, convert PDFDocument to actual PDF file through creating a temporary PDF as result file and cloning. System will determine the encryption of PDF file. If no encryption was found from the original file, system will straight forward to replace the selected page from original file with result file that contains edited page only. Once the replace process finished, system will delete all the raw file and rename the result file to original file. If encryption was found from the original file, encryption will be executed at the last step.

Delete Folder & PDF
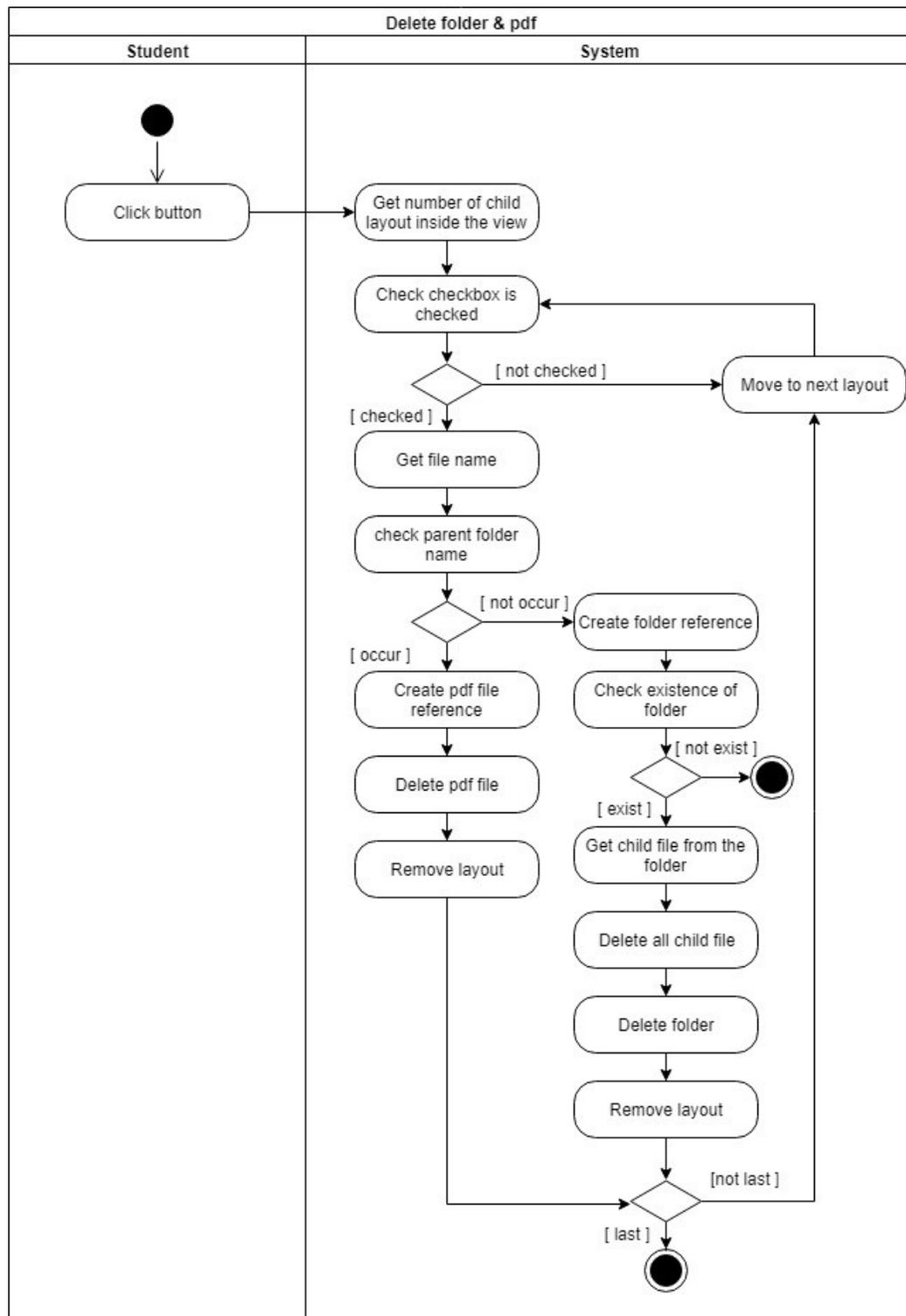
Figure 3.2-17 Delete Folder & PDF

Figure 3-2-17 shows the delete function in File Manager page. First of all, system will get the total number of layouts inside the page layout after user clicked the delete button. System will determine the check box of each layout, if the check box was checked, delete function will be started. System will get the file name from the checked layout. After that, system will determine the visibility of parent folder name due to the name will shown when parent folder is existing for the current folder. If the parent folder name is displaying, it means current folder is a subject folder which contains all lecture slides of the subject. Next, system will create file references for each of the selected file for deleting. UI will be updated for each delete performed. In the other hands, if the parent folder name is not showing, it means current folder is a general folder that contains all the subject folders. A verification was executed to avoid unexpected exception. If the folder is existing, system will get the list of child file from the folder. Looping will be started for each child file, in order to delete the selected folder, system has to delete all the child files to make sure the folder contains no item, else deletion will be performed but with no any action.

CHAPTER 4 SYSTEM STRUCTURE

4.1 Methodology
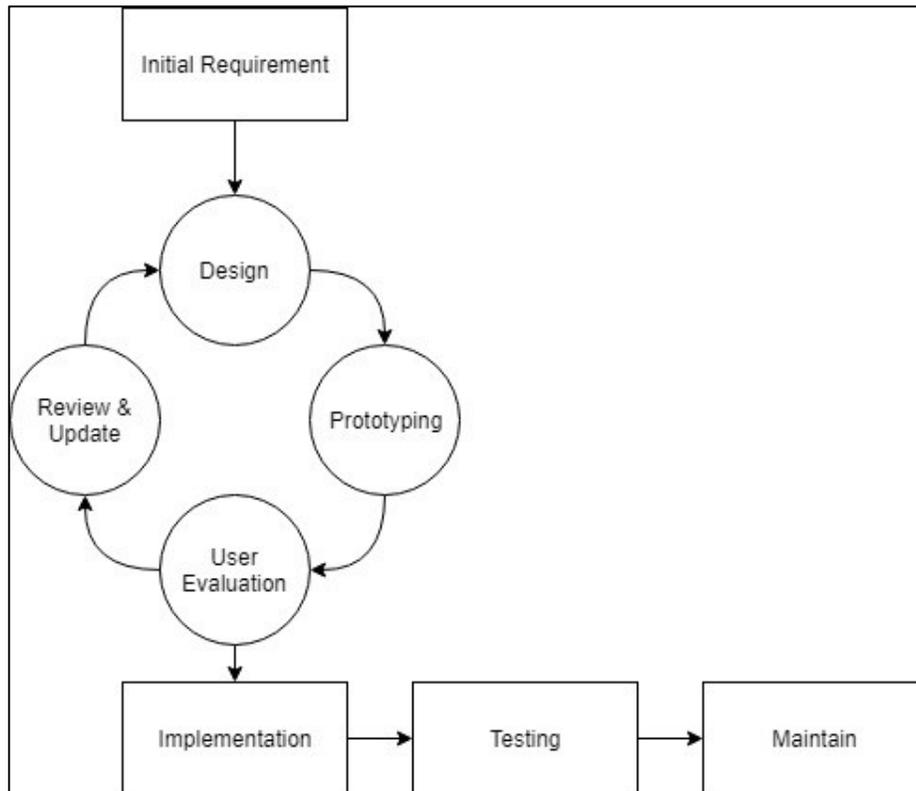
Figure 4.1-1 Prototype Development Methodology

The methodology used during the development is prototype development methodology. The initial requirement was derived from system benchmarking and developer's idea. After that, a rough design regarding functionality and user interface layout was created based on the initial requirement. At prototyping phase, developer codes the function based on a static situation with basic codes, to make sure the function is achievable. After that, system will be evaluated by other people. Review the user feedback based for the function and update the function as user wants. Design phase come again when developer has better way to perform the function that user wants. Hence the function is committed, the codes of the function will be turned into dynamic codes. Function testing will be performed in testing phase to make sure the function executes well in dynamic situation. At the last phase, code structure will get enhance since if available, for code's maintainability and performance.

4.2 Tools

Software

1. Android Studio

Android Studio is an application that allows user develop with easier way such as drag and drop. Moreover, it also allows to simulate multiple types of android devices with the difference of android version. Furthermore, there are majority of android application developers are using Android Studio as their development kit, therefore there are lot of solutions that can found from internet.

Hardware

1. Laptop

Model: Aspire E5-573G

Operating System: Windows 10 64-bit

Processor: Intel® Core™ i5-5200U CPU @ 2.20 GHz

RAM: 12.00 GB

Database

1. Firebase – Cloud Firestore

A new feature of cloud database with non-SQL. This database supports multiple platform such as mobile, web and server.

Emulator

1. Nexus 5X

API level: 24

Resolution: 1080 x 1920: 420 dpi

Target Android: 7.0

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4.3 User Requirement on Function

1. A button for download all files

- A function that allows user download all files in one button, in order to save the time for user who uses this application first time.

2. Merge PDF

- A function that allows user to merge two PDF files into one. User request this function for merging two files that separated from a chapter.

3. PDF file preview

- A function that shows the first page of PDF files into the lecture slides list. User wants this function to avoid searching the content via access each file.

4. Sound effect of button click

- A function that feedback user the event was triggered. To prevent user click the button multiple times due to user thought application is lagging.

5. Favourite subject

- A function that supports user to access the current subject taking easily.

4.4 Database Structure

Due to Cloud Firestore is not a SQL based database. It supports array and object data storing. The following shows the current database structure:

Main Collection:

1. category

- Store types of category for subjects.

- Document in this collection does not store further data and it's id is the wanted data.

2. files

- Store all the lecture slides in this collection.

- Document stored the subject id, file's URL and file name.

3. forum

- Store all the forum history.

- Document stored the time stamp, message and user of each comment and it's id is the subject id.

4. history

- Store the user's file access history.

- Document stored the file, last reading page, and the time stamp.

- The document id is created according to the user email.

5. subject

- Store all the subjects.

- Document stored the subject name, id and it's category.

4.5 Implementation

Task during this phase is committing the functions from prototyping. For instance, codes for prototyping may not be able to use at reality, therefore the code structure needed to be changed to suit the dynamic use case. Furthermore, the new code should be added with verification method in order to prevent exception trigger. After that, the system needs to implement at android phone for testing.

4.6 Testing

The only testing method used in this development is black box testing.

There are two black box testing used:

1. System Testing

- Performed when all modules function properly. Developer trigger functions across modules and pages, in order to make sure the data passing correctly among them and UI updated based on data from other pages changed.

2. Unit Testing

- This testing performed when a function was developed completely. After that, a series of function those under a module was triggered by developer randomly in order to trigger unexpected exception.

CHAPTER 5 CONSLUSION

5.1 Conclusion

The outcome of this project is developed an Electronic Document Management System especially for UTAR students. This system provides convenience to students to access and store the documents easily. Moreover, electronic documents are more durability than physical papers.

Furthermore, some technical issues are faced during the system development. Those issues are ability of modification on PDF file, encryption on PDF file, and method and data structure of storing user data or history. First, due to PDF file is not editable, therefore in order to provide modification on PDF file, developer must need to extract the texts and formats from the files first. Then, develop has to develop his/her own PDF viewer in order to display the compiled texts and formats that matches the design layout of original file. After that, the PDF viewer must track the index texts which is highlighted by users in order to update the modification. Second, encryption on PDF, although the method of encryption is easy to achieve, but it will lead to lot of error due to file access without password. The outcome of access file without password is fail to load the file content and the PDF viewer display nothing. Therefore, encryption checking is always performed for each file. Moreover, system has to ask for password and keep it temporary whenever encryption was found. Furthermore, encryption also influences the PDF file saving function on encrypted file badly due to the original file has an encryption and resulting in restriction of file access on it. The reason of access original file is process of cloning the original file and replacing with a saved page is necessary. Third, even though Firebase supports nested data, but it's excepted to nested array. In Cloud Firestore, nested array can be stored through manually enter the nested data in array, but it can not be performed programmatically. Even more, the data structure of Cloud Firestore is collections and document based which is much more different than SQL.

However, the encountered problems are found during the development, but these problems had been solved at the end of development. For the first encountered problem, the solution to overcome is restrict the user can add some texts and overlay it on the page only. After that, when the user wan to commit the changes, system will save the current layout of the PDF viewer and convert it to a bitmap which is a image

format of a program. Next, the next conversion is transforming the bitmap to image format which is WEBP used for web application image, the reason of using this format instead of PNG is WEBP provides better resolution at lower storage consumption. Then, system will create a temporary PDF file as result file to export the image as PDF file. Last, replacing the selected page from original file by cloning a new PDF file and the selected page has been replaced during the cloning. Second, solution to overcome the file loading for encryption is prompt an alert dialog to user for asking file password when the encryption is found on the file. After that, the password will be stored temporarily for file saving during PDF file edit mode. Moreover, the encryption does not be cloned from the original file during the process. Third, the solution to overcome the data structure for storing user history in Cloud Firestore is using Map (a key-value pair) data type. According to the nested array is not supported by Cloud Firestore, therefore the alternative way to store the user history is using nested Map. The key of stored data is the lecture slides. Due to Cloud Firestore handle the key uniqueness, it will remain or replace when Cloud Firestore found that the value of the key changed or not.

In the result of this development, this system achieved all the objectives stated at introduction. This system does provide an alternative way for student to read their study materials easily, because students are not always bringing the study material anywhere. Then, students may read their documents in electronic way via this application. Next, according to the documents are stored in cloud database. It allows students to back up their lecture slides at cloud database too which is a more durable than storing physical papers. Third, this system provides the ability of modify the PDF file. Students may note taking during the class via the application.

5.2 Future Work

This system has lot of potential features can be developed in future. For instance, interactive tutorial can be made and implemented in this system. Students may have some tutorials or exercises after the end of lecture. The interactive method can be MCQ format or drag and drop format. In the other hand, lecturer may become the potential user of this system for updating the latest PDF file once the typo found from the slides or the teaching materials is outdated. Moreover, lecturer may post some notifications such as midterm test timetable. Last but not least, the method of modify the PDF file can be enhanced. The current saving method contains minor problems that is resolution will get worse for each time of saving.

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APPENDIX A

PICTURE OF

SYSTEM USER INTERFACE

Home Page
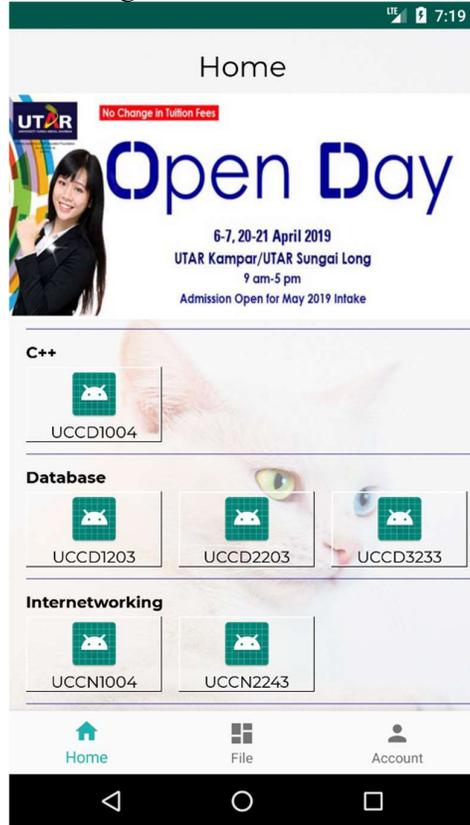
File Manager Page – Subject Folder

File Manager Page – Slide Folder

User History Page
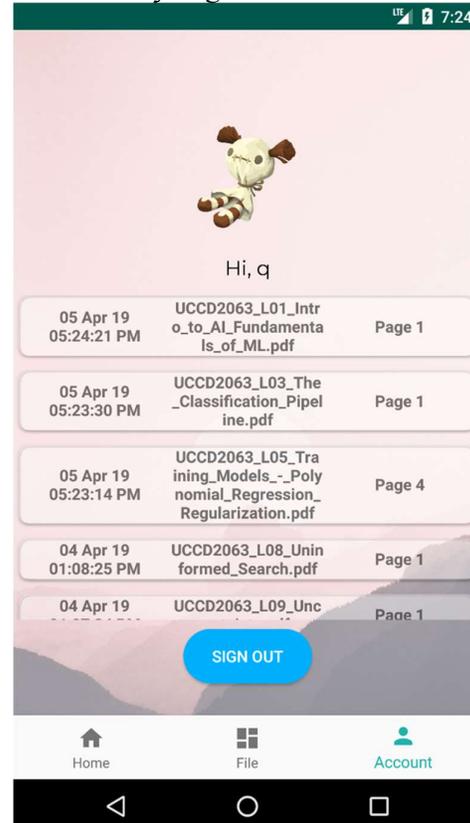
Lecture Slides Page and Subject Forum

PDF View Page

PDF Edit Mode

PDF Saved Result

Login Page

Email

Password

LOGIN

Create account

Register Page

Name

Email

Password

Confirm Password

REGISTER

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APPENDIX B

PICTURE OF

CLOUD FIRESTORE

Cloud Firestore Structure

interactiveutarwbleportal	history	q@q.com
+ Add collection	+ Add document	+ Add collection
category	q@q.com ›	+ Add field
files		▼ UCCD2063_L01_Intro_to_AI_Fundamentals_of_ML.pdf
forum		page: "1"
history ›		timeStamp: "1554456261489"
subject		▼ UCCD2063_L02_The_Regression_Pipeline.pdf
		page: "7"
		timeStamp: "1554302125982"
		▼ UCCD2063_L03_The_Classification_Pipeline.pdf
		page: "1"
		timeStamp: "1554456210876"

FINAL YEAR PROJECT WEEKLY REPORT
(Project I / Project II)

Trimester, Year: Sem 3, Year 4	**Study week no.: 1**
Student Name & ID: Lee Chuan How 1402933	
Supervisor: Mr. Soong Hoong Cheng	
Project Title: INTERACTIVE UTAR WBLE PORTAL	

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

2. WORK TO BE DONE

Able to link Firebase with Android emulator

3. PROBLEMS ENCOUNTERED

4. SELF EVALUATION OF THE PROGRESS

Understand and go through the online course regarding Firebase rules

_____   _____
Supervisor's signature   Student's signature

FINAL YEAR PROJECT WEEKLY REPORT
(Project I / Project II)

Trimester, Year: Sem 3, Year 4	**Study week no.: 2**
Student Name & ID: Lee Chuan How 1402933	
Supervisor: Mr. Soong Hoong Cheng	
Project Title: INTERACTIVE UTAR WBLE PORTAL	

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

Able to link Firebase with project

2. WORK TO BE DONE

Able to login through the project application

3. PROBLEMS ENCOUNTERED

4. SELF EVALUATION OF THE PROGRESS

Select proper method for account authorization

_____   _____
Supervisor's signature   Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project I / Project II)

Trimester, Year: Sem 3, Year 4	**Study week no.: 3**
Student Name & ID: Lee Chuan How 1402933	
Supervisor: Mr. Soong Hoong Cheng	
Project Title: INTERACTIVE UTAR WBLE PORTAL	

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

Able to login through the application

2. WORK TO BE DONE

Able to retrieve basic dummy data from Firebase
Design proper data structure

3. PROBLEMS ENCOUNTERED

4. SELF EVALUATION OF THE PROGRESS

Can finish on time

_____   _____

Supervisor's signature   Student's signature

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FINAL YEAR PROJECT WEEKLY REPORT

(Project I / Project II)

Trimester, Year: Sem 3, Year 4	**Study week no.: 4**
Student Name & ID: Lee Chuan How 1402933	
Supervisor: Mr. Soong Hoong Cheng	
Project Title: INTERACTIVE UTAR WBLE PORTAL	

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

Designed proper data structure
Able to retrieved dummy data

2. WORK TO BE DONE

Create a home page with subjects

3. PROBLEMS ENCOUNTERED

4. SELF EVALUATION OF THE PROGRESS

Able to finish on time

_____   _____
Supervisor's signature   Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project I / Project II)

Trimester, Year: Sem 3, Year 4	**Study week no.: 5**
Student Name & ID: Lee Chuan How 1402933	
Supervisor: Mr. Soong Hoong Cheng	
Project Title: INTERACTIVE UTAR WBLE PORTAL	

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

Crete a home page with subjects

2. WORK TO BE DONE

Insert subjects list to Firebase

Create a home page and display the subjects based on subjects retrieved from Firebase

3. PROBLEMS ENCOUNTERED

4. SELF EVALUATION OF THE PROGRESS

Able to finish on time

_____   _____

Supervisor's signature   Student's signature

FINAL YEAR PROJECT WEEKLY REPORT
(Project I / Project II)

Trimester, Year: Sem 3, Year 4	**Study week no.: 6**
Student Name & ID: Lee Chuan How 1402933	
Supervisor: Mr. Soong Hoong Cheng	
Project Title: INTERACTIVE UTAR WBLE PORTAL	

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

Inserted subject list to Firebase

Create a home page that displays subject dynamically

2. WORK TO BE DONE

Able to download file from Firebase

3. PROBLEMS ENCOUNTERED

4. SELF EVALUATION OF THE PROGRESS

Able to finish on time

_____   _____
Supervisor's signature   Student's signature

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FINAL YEAR PROJECT WEEKLY REPORT

(Project I / Project II)

Trimester, Year: Sem 3, Year 4	**Study week no.: 7**
Student Name & ID: Lee Chuan How 1402933	
Supervisor: Mr. Soong Hoong Cheng	
Project Title: INTERACTIVE UTAR WBLE PORTAL	

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

Able to download file from Firebase

2. WORK TO BE DONE

Create a file list page according to selected subject

3. PROBLEMS ENCOUNTERED

4. SELF EVALUATION OF THE PROGRESS

Able to finish on time

_____   _____

Supervisor's signature   Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project I / Project II)

Trimester, Year: Sem 3, Year 4	**Study week no.: 8**
Student Name & ID: Lee Chuan How 1402933	
Supervisor: Mr. Soong Hoong Cheng	
Project Title: INTERACTIVE UTAR WBLE PORTAL	

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

Create a file list page that based on selected subject

2. WORK TO BE DONE

Create a PDF viewer page that views selected PDF file

3. PROBLEMS ENCOUNTERED

4. SELF EVALUATION OF THE PROGRESS

Able to finish on time

_____   _____

Supervisor's signature   Student's signature

FINAL YEAR PROJECT WEEKLY REPORT
(Project I / Project II)

Trimester, Year: Sem 3, Year 4	**Study week no.: 9**
Student Name & ID: Lee Chuan How 1402933	
Supervisor: Mr. Soong Hoong Cheng	
Project Title: INTERACTIVE UTAR WBLE PORTAL	

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

Create a PDF viewer page that views file content

2. WORK TO BE DONE

Create subfunction inside PDF viewer page

Add functions that enable to encrypt and decrypt PDF

3. PROBLEMS ENCOUNTERED

4. SELF EVALUATION OF THE PROGRESS

Can finish on time

_____   _____
Supervisor's signature   Student's signature

FINAL YEAR PROJECT WEEKLY REPORT
(Project I / Project II)

Trimester, Year: Sem 3, Year 4	**Study week no.: 10**
Student Name & ID: Lee Chuan How 1402933	
Supervisor: Mr. Soong Hoong Cheng	
Project Title: INTERACTIVE UTAR WBLE PORTAL	

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

Create subfunction inside PDF viewer page

Add functions that enable to encrypt and decrypt PDF

2. WORK TO BE DONE

Create file manager page

3. PROBLEMS ENCOUNTERED

PDF file viewer error when opening encrypted file without password

4. SELF EVALUATION OF THE PROGRESS

Able to solve the problem on time

_____   _____
Supervisor's signature   Student's signature

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FINAL YEAR PROJECT WEEKLY REPORT
(Project I / Project II)

Trimester, Year: Sem 3, Year 4	**Study week no.: 11**
Student Name & ID: Lee Chuan How 1402933	
Supervisor: Mr. Soong Hoong Cheng	
Project Title: INTERACTIVE UTAR WBLE PORTAL	

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

Create file manager page

2. WORK TO BE DONE

Add subfunction in file manager page

Able to track user file access history

3. PROBLEMS ENCOUNTERED

4. SELF EVALUATION OF THE PROGRESS

Able to finish on time

_____   _____

Supervisor's signature   Student's signature

FINAL YEAR PROJECT WEEKLY REPORT
(Project I / Project II)

Trimester, Year: Sem 3, Year 4	**Study week no.: 12**
Student Name & ID: Lee Chuan How 1402933	
Supervisor: Mr. Soong Hoong Cheng	
Project Title: INTERACTIVE UTAR WBLE PORTAL	

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

Add subfunction in file manager page

Able to track user file access history

2. WORK TO BE DONE

Create forum function

3. PROBLEMS ENCOUNTERED

4. SELF EVALUATION OF THE PROGRESS

Able to finish on time

_____   _____
Supervisor's signature   Student's signature

Poster

INTERACTIVE UTAR WBLE PORTAL

by Lee Chuan How

Introduction

Interactive Utar Wble Portal is an EDMS as Android mobile application and act as an extension application of UTAR WBLE for Utarians. It provides PDF files download and access. The main feature is note taking is available in this application. System will also tracks the file access as user history.

Problem Statement

- Lack of learnability, e.g. complex UI design, complex procedure to register a course and register an account.
- Closed. Required an enrollment key from teacher to join a class.
- Lack of management capability. Unable to categorize downloaded file, all files are stored at default folder.

Objective

- To increate the number of channels used by students to study their subject.
- To develop an Android application that enables students to study their subject and modify the study materials via the application that substitute the way that students take notes on the physical paper.
- To increase the durability of documents via the system used by students to back up their electronic study materials at the end of semester rather than storing the physical paper.

Conclusion

Interactive Utar Wble Portal is an mobile application for Utarians only. It allows Utarians to access and store lecture slides easily and it includes PDF file note taking and supports file access history. Also, PDF file encryption and decryption is available in this application.

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FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY

Full Name(s) of Candidate(s)	LEE CHUAN HOW
ID Number(s)	14ACB02933
Programme / Course	IA
Title of Final Year Project	INTERACTIVE UTAR WBLE PORTAL

Similarity	**Supervisor's Comments** (Compulsory if parameters of originality exceeds the limits approved by UTAR)
Overall similarity index: ___3___ % **Similarity by source** Internet Sources: ___1___ % Publications: ___1___ % Student Papers: ___2___ %	
Number of individual sources listed of more than 3% similarity: _0_	
Parameters of originality required and limits approved by UTAR are as Follows: (i) Overall similarity index is 20% and below, and (ii) Matching of individual sources listed must be less than 3% each, and (iii) Matching texts in continuous block must not exceed 8 words *Note: Parameters (i) – (ii) shall exclude quotes, bibliography and text matches which are less than 8 words.*	

Note Supervisor/Candidate(s) is/are required to provide softcopy of full set of the originality report to Faculty/Institute

Based on the above results, I hereby declare that I am satisfied with the originality of the Final Year Project Report submitted by my student(s) as named above.

_____   _____
 Signature of Supervisor   Signature of Co-Supervisor

 Name: __SOONG HOONG CHENG__   Name: _____

 Date:_____   Date:_____

BIS (Hons) Information Systems Engineering Faculty of Information and Communication Technology (Perak Campus), UTAR

Plagiarism Check Result

Interactive Utar Wble Portal

ORIGINALITY REPORT

3%	1%	1%	2%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

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3	Submitted to Universiti Putra Malaysia Student Paper	<1%
4	Tony Smith. "SharePoint 2013 User's Guide", Springer Nature America, Inc, 2013 Publication	<1%
5	Submitted to The Hong Kong Polytechnic University Student Paper	<1%
6	Submitted to University of Keele Student Paper	<1%
7	Xin Yu, Nan Wang, Heyin Zhang. "Design and Development of PDF Document Protection System Based on DRM Technology", 2009 Second International Symposium on Knowledge Acquisition and Modeling, 2009	<1%

UNIVERSITI TUNKU ABDUL RAHMAN

FACULTY OF INFORMATION & COMMUNICATION TECHNOLOGY (KAMPAR CAMPUS)

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Student Name	LEE CHUAN HOW
Supervisor Name	SOONG HOONG CHENG

TICK (√)	DOCUMENT ITEMS Your report must include all the items below. Put a tick on the left column after you have checked your report with respect to the corresponding item.
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	Title Page
	Signed form of the Declaration of Originality
	Acknowledgement
	Abstract
	Table of Contents
	List of Figures (if applicable)
	List of Tables (if applicable)
	List of Symbols (if applicable)
	List of Abbreviations (if applicable)
	Chapters / Content
	Bibliography (or References)
	All references in bibliography are cited in the thesis, especially in the chapter of literature review
	Appendices (if applicable)
	Poster
	Signed Turnitin Report (Plagiarism Check Result - Form Number: FM-IAD-005)

*Include this form (checklist) in the thesis (Bind together as the last page)

I, the author, have checked and confirmed all the items listed in the table are included in my report. _____ (Signature of Student) Date: 3 APRIL 2019	Supervisor verification. Report with incorrect format can get 5 mark (1 grade) reduction. _____ (Signature of Supervisor) Date: 3 APRIL 2019